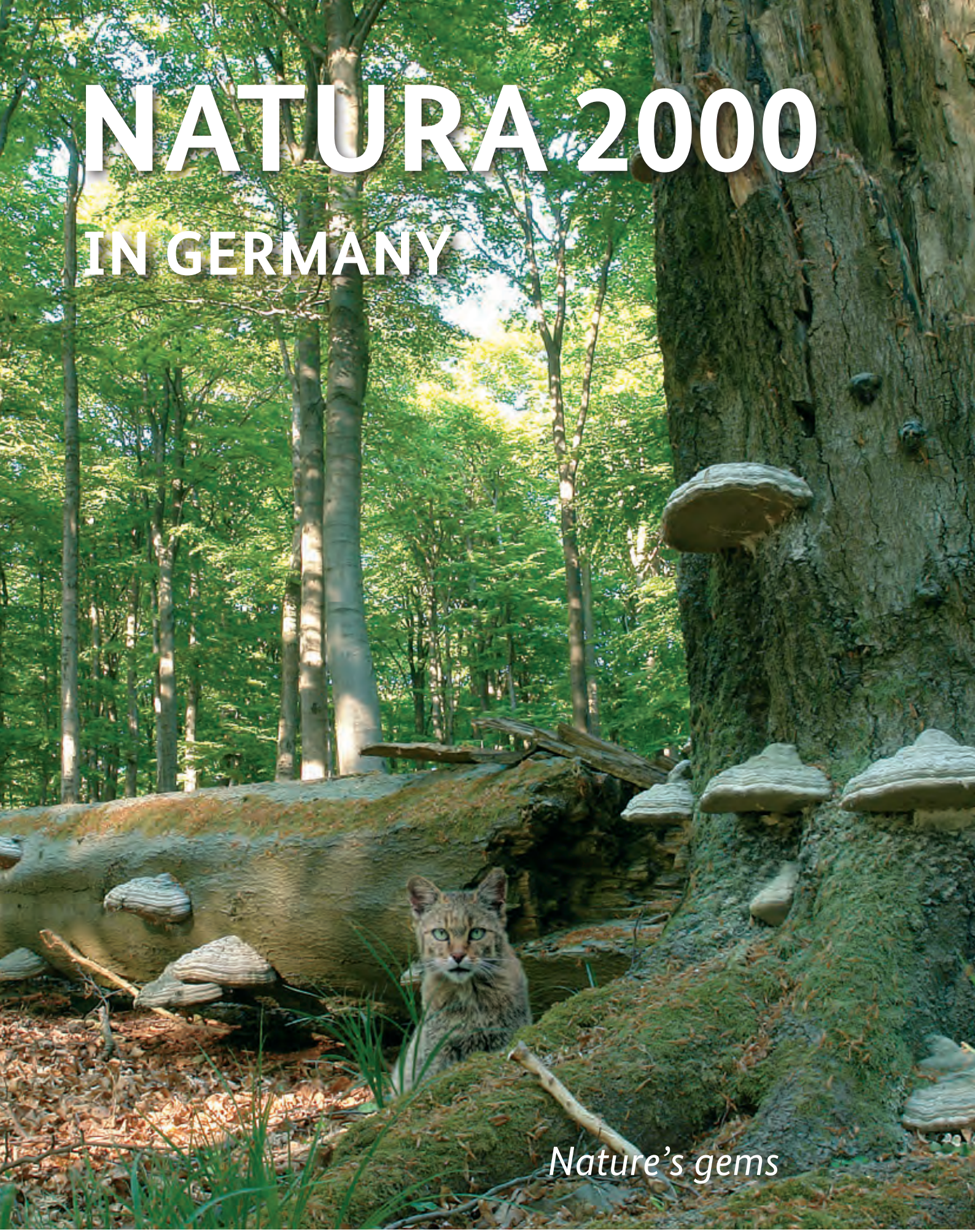
NATURA 2000

IN GERMANY



Nature's gems

NATURA 2000

Federal Ministry
for the Environment, Nature Conservation,
Nuclear Safety and Consumer Protection

BfN Federal Agency for
Nature Conservation

Imprint

Published by
The Federal Republic of Germany, represented by the
The Federal Agency for Nature Conservation
Konstantinstr. 110
53179 Bonn, German
Phone: +49 228 8491-0
E-mail: info@bfn.de
Internet: www.bfn.de

Tax ID number: DE 122268582

This brochure was revised within the scope of the R&D project "Conference on the Status of Natura 2000 and Challenges in its Implementation", Funding Code: 3520 89 1100, with the participation of the German Federal States with numerous expert contributions; supported by the Federal Agency for Nature Conservation with funds from the German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection.

Editors
Axel Ssymank, Christina Müller, Stefan Lehrke, Federal Agency for Nature Conservation, Division II 2.2 "Habitats Directive and Natura 2000";

adelphi research gemeinnützige GmbH

Additional contributors to the first edition were:
- Christa Ratte, Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection, Ref. NI2 "Site Protection"
- Martin Dieterich, Christina Drebitz, ILN Singen
- Burkhard Beinlich, Benjamin Hill, Bioplan Höxter/Marburg
- Frank Grawe, Landscape Station in the District of Höxter

With additional notes from Thomas Isselbächer.

Glossary for the first edition: Friederike Beulshausen, Sandra Balzer

Picture editors
adelphi research gemeinnützige GmbH;

Federal Agency for Nature Conservation

List of authors
Federal Agency for Nature Conservation
- Balzer, Sandra, Dr., Chapter 17
- Bernotat, Dirk, Chapter 12, box p. 61
- Frederking, Wenke, Chapter 5
- Ellwanger, Götz, Chapter 16
- Engels, Barbara, Chapter 18
- Ersfeld, Marion, Chapter 1, S. 6, Chapter 7, S. 41, S. 95
- Hauswirth, Mirko, box p. 57
- Krause, Jochen, Dr., Chapter 11, boxes p. 57, 58
- Lehrke, Stefan, Chapter 5, 10, boxes p. 33, 45
- Müller, Christina, Chapter 5, box p. 33
- Ssymank, Axel, Dr., Chapter 1, 2, 3, 4, 6, 13, 14, boxes p. 9, 35, 36
- Vischer-Leopold, Mareike, Chapter 6, boxes p. 35, 36

Brandenburg State Office for the Environment
- Köhler, Ralf, Dr., Chapter 10
- Schoknecht, Thomas, Dr., box p. 70

Saar Nature Foundation
- Didion, Axel, Dr., box p. 66
- Gerstner, Joachim (retired), box p. 66

Other organisations
- Altmoos, Michael, Dr. (Saarland Ministry for the Environment and Consumer Protection), box p. 13
- Baier, Hermann (Mecklenburg-Western Pomerania State Agency for Environment, Nature and Geology) (retired), boxes p. 22, 24
- Beinlich, Burkhard, Dr. (Bioplan Marburg-Höxter), Chapter 4, 8, 9, 15, boxes p. 27, 47, 67
- Brümmer, Franz, Prof. Dr.(Board of Trustees of the "Sports and Nature" Association), box p. 82
- Delgado Rosa, Humberto, Dr. (Director for Biodiversity at the European Commission's Directorate General for the Environment), box p. 11
- Dieterich, Martin, Prof. Dr. (ILN Südwest), Chapter 14, 15, boxes p. 51, S. 67
- Fetz, Rainer, Dr. (Bavaria State Office for the Environment (LfU)), box p. 83
- Fricke, Ronald, Dr. (Museum of Natural History Stuttgart), box p. 54
- Geier, Michael (Bavarian Administration Rhön UNESCO Biosphere Reserve), Chapter 9
- Halfmann, Jochen, Dr. (Umweltvorhaben in Brandenburg Consult GmbH), box p. 81
- Hemmerling, Walter, Dr. (Foundation Nature Conservation Schleswig-Holstein), box p. 78
- Hill, Benjamin, Dr. (Planungsgesellschaft Natur & Umwelt (PGNU)), Chapter 8, 9, 18, boxes p. 39, 53, 67
- Janke, Klaus, Dr. (Hamburg Ministry for Environment and Energy, Unit for Nature Conservation), Chapter 7
- Kleinwächter, Meike, Dr. (German Federation for the Environment and Nature Conservation Centre for floodplains, Burg Lenzen), box p. 55
- Klocke, Elisabeth, Dr. (Elbe Habitat Foundation), box p. 23
- Klugkist, Henrich (Senator for the Environment, Construction, Transport and Europe, Natura 2000 Department, Bremen), box p. 69
- Knapp, Hans Dieter, Prof. Dr. (Succow Foundation), box p. 43
- König, Sebastian (Natura 2000 Stations Competence Centre, Thuringia), box p. 71
- Krettinger, Beate (Landcare Germany (DVL)), box p. 51
- Mirbach, Erika (Rhineland-Palatinate State Office for the Environment), box p. 13
- Pusch, Jürgen, Dr. (Nature Park Kyffhäuser Administratio), box p. 26
- Raffel, Martina, Dr. (Münster District Government), box p. 77
- Scheffler, Matthias (Westerzgebirge Landcare Association), boxes p. 79, S. 83
- Sudfeldt, Christoph, Dr. (Federation of German Avifaunists), boxes p. 39, 64
- Verbücheln, Georg, Dr. (North Rhine-Westphalia State Office for Nature, Environment and Consumer Protection) (retired), box p. 70
- Wagner, Martina (Senate Department for t he Environment, Urban Mobility, Consumer Protection and Climate Action) (retired), box p. 81
- Wilhelm, Pia (Head of Wilhelmsdorf Nature Conservation Centre), box p. 73
- Wollny-Goerke, Katrin (Meeresmedien), Chapter 11

Design
undstoffers Designbüro, Schöneberger Ufer 71, 10785 Berlin

Image credits
Cover photo: Wildcat in the beech forest (Photos: A. Hoffmann, Th. Stephan)
Collage: cognitio
Back cover: Deadwood (Photo: S. Lehrke)

This publication will be included in the literature database "DNL-online" (www.dnl-online.de).

DOI 10.19217/brs216
Bonn/Berlin, March 2022, 3rd updated and expanded edition

Note: Unchanged English version of the German edition

Foreword

Photo: F. Grombali

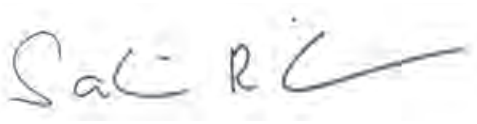
Nature is crucial to our survival; it forms the basis of both our homeland and our cultural landscapes. Preserving our natural heritage for future generations, and thereby maintaining our quality of life in the long term, is one of the greatest challenges of our time. After failing to meet its original target of halting the loss of biodiversity by 2010, the EU Commission has proposed ambitious measures for reversing the trend over the next ten years in its Biodiversity Strategy 2030.

The Natura 2000 ecological network plays a highly critical role in this context. Its rare and valuable conservation areas designated on the basis of the Habitats Directive 1992 and the Birds Directive 1979 are true gems of Europe-wide conservation. These conservation areas harbour habitats such as colourful, species-rich hay meadows, unspoiled mountain spruce forests in the highlands of the low mountain ranges and the Wadden Sea, as well as species such as the wildcat or the lady's slipper, which is Germany's largest native orchid. Germany enjoys a rich natural endowment and diverse cultural landscapes that are worthy of protection. That is why 15.5 % of our national territory and 45 % of our marine areas are designated as Natura 2000 sites. We are located in the heart of Europe and, therefore, bear a huge responsibility for the preservation of Europe's natural heritage.

Our task now is to fill the Natura 2000 ecological network with life on a permanent basis. Rare and endangered habitats such as active raised bogs or orchid-rich semi-dry grasslands need to be improved, and to be restored where necessary. Utlisation must be in harmony with the conservation objectives, and parts of the areas should be reserved to allow self-dynamic development. We also need concepts for making conservation areas as resilient as possible to the changes brought about by climate change. Rising temperatures and extreme events, such as drought, can also lead to changes in the species composition in conservation areas.

The implementation of Natura 2000 is not just an end in itself, but protects ecosystem services such as the provision of clean water and fertile soils or carbon storage, and is also an important task for regional economic reasons. It offers opportunities for the development of rural areas and thus for securing jobs, particularly in structurally weak areas. For example, involvement in nature conservation can generate additional income or serve as a beacon for agri-tourism and direct marketing—another reason why Natura 2000 needs strong, broad support in the long term!

This brochure presents the general objectives and concepts of Natura 2000 and concrete individual aspects of its implementation. It is aimed at interested parties and decision-makers in government and business as well as professional groups such as farmers and foresters, without whose support the implementation of Natura 2000 cannot succeed. Nature conservation requires cooperation. If we join forces to protect our natural resources, and at the same time, recognise the value of the Natura 2000 ecological network as both a German and European natural heritage, we are making a valuable investment in our future and in the generations to come!



Sabine Riewenherm
President of the Federal Agency for Nature Conservation

Protected habitat type siliceous screes (Habitat Type 8150) in the Haberstein nature reserve as part of the "Schneebergmassiv mit Fichtelseemoor" Natura 2000 site in the Fichtel Mountains in Bavaria. Photo: F. Grawe

Contents

Old acidophilous oak woods (Habitat Type 9190) Photo: A. Ssymank

The Eselsburger valley near the City of Heidenheim (Federal State of Baden-Württemberg) is part of the "Giengener Alb and Eselsburger Tal" Natura 2000 site. Over the centuries, sheep grazing has produced characteristic pastures denuded of shrubs which resemble pastoral areas in the Mediterranean region. Photo: B. Beinlich

1 Introduction

Towards a common future

Coordinated efforts in the European Union (EU) have produced a common legal framework for nature conservation based on the Birds Directive and the Habitats Directive. The Natura 2000 network, complemented by specific provisions for the protection of endangered species of animals and plants, forms the cornerstone for the implementation of the EU Nature Directives. By committing 15.5 % of its terrestrial area and 45 % of its marine territories, Germany has made a significant contribution to the Natura 2000 network. The network forms an essential cornerstone of the National Strategy on Biological Diversity as well as the achievenment of the nature conservation goals of the EU Biodiversity Strategy for 2030.

Germany's nature conservation in the heart of Europe

Germany is located in the heart of Europe. Within the Natura 2000 network, it has the primary responsibility for the continued preservation of central European ecosystems such as beech forests and the Wadden Sea, which is absolutely unique on a global scale. Both beech forests and the Wadden Sea encompass several habitat types which are protected within the Natura 2000 network. 14 biogeographical regions, of which nine are terrestrial and five are marine, comprise the reference and evaluation areas for the implementation of the EU conservation efforts. As Germany is centrally located, the German territory comprises a significant portion of the Continental and Atlantic regions. A narrow stretch of the Alpine region is also located in Germany. The contributions of EU member states to the Natura 2000 network correspond to the natural areas they encompass. For example, Mediterranean countries such as Spain contribute cork-oak forests, Nordic countries contribute boreal forest habitats, and the Baltic States contribute large, intact bogs and fens. One advantage of this is the preservation of the beauty and diversity of many holiday areas that are popular with German tourists within the Natura 2000 network (for example on the Canary Islands or Madeira).

Table 1: Total area of Special Areas of Conservation and Special Protection Areas in Germany

The figures for the Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) come from the Natura 2000 database, which is compiled by the Federal Agency for Nature Conservation based on the official reporting data of the Federal States.

	SCIs/SACs	SPAs	Natura 2000-sites
Total number of sites	4,544	742	5,200
Combined total area (ha)	5,451,497	6,000,328	8,083,547
Total area terrestrial sites (ha)	3,327,708	4,028,503	5,551,600
Total area marine sites* (ha)	2,123,789	1,971,825	2,531,947
Proportion of German territory	9.3 %	11.3 %	15.5 %
Proportion of German territorial waters*	approx. 37 %	approx. 35 %	approx. 45 %

* including the EEZ (Economic Exclusive Zone)

A total of 4,544 SACs and 742 SPAs was designated in Germany. Some identical sites have been listed as both SPA and SAC. Therefore, the total number of Natura 2000 sites in Germany is 5,200 (as of December 2019; source: German Federal Agency for Nature Conservation (BfN)).

Old semi-natural beech forest (Habitat Type 9110) in the "Kellerwald" Natura 2000 site (Federal State of Hesse) Photo: F. Grawe

Vitalise Natura 2000

A long time elapsed since the EU Nature Directives were passed (the Birds Directive in 1979 and the Habitats Directive in 1992), until Germany was able to largely complete the selection and designation of its Natura 2000 sites. The next step is to actually preserve and foster biodiversity in the selected sites. This is achieved through the successful implementation of good management practices. Planning on all levels has to consider the Natura 2000 network early on, in order to avoid adverse impacts. Land use practices, including those of forestry and agriculture, within the Natura 2000 sites have to be devised so that the preservation of our natural and cultural landscapes, with their regional peculiarities and richness, can be optimised. Many Natura 2000 sites require certain types of land use. Nature conservation in the Natura 2000 network is not restricted to pristine areas; rather, our species-rich cultural landscapes, with their particular habitat types, require continued land use. Our children will be grateful that we preserved nature's richness for future generations. In the global context, Natura 2000 serves as an example of how the diversity of life can be preserved through cultural landscapes that have evolved over centuries of continued use.

Global trends call for decisive action

But this wealth is in danger, because global trends do not stop at the doors of the European Union. The global loss of biodiversity has long since reached alarming levels, and EU-wide surveys of the state of nature reveal that many habitats are in inadequate or even bad condition. Numerous studies show that there is less crawling and less buzzing also in German meadows and forests, and that various habitat types in Germany are suffering more and more from the consequences of the climate crisis. Where the Nature Directives are effectively implemented, they make an important contribution to combating these trends by reducing pressure on ecosystems and slowing the decline of species. The latest review, or Fitness Check, of the EU Nature Directives in 2015 found that, even though there is a need for action, Natura 2000 is one of the most important instruments for the conservation of biodiversity in the European Union.

This brochure is designed to acquaint readers with the uniqueness of our natural and cultural landscapes and to provide insights into the aims and practices of nature conservation in the European Union. European Nature Directives are not theoretical guidelines from "far-away Europe". Rather, the European Union supports us in preserving our natural heritage here in Germany for future generations. Commitment to the protection of nature and the sustainable use of natural resources are preconditions for retaining and improving the quality of life for every citizen in Germany.

Asperulo-Fagetum beech forest (Habitat Type 9130), Germany

Atlantic wet heaths (Habitat Type 4010), Germany

Wooded pastures, called “dehesas” in Spanish (Habitat Type 6310), Spain

The Muschia aurea flower, an endemic species protected according to Annexes II and IV of the Habitats Directive, Madeira

Canary Islands endemic pine forest (Habitat Type 9550) along the Teide volcano, Canary Islands

Thorny shrubs with endemic milkweed, *Euphorbia melittensis* (clifftop phryganas, Habitat Type 5410), Malta

MARINE ATLANTIC

MARINE MACARONESIAN

MARINE

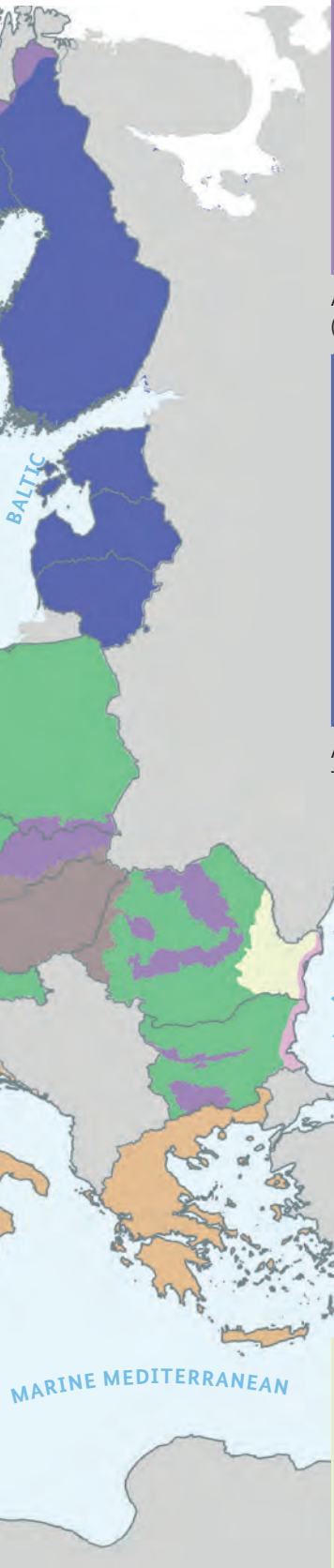



Photo: F. Grawe

Alpine Ibex (Annex V species), on alpine calcareous grasslands (Habitat Type 6170)


Photo: B. Beinlich

Active raised bog with bog lake and bog woodland (Habitat Types 7100*, 3160 and 91D0), Estonia


Photo: H.-J. Fünfstück

The souslik *(Spermophilus citellus)* inhabiting the steppe and grasslands in southeastern Europe (Annex II species)


Photo: A. Ssymank

Steppic grassland, Bulgaria

A total of 14 biogeographic regions are currently recognised within the European Union

Germany, located in the heart of Europe, is part of three terrestrial regions (the Atlantic region, the Continental region and the Alpine region) as well as two marine regions.

The respective assignment to terrestrial and marine biogeographical regions is of major importance in terms of both designation and assessment of the conservation status of Natura 2000 sites. Two biogeographical seminars, chaired by the EU Commission, were held for each region in order to evaluate the comprehensive and overall quality of site selection. The assessment was performed by independent experts from the the European Topic Centre on Biological Diversity in Paris (ETC/BD) and representatives from the member states.
If site selection was found to be insufficient, member states were required to supplement their list of Natura 2000 sites with other possible sites. This process produced a fairly uniform quality and a high standard for site selection among all EU member states.

Dr. Axel Ssymank
Federal Agency for Nature Conservation

Biogeographical regions

- Alpine
- Atlantic
- Black Sea
- Boreal
- Continental
- Macaronesian
- Mediterranean
- Pannonian
- Steppe

The names of the marine regions are indicated on the map.

Alkaline fen (Habitat Type 7230) with orchids in the "Nethe" Natura 2000 site (Weser Mountains, Federal State of North Rhine-Westphalia)
Photo: F. Grawe

2 Goals and concepts of nature conservation in the EU

Because nature knows no borders, commonly held European regulations are particularly important. It would not make sense to protect a species of songbird in Germany, if it could be legally hunted along its migration routes. European regulations also have economic and political importance, as competitive disadvantages could result from environmental legislation being passed and subsequently applied only in individual member states. The preservation of biological diversity is the most important target of European Union nature conservation efforts (see Chapters 3 and 4). The Birds Directive (2009/147/EEC), codified in 2009, and the Habitats Directive (92/43/EEC) provide the basis for nature conservation in the EU. These Nature Directives are supplemented by environmental legislation which gives citizens of EU member states access to information about the state of the environment. Both of the EU Nature Directives have legal status in the member states, but they are by no means "decreed from on high". Rather, intense negotiations among all the EU member states resulted in the draft and subsequent passage of these documents designed to effectively protect biological diversity.

Photo: F. Grawe

White stork standing on its nest and clattering its beak; it is a protected species according to Annex I, Birds Directive

The Birds Directive only protects birds. It is complemented by the Habitats Directive, which applies to other endangered plants, animals and habitat types ("biotopes") in the European Union. In the Federal Republic of Germany, both Directives are implemented at the national level through the Federal Nature Conservation Act and subsequently through state conservation laws. The Federal States are responsible for the designation, protection and implementation of all measures in the protected areas that form the Natura 2000 network. The responsibility of the Federal Government is limited to areas and species beyond coastal waters in the Economic Exclusive Zone (EEZ, 12-200 nautical miles off the coast).

The Natura 2000 network

Natura 2000, established in 1992, is the first Europe-wide network of conservation areas based on identical legal premises. The system includes both conservation areas protected under the Birds Directive (SPA, Special Protection Areas) and those protected under the Habitats Directive (SAC, Special Areas of Conservation). A very particular and important aspect of the Natura 2000 network is that site selection was based solely on the needs of endangered species and the quality of existing endangered habitat types. Political or economic arguments were not considered valid in the selection process. This site selection process is reasonable, because endangered species and habitat types must be protected at the most suitable sites. Restricting site selection to areas that are not affected by current or future use or plans would certainly fail to provide effective protection. The sites selected are those that were identified as being the best for ensuring the continued existence of each of the species and habitat types that are endangered across Europe. To ensure uniform application of EU legal requirements throughout Europe, all the habitat types and species for which conservation areas must be selected are designated in Annexes I and II of the Habitats Directive. If the sites are selected and designated for Natura 2000, economic and social concerns can and should be taken into account during implementation, but without causing substantial damage to the sites. These concerns can be addressed as part of the site management process (see Chapter 15). There are also uniform regulations that apply throughout Europe for dealing with plans and projects that could affect the conservation objectives of such an area (see Chapter 12).

Red kite

Photo: F. Grawe

Europe has the largest network of conservation areas in the world; it's called Natura 2000, and it covers more than 18 % of Europe's terrestrial surface and more than 8 % of European marine areas and is made up of more than 27,000 individual Natura 2000 sites.

Not only do these conservation areas protect the rich biodiversity of nature, but they are also of immense value to people. The best drinking water, clean air, flood and drought protection, carbon storage, tourism and recreational areas are examples of the ecosystem services provided by Natura 2000. This value is estimated at up to 300 billion euros per year.

Conservation professionals, entrepreneurs and the general public are working together to protect this valuable natural heritage. Their efforts are making a significant contribution towards achieving the EU Biodiversity Strategy's goal of conserving and enhancing European biodiversity by 2030. Not only does this help us humans while combating climate change, but it also helps the entire planet. Come out into nature with me! Find your nearest Natura 2000 site on the interactive map

https://natura2000.eea.europa.eu/

Sincerely,

Dr. Humberto Delgado Rosa
Director for Biodiversity at the European Commission's Directorate General for the Environment

Annexes to the Habitats Directive

Annex I	Natural habitat types of Community interest whose conservation requires the designation of Special Areas of Conservation.
Annex II	Animal and plant species of Community interest whose conservation requires the designation of Special Areas of Conservation.
Annex III	Criteria for the selection of Sites of Community Importance.
Annex IV	Animal and plant species of Community interest in need of strict protection.
Annex V	Animal and plant species of Community interest whose taking in the wild and exploitation may be subject to management measures.
Annex VI	Prohibited methods and means of capture and killing and modes of transport.

Photo: F. Grawe

Wolves (Annex II, IV) need large territories with sufficient refuges in order to be able to meet their food requirements and raise their pups. As of 2000, they have once again started making their home in Germany.

The International Convention on Biological Diversity

It has also been recognised at the international level that the protection of genetic diversity, the prevention of species extinction, and the conservation of habitats and ecosystems require global cooperation. This is why the Convention on Biological Diversity (CBD) was launched back in 1992 in Rio de Janeiro. The 196 signatory states of the Convention set themselves the goal therein of protecting and conserving the diversity of life on Earth and organising its sustainable use in such a way that as many people as possible can benefit from it, both today and in the future. In 2004, the signatories of the CBD adopted a work programme to establish a system of national and regional conservation areas that are representative, comprehensively and effectively managed, and integrated into a global network. The Natura 2000 network is part of this global network. Within the scope of the CBD, the signatories regularly define concrete targets for specific time frames which are addressed at the European scale by the EU Biodiversity Strategy (see Chapter 5).

Species protection

Not every species can be effectively protected within the boundaries of conservation areas. Some species are migratory, and others have large spatial requirements or use specific resources within vast landscapes to satisfy different basic needs (e. g. rearing their young, food acquisition and hibernation). In these cases, rather than trying to delineate huge conservation areas, it makes more sense to impose a specific species protection regime throughout the entire EU territory.

Photo: F. Grawe

The stag beetle (Annex II), our largest native beetle, depends on old-growth oak trees exposed to the sun for the successful development of their larvae.

Photo: F. Grawe

The European lynx (Annex II, IV), the largest European cat, has also returned to Germany. Its preferred habitat consists of large forests in the low mountain ranges.

Photo: E. Schröder

Almost pristine montane spruce forest (Habitat Type 9410) in the "Kleiner Arbersee" Natura 2000 site, Bavarian Forest National Park (Federal State of Bavaria)

Such a protection regime provides flexible implementation of measures suited to the specific needs and occurrences of a species without imposing unnecessary broad-scale management restrictions. Besides the Natura 2000 network, the direct protection of species constitutes the second important pillar in European nature conservation policy. Restrictions and the lack thereof will be applied only where the species is present and will be based on the actual needs of the particular species. The European approach to species protection is thus target oriented, and at the same time, flexible in terms of actual implementation.

Natura 2000 goes to school

"Cutting down trees?" – "This is absolutely necessary; we need the jobs" – "But there must be other solutions..."

This illustrates the dialog among students in a role-playing activity pertinent to the controversies over the development of a management plan for a Natura 2000 site. The role-playing activity is part of a workshop for schools (grades 10 to 13) in the Federal State of Rhineland-Palatinate. During class, students will become familiar with opposing sides of the argument, which will then be studied in more detail during the workshop. In a humorous role-playing activity, students will actually stage the conflicts arising around a Natura 2000 site and develop creative solutions. The role play will be complemented by a concluding field trip which will provide opportunities for students to experience and understand nature and the complex interactions between stakeholders and nature conservation.

Dr. Michael Altmoos & Erika Mirbach
Saarland Ministry for the Environment and Consumer Protection & Rhineland-Palatinate State Office for the Environment

Photo: M. Baumhof-Pregitzer

Photo: E. Mirbach

Common core principles and challenges

The ideas and basic principles of Europe-wide nature conservation are ground-breaking and progressive. They require protection only where absolutely necessary and are based on the needs of the species and habitats in question. As a rule, special areas of conservation (SAC) and Special Protection Areas (SPA) are not outright reserves; rather, only the species and habitat types listed in the Annexes of the EU Nature Directives are subject to special protection in these areas.

Human activity and even development is permissible, as long as it does not affect the conservation status of the protected species listed in the Annexes of the EU Nature Directives. On the other hand, if there is a potential for a significant negative impact on the conservation status of protected species and habitat types within the Natura 2000 sites, then even activity and development outside the Natura 2000 sites is prohibited. Based on clear targets, this system of conservation areas allows for a high degree of flexibility with respect to implementation by EU member states, or in the Federal Republic of Germany, by the Federal States.

Natura 2000 sites have been selected according to standardised procedures, first on the national and then on the European level (see Chapter 7). Economic concerns or overriding public interest can be considered when it comes to development (e. g. road construction or the deepening of river beds for navigation) that might impact the conservation status of Annex species and habitat types in Natura 2000 sites. However, such development requires an impact assessment meeting certain general rules. The primary preconditions for implementation are that measures minimise harm to conservation status, that permanent damage to protected habitat types and species is avoided, and that effective compensation is granted for unavoidable damage or losses (see Chapters 12 and 15).

The successful implementation of the EU Nature Directives is evaluated by means of reports required in six-year cycles, and by scheduled, regular monitoring. This applies to both the Habitats and Birds Directives. Effective monitoring is a necessary precondition for target-oriented management adapted to site-specific conservation needs. In general, member states are responsible for providing the necessary financial means for successful implementation of the European Nature Directives. In Germany, this responsibility lies with the Federal States (see Chapter 17). Implementation is supported by EU funding schemes in the areas of environment as well as rural and regional development (structural funds).

The lady's slipper, listed in Annexes II and IV of the Habitats Directive, is the largest native orchid in Germany. Open deciduous forests are its preferred habitat. Photo: F. Grawe

Active raised bogs (Habitat Type 7110*) harbour highly specialised biological communities. They are extremely endangered and thus considered a priority habitat type. Pictured is the "Schwarze Moor" Natura 2000 site in the Bavarian High Rhön Mountains. Photo: F. Grawe

3 What to protect? – species and habitat types of Community interest

Preserving natural diversity

With more than 24,000 species of plants and mushrooms (including mosses, ferns and lichens) and 48,000 species of animals in approximately 860 different biotope types, Germany's natural diversity is a veritable treasure chest of immense value. Our landscape is characterised by rather typical habitats: colourful flowering meadows, dune-lined beaches, and beech and oak forests which provide shade and cover. We take the availability of many products obtained from nature, such as nutrition, medicinal plants, and the wood for our fireplaces, for granted.

But how can this diversity be effectively protected? What species warrant specific protection? Long lists of endangered species and biotope types provide a clear indication; in Germany more than two thirds of the biotope types, 40 % of the plant species and approximately 30 % of the animal species are considered to be endangered, and many of them are at the brink of extinction. There are taxonomic groups in which up to 70 % of the native species are red listed, although a species that is severely endangered and very rare in Germany may still be common in Spain or Italy. The Annexes of the Habitats Directive only list habitat types and species "of Community interest". The basic condition for listing any given species or habitat types is endangerment at the European level (throughout the European Union), i.e. that severe decline has been recorded or that there is a particular European responsibility for the protection of a certain species or habitat type.

Conservation areas designated for habitat types and species

The Natura 2000 network protects the following habitat types and species:

1. Habitat types listed in Annex I of the Habitats Directive
Annex I lists a total of 233 habitat types of Community interest in the EU, including 93 habitat types in Germany (see table). The list extends from marine and coastal habitat types, to heathlands, grasslands and forests, to high alpine rocks and screes.

2. Species listed in Annex II of the Habitats Directive
Annex II lists species that require the designation of Natura 2000 sites (Special Areas of Conservation, SAC). In the EU, this includes approximately 1,000 species, 138 of these species occur in Germany.

3. Bird species listed in Annex I of the Birds Directive in Special Protection Areas
The Birds Directive requires the establishment of Natura 2000 sites (Special Protection Areas, SPA) for the species listed in Annex I. This amounts to approximately 190 species throughout the EU, including approximately 100 species that regularly occur in Germany. In addition, the sites selected according to the Birds Directive are supposed to secure resting, moulting and hibernation sites for migratory species.

Some species and habitat types are severely endangered throughout Europe. These are designated as "priority". Priority species and habitat types listed in the Habitats Directive require a stricter degree of protection, which is reflected in the provision of the appropriate (impact) assessments. No bird species have been designated as "priority" to date.

Habitat types listed in Annex I of the Habitats Directive
* = indicates priority habitat type, colour coding of the biogeographical regions: violet = Alpine, blue = Atlantic and Marine-Atlantic, green = Continental and Marine-Continental, see map pp. 8 – 9


LRT 1220

Photo: H.-J. Augst

Code	Name of the habitat type	Region
1. Marine and coastal habitats		
1110	Sandbanks which are slightly covered by sea water all the time	● ●
1130	Estuaries	● ●
1140	Mudflats and sandflats not covered by seawater at low tide	● ●
1150	Lagoons*	● ●
1160	Large, shallow inlets and bays	● ●
1170	Reefs	● ●
1210	Annual vegetation of drift lines	● ●
1220	Perennial vegetation of stony banks	● ●
1230	Vegetated sea cliffs of the Atlantic and Baltic coasts	● ●
1310	*Salicornia* and other annuals colonizing mud and sand	● ●
1320	Spartina swards (Spartinion maritimae)	●
1330	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	● ●
1340	Inland salt meadows*	● ●
2. Coastal sand dunes and inland dunes		
2110	Embryonic shifting dunes	● ●
2120	Shifting dunes along the shoreline *(Ammophila arenaria)* (white dunes)	● ●
2130	Fixed dunes with herbaceous vegetation (grey dunes)*	● ●
2140	Decalcified fixed dunes with *Empetrum nigrum**	● ●
2150	Atlantic decalcified fixed dunes (Calluno-Ulicetea)*	● ●
2160	Dunes with *Hippophaë rhamnoides*	● ●
2170	Dunes with *Salix repens ssp. argentea* (Salicion arenariae)	● ●
2180	Forested dunes of the Atlantic coast	● ●
2190	Humid dune slacks	● ●
2310	Dry sandy heaths with *Calluna* and *Genista* (inland dunes)	● ●
2320	Dry sandy heaths with *Calluna* and *Empetrum nigrum* (inland dunes)	● ●
2330	Inland dunes with open *Corynephorus* and *Agrostis* grasslands (inland dunes)	● ●


LRT 3150

Photo: H.-J. Augst

3. Freshwater habitats		
3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)	● ●
3130	Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or Isoëto-Nanojuncetea	● ● ●
3140	Hard oligo-mesotrophic waters with benthic vegetation of Chara formations	● ● ●

Code	Name of the habitat type	Region
3150	Natural eutrophic lakes with Magnopotamion or Hydrocharition-type vegetation	● ● ●
3160	Natural dystrophic lakes and ponds	● ● ●
3180	Turloughs*	● ●
3190	Lakes of gypsum karst	● ● ●
3220	Alpine rivers and the herbaceous vegetation along their banks	● ●
3230	Alpine rivers and their ligneous vegetation with *Myricaria germanica*	● ●
3240	Alpine rivers and their ligneous vegetation with *Salix eleagnos*	● ●
3260	Watercourses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation	● ● ●
3270	Rivers with muddy banks with Chenopodion rubri p.p. and Bidention pp. vegetation	● ●
4. and 5. Heaths and scrub		
4010	Northern Atlantic wet heaths with *Erica tetralix*	● ●
4030	European dry heaths	● ●
4060	Alpine and Boreal heaths	● ●
4070	Bushes with *Pinus mugo* and *Rhododendron hirsutum* (Mugo-Rhododendretum hirsuti)*	● ●
4080	Sub-Arctic Salix scrub	●
40A0	Subcontinental peri-Pannonic scrub*	●
5110	Stable xerothermophilous formations with *Buxus sempervirens* on rock slopes (Berberidion p.p.)	●
5130	*Juniperus communis* formations on heaths or calcareous grasslands	● ●

LRT 6510

Photo: F. Grawe

6. Natural and semi-natural grassland formations		
6110	Rupicolous calcareous or basophilic grasslands of the Alysso-Sedion albi*	● ●
6120	Xeric sand calcareous grasslands*	● ●
6130	Calaminarian grasslands of the Violetalia calaminariae	● ●
6150	Siliceous alpine and boreal grasslands	● ●
6170	Alpine and subalpine calcareous grasslands	●
6210	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (*important orchid sites)	● ● ●
6230	Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas in Continental Europe)*	● ● ●
6240	Subpannonic steppic grasslands (Festucetalia vallesiacae)*	● ●

Code	Name of the habitat type	Region
6410	Molinia meadows on calcareous, peaty or clayey silt-laden soils (Molinion caeruleae)	● ● ●
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	● ● ●
6440	Alluvial meadows of river valleys of the Cnidion dubii	● ●
6510	Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*)	● ● ●
6520	Mountain hay meadows	● ●

LRT 7110 + 91D0

Photo: B. Beinlich

7. Raised bogs, mires and fens		
7110	Active raised bogs*	● ● ●
7120	Degraded raised bogs still capable of natural regeneration	● ● ●
7140	Transition mires and quaking bogs	● ● ●
7150	Depressions on peat substrates of the Rhynchosporion	● ● ●
7210	Calcareous fens with *Cladium mariscus* and species of the Caricion davallianae*	● ● ●
7220	Petrifying springs with tufa formation (Cratoneurion)*	● ● ●
7230	Alkaline fens	● ● ●
7240	Alpine pioneer formations of the Caricion bicoloris-atrofuscae*	●
8. Rocky habitats and caves		
8110	Siliceous scree of the montane to snow levels (Androsacetalia alpinae and Galeopsietalia ladani)	● ●
8120	Calcareous and calc-shist screes of the montane to alpine levels (Thlaspietea rotundifolii)	●
8150	Medio-European upland siliceous screes	●
8160	Medio-European calcareous scree of hill and montane levels*	● ● ●
8210	Calcareous rocky slopes with chasmophytic vegetation	● ● ●
8220	Siliceous rocky slopes with chasmophytic vegetation	● ● ●
8230	Siliceous rock with pioneer vegetation of the Sedo-Scleranthion or of the Sedo albi-Veronicion dillenii	● ●
8310	Caves not open to the public	● ● ●
8340	Permanent glaciers	●
9. Forests		
9110	Luzulo-Fagetum beech forests	● ● ●
9120	Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrub layer (Quercion robori-petraeae or Ilici-Fagenion)	● ●
9130	Asperulo-Fagetum beech forests	● ● ●

Code	Name of the habitat type	Region
9140	Medio-European subalpine beechwoods with Acer and *Rumex arifolius*	
9150	Medio-European limestone beech forests of the Cephalanthero-Fagion	
9160	Sub-Atlantic and medio-European oak or oak-hornbeam forests of the Carpinion betuli or Stellario-Carpinetum	
9170	Galio-Carpinetum oak-hornbeam forests	
9180	Tilio-Acerion forests of slopes, screes and ravines*	
9190	Old acidophilous oak woods with *Quercus robur* on sandy plain	
91D0	Bog woodlands*	
91E0	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)*	
91F0	Riparian mixed forests of *Quercus robur, Ulmus laevis, Ulmus minor, Fraxinus excelsior* or *Fraxinus angustifolia* (Ulmenion minoris)	
91G0	Pannonic woods with *Quercus petraea* and *Carpinus betulus* (Tilio-Carpinetum)*	
91T0	Central European lichen pine forests	
91U0	Sarmatic steppe pine forests	
9410	Acidophilous *Picea* forests of the montane to alpine levels (Vaccinio-Piceetea)	
9420	Alpine *Larix decidua* and/or *Pinus cembra* forests	
9430	Subalpine and montane *Pinus uncinata* forest (* if on gypsum or limestone)	


LRT 9110

Photo: F. Grawe

Photo: A. Ssymank

Steep chalk cliffs (Habitat Type 1230) on the Island of Rügen (Federal State of Mecklenburg- Vorpommern)

Photo: E. Stegmaier

The Lake Constance forget-me-not is restricted to the vicinity of Lake Constance (Federal State of Baden-Württemberg) Germany has therefore a specific responsibility for the preservation of this species which is listed in Annexes II and IV.

Species listed in Annex II of the Habitats Directive according to data submitted by the German Federal States for the national Article 17 report

* = indicates priority habitat type, colour coding of the biogeographical regions: violet = Alpine, blue = Atlantic and Marine-Atlantic, green = Continental and Marine-Continental, see map pp. 8 – 9

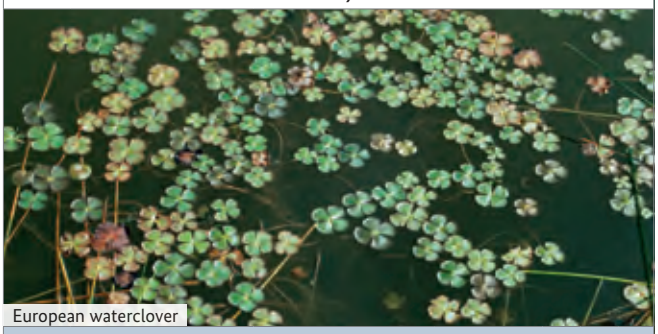
Code	English name of the species	Species name (acc. Habitats Directive)	Annex	Region
		 European waterclover		
Ferns and Flowering plants				
4068	Lilyleaf lady bells	*Adenophora lilifolia*	II, IV	
1516	Waterwheel Plant	*Aldrovanda vesiculosa*	II, IV	
1617	Marsh angelica	*Angelica palustris*	II, IV	
1614	Creeping marshwort	*Apium repens*	II, IV	
4066	Ladder spleenwort	*Asplenium adulterinum*	II, IV	
1419	Little grapefern, least moonwort	*Botrychium simplex*	II, IV	
1882	Great rye brome	*Bromus grossus*	II, IV	
1832	Caldesia	*Caldesia parnassifolia*	II, IV	
1887	Moss grass	*Coleanthus subtilis*	II, IV	
1902	Lady's slipper orchid	*Cypripedium calceolus*	II, IV	
4094	Bohemian gentian*	*Gentianella bohemica*	II, IV	
4096	Marsh gladiolus	*Gladiolus palustris*	II, IV	

Photo: B. Beinlich

Code	English name of the species	Species name (acc. Habitats Directive)	Annex	Region
1805	*Jurinea cyanoides*	*Jurinea cyanoides*	II, IV	
1903	Fen orchid	*Liparis loeselii*	II, IV	
1831	Floating waterplantain	*Luronium natans*	II, IV	
1428	European waterclover	*Marsilea quadrifolia*	II, IV	
1670	Lake Constance forget-me-not	*Myosotis rehsteineri*	II, IV	
1601	Elbe water dropwort*	*Oenanthe conioides*	II, IV	
1477	Pasque flower	*Pulsatilla patens*	II, IV	
1881	Bavarian golden feather grass*	*Stipa bavarica*	II, IV	
1437	*Thesium ebracteatum*	*Thesium ebracteatum*	II, IV	
6985	Killarney fern	*Trichomanes speciosum*	II, IV	
Mosses				
1386	Green shield moss	*Buxbaumia viridis*	II	
1383	Hair claw moss	*Dichelyma capillaceum*	II	
1381	Green fork moss	*Dicranum viride*	II	
1380	*Distichophyllum carinatum*	*Distichophyllum carinatum*	II	
6216	Slender Green feather-moss	*Hamatocaulis vernicosus*	II	
1379	Mushroom-headed liverwort	*Mannia triandra*	II	
1396	Short-horned liverwort	*Nothothylas orbicularis*	II	
1387	Roger's bristlemoss	*Orthotrichum rogeri*	II	
6166	Carinthian earwort	*Scapania massolongi*	II	
1399	Rudolph's trumpet moss	*Tyloria rudolphiana*	II	

Photo: F. Grawe

Greater mouseeared bat

Mammals				
1308	Barbastelle	*Barbastella barbastellus*	II, IV	
1352	Wolf*	*Canis lupus*	II, IV	
1337	European beaver	*Castor fiber*	II, IV	
1364	Grey seal	*Halichoerus grypus*	II, V	
1355	Otter	*Lutra lutra*	II, IV	
1361	Lynx	*Lynx lynx*	II, IV	
1323	Bechstein's bat	*Myotis bechsteini*	II, IV	
1318	Pond bat	*Myotis dasycneme*	II, IV	
1321	Geoffroy's bat	*Myotis emarginatus*	II, IV	
1324	Greater mouseeared bat	*Myotis myotis*	II, IV	
1365	Harbour seal	*Phoca vitulina*	II, V	
1351	Harbour porpoise	*Phocoena phocoena*	II, IV	
1304	Greater horseshoe bat	*Rhinolophus ferrumequinum*	II, IV	
1303	Lesser horseshoe bat	*Rhinolophus hipposideros*	II, IV	

Photo: M. Harzheim / piclease

European pond turtle

Amphibians and reptiles				
1188	European Firebellied toad	*Bombina bombina*	II, IV	
1193	Yellow-bellied toad	*Bombina variegata*	II, IV	
1220	European pond turtle	*Emys orbicularis*	II, IV	
1166	Nothern great crested newt	*Triturus cristatus*	II, IV	

Photo: B. Stemmer

European weather loach

Fishes and Cyclostomata				
5042	Baltic sturgeon	*Acipenser oxyrinchus*	II, IV	
1101	European sea sturgeon	*Acipenser sturio*	II, IV	
5289	Alburnus mento	*Alburnus mento*	II	
1102	Allis shad	*Alosa alosa*	II, V	
1103	Twaite shad	*Alosa fallax*	II, V	

Code	English name of the species	Species name (acc. Habitats Directive)	Annex	Region
1130	Asp	*Aspius aspius*	II, V	● ●
6963	Spined loach	*Cobitis taenia*	II	● ●
1113	Houting*	*Coregonus oxyrhynchus*	II, IV	●
6965	European Bullhead	*Cottus gobio*	II	● ● ●
2485	Ukrainian brook lamprey	*Eudontomyzon vladykovi*	II	●
2555	Balon's ruffe	*Gymnocephalus baloni*	II, IV	●
1157	Schraetzer	*Gymnocephalus schraetzer*	II, V	●
1105	Danube salmon	*Hucho hucho*	II, V	● ●
1099	River lamprey	*Lampetra fluviatilis*	II, V	● ●
1096	European brook lamprey	*Lampetra planeri*	II	● ●
1145	European weather loach	*Misgurnus fossilis*	II	● ●
2522	Sabre Carp	*Pelecus cultratus*	II, V	●
1095	Sea lamprey	*Petromyzon marinus*	II	● ●
5339	European bitterling	*Rodeus amarus*	II	● ●
5328	Northern whitefin gudgeon	*Romanogobio belingi*	II	● ●
5329	Danube whitefin gudgeon	*Romanogobio vladykovi*	II	●
6145	Danubian longbarbel gudgeon	*Romanogobio uranoscopus*	II	●
6146	Pearl roach	*Rutilus meidingeri*	II, V	●
5345	Danubian roach	*Rutilus virgo*	II, V	●
5348	Northern golden loach	*Sabanejewia baltica*	II	●
1106	Atlantic salmon	*Salmo salar*	II, V	● ●
6147	Western vairone	*Telestes souffia*	II	●
1160	Danube Streber	*Zingel streber*	II	●
1159	Zingel	*Zingel zingel*	II, V	●

Stag beetle

Photo: F. Grawe

Beetles				
1914	Carabus menetriesi ground beetle*	*Carabus menetriesi pacholei*	II	●
1088	Great capricorn beetle	*Cerambyx cerdo*	II, IV	● ●
5377	*Carabus variolosus nodulosus*	*Carabus variolosus nodulosus*	II, IV	●
1086	Flat bark beetle	*Cucujus cinnaberinus*	II, IV	● ● ●
1081	Great diving beetle	*Dytiscus latissimus*	II, IV	●
1082	Graphoderus bilineatus diving beetle	*Graphoderus bilineatus*	II, IV	● ●
1079	Violet click beetle	*Limoniscus violaceus*	II	●
1083	Stag beetle	*Lucanus cervus*	II	● ●
6966	Hermit beetle*	*Osmoderma eremita*	II, IV	● ●
1087	Rosalia longicorn*	*Rosalia alpina*	II, IV	● ●
1927	Powder-post beetle	*Stephanopachys substriatus*	II	●
Damsel- and dragonflies				
1044	Southern damselfly	*Coenagrion mercuriale*	II	● ● ●
4045	Ornate damselfly	*Coenagrion ornatum*	II	● ●
1042	Large whitefaced darter	*Leucorrhinia pectoralis*	II, IV	● ●
1037	Green club-tailed dragonfly	*Ophiogomphus cecilia*	II, IV	● ●
1041	Orange-spotted emerald	*Oxygastra curtisii*	II, IV	●

Jersey tiger moth*

Photo: A. Ssymank

Butterflies				
1071	False ringlet	*Coenonympha oedippeus*	II, IV	●
1074	Eastern eggar	*Eriogaster catax*	II, IV	●
1065	Marsh fritillary	*Euphydryas aurinia*	II	● ● ●
6199	Jersey tiger moth*	*Euplagia quadripunctaria*	II	● ● ●
4035	Fisher's estuarine moth	*Gortyna borelii lunata*	II, IV	●

Code	English name of the species	Species name (acc. Habitats Directive)	Annex	Region
6169	Scarce fritillary	*Euphydryas maturna*	II, IV	
1060	Large copper	*Lycaena dispar*	II, IV	
4038	Violet copper	*Lycaena helle*	II, IV	
1061	Dusky large blue	*Maculinea nausithous*	II, IV	
1059	Scarce large blue	*Maculinea teleius*	II, IV	

Photo: W. Lorenz

Thick shelled river mussel

Molluscs				
4056	Little whirpool ramshorn snail	*Anisus vorticulus*	II, IV	
1029	Freshwater pearl mussel	*Margaritifera margaritifera*	II, V	
4064	Striped nerite	*Theodoxus transversalis*	II, IV	
1032	Thick shelled river mussel	*Unio crassus*	II, IV	
1014	Narrow-mouthed whorl snail	*Vertigo angustior*	II	
1015	Round-mouthed whorl snail	*Vertigo genesii*	II	
1013	Geyer's whorl snail	*Vertigo geyeri*	II	
1016	Des moulin's snail	*Vertigo moulinsiana*	II	

Photo: H.-J. Troschel

Stone crayfish*

Other invertebrates				
1936	Stella's Pseudoscorpion	*Anthrenochernes stellae*	II	
1092	White-clawed crayfish	*Austropotamobius pallipes*	II, V	
1093	Stone crayfish*	*Austropotamobius torrentium*	II, V	

Photo: F. Grawe

Boreal owl (Annex I, Birds Directive)

Selected species listed in Annex I of the Birds Directive

Code	English name of the species	Species name (according to the Birds Directive)
A294	Aquatic warbler	*Acrocephalus paludicola*
A223	Boreal owl	*Aegolius funereus*
A229	Common kingfisher	*Alcedo atthis*
A255	Tawny pipit	*Anthus campestris*
A222	Short-eared owl	*Asio flammeus*
A031	White stork	*Ciconia ciconia*
A030	Black stork	*Ciconia nigra*
A084	Montagu's harrier	*Circus pygargus*
A236	Black woodpecker	*Dryocopus martius*
A001	Red-throated loon	*Gavia stellata*
A127	Common crane	*Grus grus*
A075	White-tailed eagle	*Haliaeetus albicilla*
A338	Red-backed shrike	*Lanius collurio*
A157	Bar-tailed godwit	*Limosa lapponica*
A272	Bluethroat	*Luscinia svecica*
A074	Red kite	*Milvus milvus*
A194	Arctic tern	*Sterna paradisaea*
A409	Black grouse	*Tetrao tetrix ssp. tetrix*
A108	Western capercaillie	*Tetrao urogallus*
A029	Purple heron	*Ardea purpurea*
A021	Eurasian bittern	*Botaurus stellaris*
A060	Ferruginous duck	*Aythya nyroca*
A314	Bewick's Swan	*Cygnus columbianus bewicki*
A122	Corn crake	*Crex crex*
A320	Red-breasted flycatcher	*Ficedula parva*

The Lesser Spotted Eagle – Germany's most endangered raptor

The Lesser Spotted Eagle (Clanga pomarina), which is specially protected under Annex I of the Birds Directive, reaches its western limit of distribution in north-eastern Germany. There are only about 130 breeding pairs in Germany.

The lesser spotted agle breeds in Germany in undisturbed, well-structured deciduous forests on mostly waterlogged soils, with adjacent fallow fields and grasslands providing a rich food base. Its preferred prey are small mammals and amphibians, but it is not averse to eating carrion as well. Unlike the white-tailed eagle and osprey, whose populations have recovered encouragingly in recent years, the number of breeding territories of the lesser spotted eagle has declined steadily since the 1990s. Recent years have seen a slight stabilisation of the populations at a low level. To improve the situation, measures to secure or improve habitat quality, as implemented in the large-scale "North-western Pomeranian Forest Landscape" nature conservation project, are required as a matter of priority. The project objectives include the preservation of the forests where the lesser spotted eagle breeds by permanently securing suitable forest structures with a high proportion of old trees and deadwood as well as the protection and development of lesser spotted eagle feeding habitats.

Dr. Nicole Wasmund & Hermann Baier
Federal Agency for Nature Conservation & Retired, formerly Mecklenburg-Western Pomerania State Agency for Environment, Nature and Geology

Meanwhile, about 130 pairs of Lesser Spotted Eagle are breeding again in Mecklenburg-Western Pomerania, Brandenburg and Saxony-Anhalt. Photo: H. Henderkes

Specific species protection

Certain rare or endangered plants and animals warrant specific protection. The Habitats Directive provides for specific protective measures for these species listed in Annex IV. All specimen and the resting and breeding sites of Annex IV species are strictly protected in Germany and in the EU. Strict protection applies to the entire territory and is not restricted to Natura 2000 sites. Annex IV lists over 900 species with 134 of them occurring in Germany. Most of the species listed in Annex IV are endemic species (species with a very restricted range) particularly from the Mediterranean region. Germany's listed species include some bat species, amphibians and forest species with specific habitat requirements such as the European hermit beetle. Deliberate disturbance, capture or killing of individuals, the damage or destruction of breeding sites and resting places, and trade are prohibited for Annex IV species (Arts. 12 and 13 of the Habitats Directive; § 44 of the German Federal Nature Conservation Act).

Exemptions from strict protection are possible in certain cases. The preconditions for derogation from the Annex IV restrictions include imperative reasons of overriding public interest for a project or plan, lack of a satisfactory alternative, and the stipulation that conservation status of the affected populations will not deteriorate (Art. 6 of the Habitats Directive; § 45, Sec. 7 of the Federal Nature Conservation Act). Some plant species, such as arnica, have traditionally been used for medicinal or other purposes. Such species are listed in Annex V of the Habitats Directive. Continued sustainable use of these species is granted when, for example, the use does not endanger population size, and thus, long-term sustainable yield. There are approximately 200 Annex V species in the EU, 103 of which are found in Germany.

Mainly due to historical developments, all bird species occurring in Europe are specially protected regardless of endangerment and are subject to similar protection regulations as species in the Habitats Directive.

The Natura 2000 sites also protect those species of both plants and animals which are characteristic for Annex I habitat types. As these particular habitat types are already protected indirectly, there was no need to include endangered species that are characteristic for habitat types in the Annexes devoted to species protection.

The Habitats Directive requires the establishment of specific conservation areas in order to preserve Annex II species. Protection of summer roosts is particularly important for bats. Greater mouse-eared bats (left) roost in the attics of larger buildings. This explains why the City Hall in Höxter/ Westphalia (right), harbouring approximately 100 animals, has become a Natura 2000 site.
Photos: F. Grawe

Opportunity for Elbe water dropwort

Along the Lower Elbe river are the only places in the world where Elbe water dropwort can be found; however, this plant's natural habitats, such as sparse alluvial forests or muddy areas with low flow, have become rare. It is listed as a priority species in Annex II of the Habitats Directive, and the Elbe Habitat Foundation is helping to ensure the preservation of this endangered species by successfully developing new locations, for example in Hamburg near Obergeorgswerder, at Wrauster Bogen and in Kirchwerder. The Foundation is also implementing establishment measures and continuously incorporating the knowledge gained throughout this process into the development of the project.

Dr. Elisabeth Klocke
Elbe Habitat Foundation

Photo: H.-J. Augst

The endangered Elbe water dropwort is listed as a priority species in Annexes II and IV of the Habitats Directive.

River lowland mire in Mecklenburg-West Pomerania

The network of river lowland mire in north-eastern Germany developed about 10,000 years ago, near the end of the last glacial period, when huge quantities of meltwater flowed toward the Baltic Sea. As the sea level rose approximately 8,000 years ago, bog formation in river lowlands began and was enhanced by extensive forest clear-cutting during the Bronze Age (approx. 2,000 to 3,800 years ago). Harbouring a large number of endangered habitat types and species which are well worth protecting, the Warnow, Recknitz, Trebel, Peene and Tollense river valleys form the backbone of the terrestrial Natura 2000 network in the Federal State of Mecklenburg-West Pomerania.

Hermann Baier
Retired, formerly Mecklenburg-Western Pomerania State Agency for Environment, Nature and Geology

Photo: M. Harzheim / piclease

The European fire-bellied toad inhabiting the north-eastern German lowlands is one of the species listed in Annexes II and IV of the Habitats Directive.

In addition to habitat types characteristic of river lowland mires, the Rustow-Randow polder in the Peene Valley near Demmin harbours numerous species listed in the Annexes of the Birds and Habitats Directives. These include beaver, fire-bellied toad, great bittern, black tern and bluethroat.

Photo: L. Wölfel

Special Areas of Conservation (SAC) with river lowland mires (green) in Mecklenburg-Western Pomerania.

Source: adelphi's own research; Layer: States world-wide 1:1 million (2020), © EuroGeographics regarding administrative boundaries; Layer: Natura 2000 sites (2020), © European Environmental Agency, CC BY 2.5 DK; Layer: Rivers in Mecklenburg-Western Pomerania (2018), © Federal Agency for Cartography and Geodesy

A natural section of the Nethe River (Habitat Type 3260), a tributary of the Weser River – the Nethe River is a Natura 2000 site along much of its course.
Photo: F. Grawe

4 Favourable conservation status – the measure of all things

The central aim of the Habitats Directive is "to maintain or restore, at favourable conservation status, natural habitats and species of wild fauna and flora of Community interest" (Art. 2, Sec. 2 of the Habitats Directive).

What is a favourable conservation status?

Conservation status is comprised of all the influences affecting a certain protected habitat type (including characteristic species, structures and functions) or a protected species (including its specific habitats and its populations). The conservation status is favourable in the long term if range, distribution and population sizes are stable or expanding. Thus, favourable conservation status is more than just preventing species and habitat types from going extinct (which in Germany would correspond to assessment based on Red Lists). Rather, favourable conservation status is intended to secure permanent protection of a habitat type and/or survival of a species of Community interest in sufficiently large areas and/or numbers in their natural surroundings. Assuring this is the key task of the Natura 2000 network.

Photo: M. Woike

The kingfisher is a species that characterises our streams (Annex I, Birds Directive). It burrows into steep riparian banks characterised by erosion and breeds in these burrows. Branches reaching above the water surface provide it with perches from which to successfully hunt for small fish.

Steppic grassland in the Kyffhäuser

The continental steppic grasslands in the Kyffhäuser Mountains are home to an unusual number of plants and animals that occur primarily in the south-eastern European steppe and Mediterranean regions. These include various species of feather-grass, several globally endangered species of broomrape, and steppe mushrooms as well as spiders and insects such as the Kyffhäuser cicada. Steppe and Mediterranean species take advantage of the extremely dry, warm climatic conditions and the open gypsum-karst landscapes in the Kyffhäuser region. The Kyffhäuser grasslands are maintained by means of traditional sheep or cattle grazing.

Dr. Jürgen Pusch
Nature Park Kyffhäuser Administration

Photo: M. Woike

Extended areas with feather-grass characterise the steppic grasslands (Habitat Type 6240*) in the "Kyffhäuser-Badraer Schweiz-Solwiesen" Natura 2000 site (Federal State of Thuringia).

Achievement of a favourable conservation status in the biogeographical regions is assessed by reports due every 6 years and by on site determination of conservation status (monitoring).

In summary: measures to implement the Habitats Directive are targeted at the achievement of an overall favourable conservation status for the species and habitat types listed in the Annexes I and II of the Directive.

Measuring the degree of conservation for Natura 2000 sites

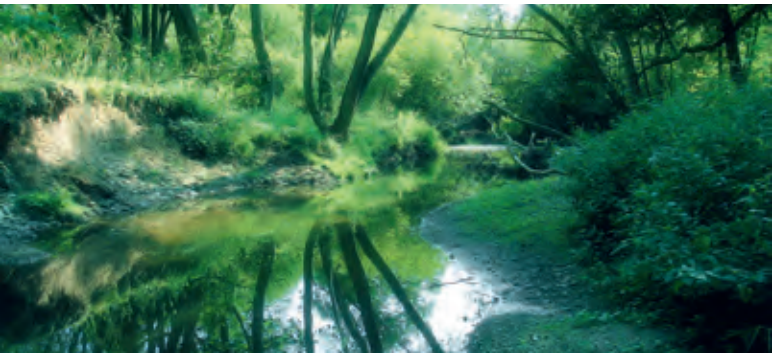
Sites are selected for inclusion in the Natura 2000 network according to their importance for the preservation of habitat types and species of Community interest (Annexes I and II of the Habitats Directive) in the EU and according to the criteria listed in Annex III of the Habitats Directive. For example, the criteria for habitat types include: a) the degree to which they are representative; b) relative area; c) degree of conservation (parameter structure and functions); and d) global assessment. Accordingly, the site designation process for the Annex III criteria includes site-specific assessments for habitat types and species. These assessments are reported on the standard data form. This effort will pay off, as conservation objectives for a certain site cannot be properly defined without detailed information on the degree of conservation of its protected habitats and species. The defintion of conservation objectives is a precondition for identifying appropriate measures and conservation priorities and, thus, for sound management.

Assessment of conservation status for Germany and Europe

Conservation status for habitat types and species is also assessed at the national and EU levels with the biogeographical regions serving as reference areas for the assessments. Evaluations are based on a simple "traffic light" scheme (green = favourable, yellow = unfavourable/inadequate, red = unfavourable/bad). The assessment protocol is standardised for the EU as a whole. The assessments of site-specific conservation status provide a weighted component which is included in the overall evaluation at the level of the biogeographical regions. The overall assessment accounts not only for occurrences within Natura 2000 sites, but all occurrences within Germany or the EU. The "traffic light" scheme is an important component of the monitoring and status reports required by the EU Commission in six-year cycles (see Chapters 5 and 13).

Flowering aspect of the fragrant orchid in an intact, species rich semi-natural dry grassland (Habitat Type 6210, degree of conservation A) within the "Warmberg-Osterberg" Natura 2000 site in the Diemel River valley, Federal State of Hesse. Photo: F. Grawe

Semi-natural dry grassland on calcareous substrates that has been fallow for many years (Habitat Type 6210, degree of conservation C) and is now dominated by grassy vegetation within the "Kalkmagerrasen bei Ossendorf" Natura 2000 site in the Diemel River valley, Federal State of North Rhine-Westphalia. Photo: F. Grawe



Natural section of the Aa River (Habitat Type 3260) flowing through an alluvial forest (Habitat Type 91E0) in the "Satzer Moos" Natura 2000 site, Federal State of North Rhine Westphalia. Photo: F. Grawe

Channelised section of the Diemel River near Warburg/Westphalia with nearly complete destruction of Habitat Type 3260. Photo: F. Grawe

Target oriented protection – on-site flexibility

The actual occurrence and distribution of protected species and habitat types define the target areas for nature conservation within Natura 2000 sites. This differs from the "classical" German approach, where the nature reserve is protected as a whole. A Natura 2000 site may include "blind spots", i. e. patches without protected habitat types or species. Construction and other development projects may be implemented in the blind spots, provided that these projects do not negatively affect the conservation objectives of protected species and habitat types within the site. On the other hand, developments or interventions outside a Natura 2000 site are usually not permitted, if they might result in significant negative impacts on protected habitat types and species inside a Natura 2000 site (see Chapter 12).

For example, if the spawning area of a protected migratory fish species is located within a Natura 2000 site, then building a dam 20 km downstream and outside the protected area is permissible, only if mitigation measures, such as a fish ladder or a migration channel around the dam, allow for the continued passage of fish toward their spawning areas. Natura 2000 sites in Germany may be assigned a different legal status such as nature reserve or landscape conservation area, or they may be protected through local management contracts. The Federal States have the latitude to choose the appropriate instruments to assure protection (see Chapter 15).

A, B or C…?

Natural or semi-natural streams are rarely found in Germany today. Most streams have been altered by humans. The Diemel, a small river in the northern low-mountain region provides a good example of a stream altered by humans. Good water quality and a high degree of structural diversity characterise streams with excellent (A) or good (B) degree of conservation. Steep streamside slopes, gravel and sand bars are preconditions for the presence of rare and protected species such as the European bullhead, the brook lamprey and the kingfisher.

The conservation status of semi-natural dry grasslands depends on continued, low intensity use. As pastoral use is gradually abandoned over a period of years, these grasslands lose their value for nature conservation. They are invaded by shrubs, and competitively superior, rather common grasses replace the competitively inferior and often endangered vegetation which depends on a greater input of light.

Dr. Burkhard Beinlich
Bioplan Marburg-Höxter

Semi-natural Baltic Sea beach on the moraine coast with active cliff in the South-east Rügen Biosphere Reserve Photo: S. Lehrke

5 The state of nature in Germany and Europe

Status of species and habitat types in Germany

The most comprehensive assessment of the state of nature in Germany is undertaken every six years in the regular national reports required by the Habitats Directive and the Birds Directive, wherein all relevant data on the respective habitat types and species are collected and subjected to a detailed assessment via a standardised procedure.

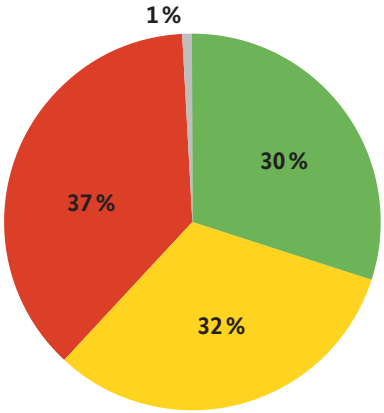
The aim of the Habitats Directive is to restore or maintain favourable conservation status for species and habitat types of Community interest. The most important instrument for this is the establishment of the Natura 2000 network, which is based on uniform criteria and includes Special Protection Area (SPA) for bird species as well as Special Areas of Conservation (SAC) for habitat types and species protected by the Habitats Directive. The network is based on the fact that biological diversity cannot be preserved by protecting individual habitats alone, but only through a coherent network of conservation areas. The member states determine the necessary measures for preserving the natural assets that occur in these Special Areas of Conservation. Every six years, the member states prepare national reports on the measures implemented, preasures and threats, as well as the conservation status achieved by the Annex species and habitats of the Habitats Directive both inside and outside the Natura 2000 sites. The assessment is performed separately for the biogeographical regions of Europe; in Germany these are the Atlantic, Continental and Alpine regions as well as the marine regions (marine-atlantic and marine-continental). If there are occurrences in several biogeographical regions, the natural assets are assessed individually in each region.

As of 2019, nature in Germany is in varying condition in the three biogeographical regions. Whereas the habitats and species of the Habitats Directive in the Alps have been predominantly assessed as favourable, the majority of habitats in north-western Germany (Atlantic region), for example, are in an unfavourable conservation status, predominantly an unfavourable-bad status.

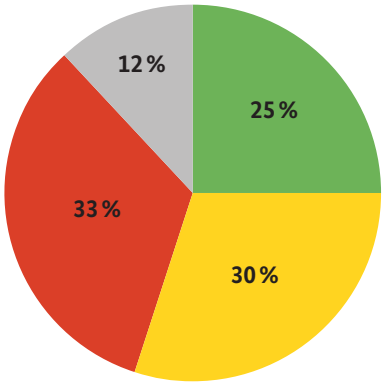
Overall, just under a third of all assessments of the 93 German habitat types and a quarter of all assessments of the 195 species show a favourable conservation status. In contrast, 69% of habitat types and 63 % of species have unfavourable-inadequate or unfavourable-bad conservation status. The status is particularly unfavorable for grassland and inland water habitats, marine and coastal habitats, bogs and marshes, and glaciers. In terms of species, the situation of dragonflies, reptiles, higher plants, beetles, butterflies and Other animal species (particularly crayfish) is especially unfavorable.

Compared to their status twelve years ago, about half of the species and habitat types exhibit a stable or improving trend in conservation status, while 34 % of species and 41 % of habitat types exhibit a deteriorating trend.

Conservation status of the habitat types in Germany (Article 17 Report 2019)



Conservation status of the species in Germany (Article 17 Report 2019)



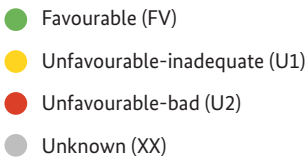


Photo: S. Lehrke

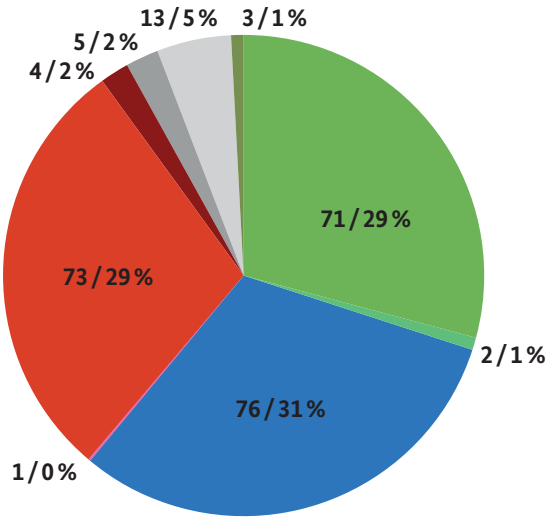
Dune landscape with white dunes (Habitat Type 2120), grey dunes (Habitat Type 2130*) and wooded dunes (Habitat Type 2180) in the "de Manteling" nature reserve in Zeeland, Netherlands

Status of bird species in Germany

The Birds Directive report contains data on populations, population trends, and distribution of native bird species. For the "trigger species" which led to the designation of the European Special Protection Areas, it also provides information on pressures, threats and conservation measures as well as population trends in the Special Protection Areas. However, in contrast to the Habitats Directive Report, there is no assessment of conservation status and no subdivision into biogeographical regions.

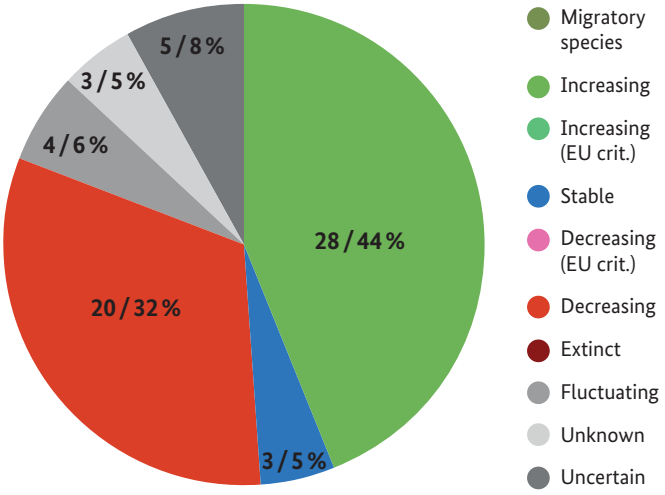
The results of the 2019 national report under the Birds Directive demonstrate that in Germany, the proportion of species with increasing and decreasing population trends is roughly balanced over a twelve-year period: Around one third of bird species exhibit increasing population trends, e.g., some large bird species such as the white-tailed eagle, Eurasian eagle-owl, and black stork. Intensive conservation measures have already been implemented for these species. At the same time, however, approximately one third of the bird species have declined in number over the last twelve years. Bird species with significant population declines are primarily species of the agricultural landscape, such as the northern lapwing, Eurasian skylark, and gray partridge. For another third of the breeding bird species, populations have remained at around the same level.

Population trends of breeding birds in Germany (2019 Article 12 report)



Number of species and proportions of trend categories for breeding birds in Germany over a period of twelve years (n = 248 species). Increase/decrease (EU crit.): Species whose trends are increasing/decreasing according to EU criteria, but stable according to national criteria.

Population trend of non-migratory bird species in Germany (2019 Article 12 report)



Number of species and proportions of trend categories for non-migratory birds in Germany (according to EU requirements for the Article 12 report; n = 63 species) over twelve years.

Photo: G. Ellwanger

As a ground-nesting bird species on farmland, the northern lapwing is particularly endangered due to intensive agriculture.

Photo: M. Woike

The population of the black stork has been able to recover thanks to intensive, targeted conservation measures.

The results for wintering bird species indicate that the overall situation here is somewhat better than for breeding birds. The proportion of bird species with increasing trends over the twelve-year period is over 40 % for wintering birds, e.g. many duck and goose species, such as the northern shoveler, which also benefit from milder winters in Central Europe. However, more than 30 % of wintering bird species are also showing decreasing trends; one example is the Taiga bean goose, whose numbers in Germany have declined particularly seriously – by 70 % over the last twelve years. A high proportion of wading bird species that forage in the Wadden Sea, such as the common redshank and red knot, also exhibit decreasing trends.

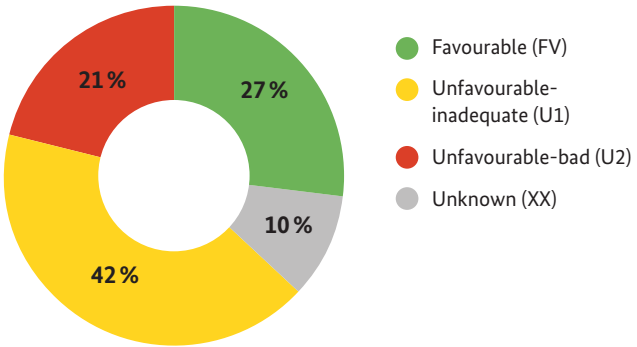
The state of nature in Europe

The EU Commission compiles a Community report on the state of nature in Europe based on the national reports under the Habitats and Birds Directives of the member states. This report documents the status of habitats and species according to data submitted by member states and assesses them at the EU level. While the population status of birds is assessed exclusively at this level in conjunction with the European Red List for birds, the species and habitat types protected by the Habitats Directive are also assessed for nine terrestrial biogeographical regions and five marine regions.

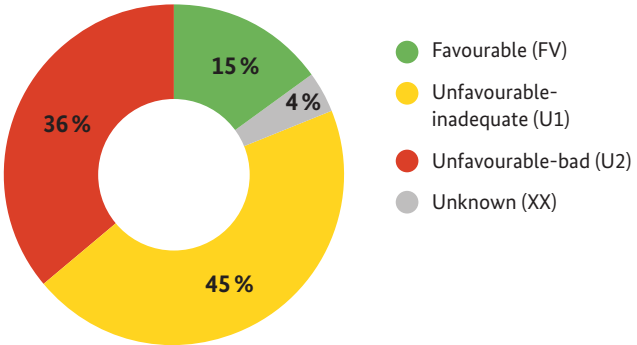
The Habitats Directive protects a total of nearly 1,200 species and over 230 habitat types in Europe. Based on an analysis of data from the 2013 – 2018 reporting period, just over a quarter of species are in a favourable conservation status, and 6 % exhibit an improving trend (as of 2018). Among these, reptiles and vascular plants have the highest proportion with favourable conservation status.

Three-quarters of the habitat types, on the other hand, have an inadequate or bad status. While over a third of the habitat types continue to deteriorate at the EU level, with dune and bog habitats being assessed as bad most frequently, only 9 % exhibit an improving trend.

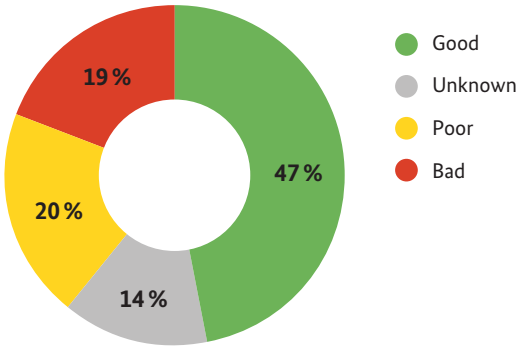
Conservation status of species at the EU level



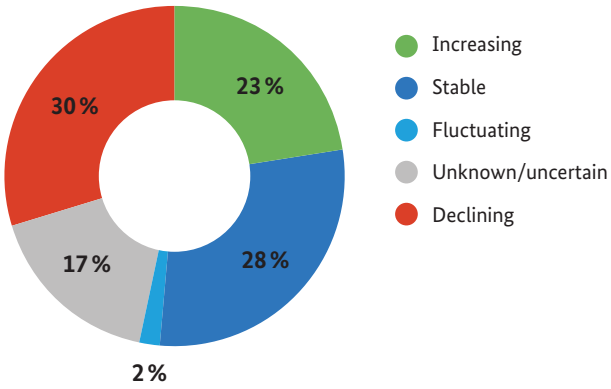
Conservation status of habitats (Article 17 Report 2019)



Population status of bird species in the EU



Short-term population trend of breeding bird populations



The Birds Directive protects over 460 species of birds in Europe through all their life cycles. The assessment of population status at the EU level shows that less than half of all bird species have a good population status, while the population status of almost 40 % of bird species is bad. Nearly half of all waterfowl, including seabirds, have poor or bad population status and primarily exhibit decreasing population trends. The situation is somewhat more positive for the groups of storks, herons and pelicans crested and common loons, doves and owls, among others. More than half of the species in each of these groups enjoy a good population status. For birds of prey, the situation varies greatly depending on the species group. Half of the species, e.g. vulture and some eagle species, have a good population status, while the status of half of the falcons and harriers, e.g. Montagu's harriers and northern harriers, is bad.

Similar to Germany, the poor situation for some bird species of open habitats is also confirmed on the European level; in more than half of the member states, for example, the northern lapwing, corn crake and gray partridge exhibit decreasing short-term trends. Some examples of bird species with positive short-term trends at the EU level are the greylag goose and the gadwall. There is also an improving tendancy for the common crane, white-tailed eagle, and great egret, in other words, primarily species that are the focus of targeted conservation efforts.

Photo: G. Ellwanger

Alpine salamander, an amphibian species listed in Habitats Directive Annex IV

Reasons for loss of biodiversity

The principal causes of the deterioration of habitat types and species in Germany include high inputs of nutrients and pesticides, the intensification or abandonment of land use, changes in the hydrology and morphology of aquatic systems, drainage and groundwater extraction, loss of areas and fragmentation due to infrastructure development or settlements and, to some extent, recreational activities, sport, tourism and the spread of invasive species. As reflected in the data provided by all EU member states in the EU State of Nature Report, many of these factors are due to the type and intensity of land use, particularly in agriculture.

The population declines of bird species in Germany are also largely due to the intensification of agriculture, e.g. through the use of pesticides or the loss of landscape structures. For breeding birds, however, predation by invasive species (e.g. raccoons) and the loss of territory due to residential, commercial, or recreational development also play major roles. The decline in insects (see Chapter 6) has an additional negative impact on insectivorous bird species due to the reduction in food supply. Comparable hazards occur at the European scale. Illegal killing and hunting also pose a significant threat, particularly to wintering species and resting birds; for seabirds in particular, bycatch in fishing nets is another major problem.

Photo: G. Ellwanger

After it had already been extinct, the lammergeier was successfully reintroduced into the wild in the Alps.

The EU State of Nature Report shows that, despite progress in the implementation of both directives (significant extension of the Natura 2000 network and more sites with management plans), it has not yet been possible to halt the decline of protected habitat types and species of Community interest to the EU. The most severe pressures, particularly those resulting from intensive utilistation of soil and water, continue unabated, and utilisation pressures continue to increase, resulting in a failure to meet the 2020 target to halt and measurably reverse the deterioration of species and habitats.

Nature conservation successes and need for additional action

However, nature conservation has also been successful. The Natura 2000 network is making a vital contribution to the protection of biodiversity, as was also confirmed in the "Fitness Check" of the Habitats and Birds Directives performed by the EU from 2014 to 2016. In addition, numerous endangered biotope types and species that are not listed in the annexes of the Habitats and Birds Directives also benefit from the Natura 2000 network and the measures implemented therein. Moreover, examples from all member states demonstrate that success can be achieved through targeted nature conservation measures supported by initiatives within the scope of the EU's LIFE programme or by national and regional nature conservation programmes.

The management of Natura 2000 sites needs to be significantly improved in order to effectively protect them. This requires the development of appropriate management plans as well as the binding implementation of the measures defined therein. However, the implementation of the necessary protection and maintenance measures are also hugely underfunded. In order to achieve the European requirements for favourable conservation status for the habitats and species protected under the Habitats Directive and favourable population status for the bird species, sufficient funding must be secured for the Natura 2000 network.

Measures are also needed outside the conservation areas for many mobile species and those with larger spatial requirements. To this end, landscape structures such as small water bodies, hedgerows and field margins must be preserved or re-created to a sufficient extent, grassland must be extensively cultivated, and fallow land must be allocated. Ultimately, the connectivity between the individual conservation areas is also crucial for the functionality of the Natura 2000 network; therefore, the cross-border biotope network in Germany must be expanded to a much greater extent.

Within the aim of improving the state of biodiversity, the EU Biodiversity Strategy for 2030 is formulating a framework for achieving the necessary changes and improvements to the existing measures by 2030. In collaboration with other initiatives as part of the Green Deal and the EU Pollinators Initiative (see Chapter 6), this strategy sets out a very ambitious and practical programme of action.

The EU Biodiversity Strategy for 2030

The EU Biodiversity Strategy for 2030 addresses the five main causes of the loss of biodiversity, sets out an improved framework for closing the remaining gaps, and bundles existing efforts. At least 30 % of the EU's land area and 30 % of its seas are to be protected. Of these areas, at least one third should be subject to particularly strict protection. The goal is to ensure effective management for biodiversity conservation, clear conservation objectives and measures, and adequate monitoring for all conservation areas. The conservation status and trend of habitats and species should stop deteriorating by 2030, and at least 30 % of habitats and species that are currently not in a favourable conservation status should be improved to favourable status or at least be exhibiting a strong positive trend by then. With birds as well, the conservation trend of at least 30 % of those species that are currently not in a favourable status is expected to improve. Damaged terrestrial and marine ecosystems are to be restored across Europe by strengthening organic farming and increasing it to over 25 % of agricultural areas by 2030, biodiversity-rich landscape elements should cover at least 10 % of utilised agricultural areas and 25,000 km of watercourses, which are often obstructed, are to be converted back into free-flowing rivers. Ecological corridors should be established to create or maintain healthy ecosystems and to allow species to migrate and thus prevent genetic isolation. The goal is to create a truly coherent and resilient trans-European conservation network through investment in green and blue infrastructure and cross-border cooperation. In addition, the loss of pollinators is to be halted, and the use of pesticides is to be reduced by 50 % and that of fertilisers by at least 20 %.

Christina Müller & Stefan Lehrke
Federal Agency for Nature Conservation

Bees? No, a harmless hover fly *(Merodon rufus),* a characteristic species of semi-natural dry grasslands on calcareous substrates (Habitat Type 6210) during mating and flower pollination on a grass lily at the Wipperdurchbruch conservation area Photo: A. Ssymank

6 We can't do without them – insects and their importance for Natura 2000

Insects comprise the largest and most diverse group of animals worldwide, with over 33,000 species in Germany alone. They serve essential functions in all terrestrial and aquatic environments and are represented by a particularly large number of species within the Natura 2000 network. Some of the key ecosystem functions provided by insects include the pollination of flowers, the decomposition of organic matter (water purification, soil formation, etc.), and regulatory functions that govern ecosystem stability (e.g., parasites and parasitoids). They also form an important nutritional basis for numerous insectivorous species of birds, bats, amphibians, reptiles, mammals and fish. In recent decades, however, the number and species diversity of insects in Germany has declined sharply. The main reason for this is the loss and qualitative degradation of suitable habitats. Therefore, the preservation of the Annex habitat types of the Habitats Directive is particularly important in terms of providing development sites and refuges for insects. Several studies focusing on various insect groups attest to dramatic declines in insects. Hallmann et al. presented alarming results in 2017 based on a standardised survey of flying insects using flight traps (Malaise) from the past 27 years. This survey revealed a decline in insect biomass of more than 75 % in various conservation areas, including many Natura 2000 sites. This scientifically based study attracted a great deal of interest both nationally and internationally and, among other things, was the prelude to numerous political activities at various levels.

Another study from the Randecker Maar research station in the Swabian Alb, for example, shows declines in migratory insects of the hover fly, soldier fly and Ichneumon wasp groups of up to 97 % over the last 40 – 50 years.

These results are also measurable in the Red Lists of insects, which reveal a long-term population decline for over 40 % of the insect species studied in Germany. For example, according to the German Red Lists of the Federal Agency for Nature Conservation, 36 % of hover flies and 52 % of wild bees are endangered, and certain aquatic insect groups may be at much higher risk. Key causes of the increasing threats are the degradation and destruction of insect habitats, including loss of structural diversity, increased use of pesticides and seed dressings, and inputs of nutrients and pollutants. Even though some Red Lists are still being compiled at the European level, various studies indicate that the situation is similarly alarming as in Germany. This has led, for example, to the establishment of the EU-wide Pollinators Initiative (see box).

EU Pollinators Initiative

Against a backdrop of severe insect declines and a high level of endangerment, the EU Commission launched the EU Pollinators Initiative in 2019, focusing on key pollinator groups (wild bees, hover flies and butterflies). It comprises ten sets of measures within the framework of three priority thematic areas (European Commission 2020):

Priority 1: *Improving our understanding of declines, their causes and consequences, e.g. through research, new EU Red Lists, monitoring and the transfer of knowledge.*

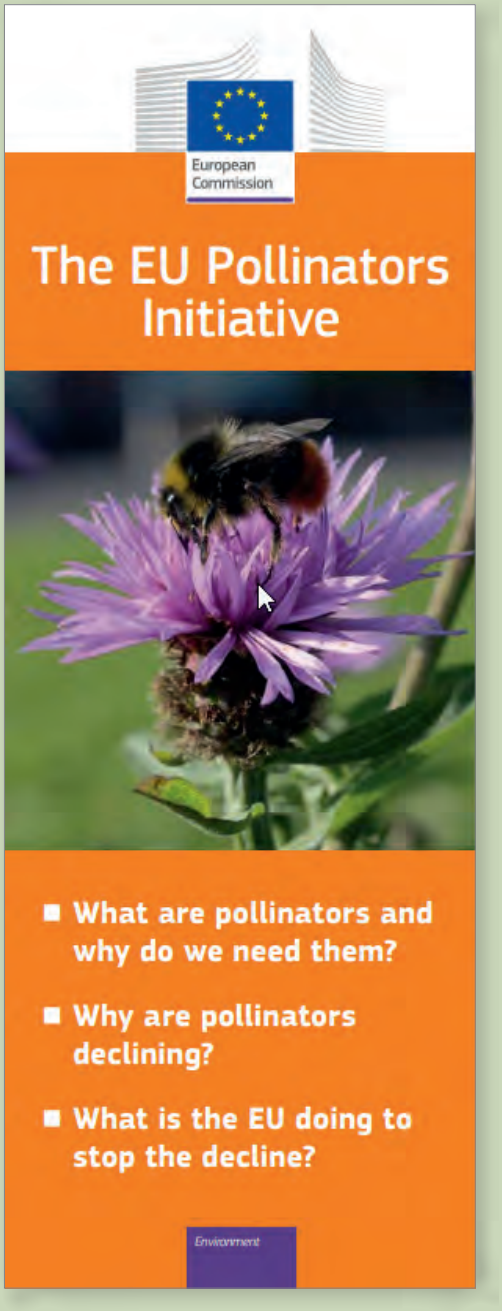
Priority 2: *Addressing the causes, e.g., by improving habitats and reducing pesticide use.*

Priority 3: *Raising society's awareness and promoting cooperation, e.g. by encouraging action at all levels.*

According to an EU survey, the programme resonates greatly with the public, as 94 % of the surveyed population consider the decline of pollinators to be alarming. In addition to their important function in maintaining biodiversity in all terrestrial ecosystems, particularly within the Natura 2000 network, insects contribute approximately 15 billion euros per year to agricultural production through pollination.

It is time to consistently implement insect protection measures!

Mareike Vischer-Leopold & Dr. Axel Ssymank
Federal Agency for Nature Conservation



In response to these findings, greater emphasis is being placed on insect conservation at the policy-making level in Germany as well. For example, the German Federal government has adopted the Action Programme for Insect Conservation, which aims to reverse the declining trend in the populations and biodiversity of insects. To this end, nine action areas have been singled out and are being supported with corresponding measures. The Act for the Protection of Insect Diversity in Germany and the Amendment of Other Regulations enacted in 2021 was an important implementation milestone.

Insects also play a major role as characteristic species in the assessment of the conservation status of the Annex habitat types of the Habitats Directive (parameter specific structures and functions). Characteristic species are species that occur regularly or whose occurrence is prevalent in an Annex habitat type of the Habitats Directive, or at least in an important subtype or variant of a habitat type. For example, as dominant species, they can significantly determine the structure of a habitat type; they can also be used as diagnostic indicator species for identification of a habitat and as special indicator species to identify certain habitat qualities or specific formations. Characteristic species include many plant and animal species, as well as fungi. The majority of characteristic species by far are animals, particularly insects.

Characteristic species are thus integral components of the habitat types listed in the Habitats Directive. For the conservation status of a habitat type to be assessed as favourable, the status of its characteristic species must also be favourable (Article 1(e) of the Habitats Directive). Specifically, suitable conditions for their development are found primarily in the particular habitat type of which they are intrinsic features. Consequently, they receive protection by inhabiting a protected habitat type and have therefore not been separately included in Species Annexes II, IV and V of the Habitats Directive. When the conservation status of a habitat type is being assessed, the characteristic species are included in the parameter specific structures and functions (see box).

Insect diversity in grassland habitats

Many of the Annex habitat types of the Habitats Directive, e.g. hydrophilous tall herb fringe communities, alluvial forests and numerous types of grassland, are characterised by a high number of characteristic animal species, provided they have a favourable conservation status.

For example, in the orchid-rich semi-natural dry grasslands on calcareous substrates priority habitat type (6210), 70 to over 100 plant species can coexist on only 100 m². Approximately 250 characteristic plant species and over 1,000 characteristic insect species, such as specific butterflies, wild bees, beetles and hover flies, are concentrated here. Added to that are an estimated 2,000 to 3,000 other insect species that reside in the habitat type. The more diverse the areas are, the more species will find suitable living conditions there, making the areas all the more valuable. This is reflected in the conservation degree of the area and in the sum of all occurrences in the assessment of conservation status in the biogeographical regions.*

Maintaining this colourful diversity is an essential task of the Natura 2000 network and an essential criterion for achieving favourable conservation status and must be taken into account in management at the site-specific level.

Mareike Vischer-Leopold & Dr. Axel Ssymank
Federal Agency for Nature Conservation

Photo: A. Ssymank

Semi-natural dry grasslands in Baden-Württemberg

Photo: A. Ssymank

Crepuscular burnet

Mudflats at low tide (Habitat type 1140) along the tidal coastline of the "Wadden Sea of Hamburg" National Park Photo: K. Janke

7 Envisioning Natura 2000 sites

The Wadden Sea example

Protection of the Wadden Sea – a well-known international success story

Along the German coastline of the North Sea one of the largest and most important Natura 2000 sites in Central Europe is located - the Wadden Sea, which is shaped by tidal dynamics that expose and reflood a band of the sea floor up to 20 km wide twice a day. The three countries bordering the Wadden Sea (The Netherlands, Denmark, and Germany) instituted the Trilateral Wadden Sea Cooperation for the protection of the Wadden Sea in 1978. The cooperation serves the sustainable development and preservation of this unique landscape for future generations. Perhaps the most significant outcome of this cooperation has been the development of a transnational management system, which is also an outstanding model for international collaboration.

In Germany, the Federal States of Schleswig-Holstein, Hamburg, and Lower Saxony share the Wadden Sea. For this reason, several, largely overlapping Special Areas of Conservation and Special Protcetion Areas were formally designated (see table on p. 41). In Germany alone, and within the twelve-mile boundary of the territorial waters, more than 730,000 ha are now protected by the provisions of the Habitats Directive.

The Hamburg, Schleswig-Holstein and Lower Saxony Wadden Sea National Parks are at the centre of the Natura 2000 sites. In 1998, the Lower-Saxony National Park was declared a Natura 2000 site. Since the autumn of 2004, all three national parks have become part of the European Natura 2000 network (Special Areas of Conservation and Special Protection Areas). This was topped off in 2009 with the recognition of the Wadden Sea as a UNESCO World Heritage site.

The Wadden Sea – an environment subject to continuous change

The Wadden Sea is only a couple of thousand years old; making it very young on a geological time scale. Its formation is linked to the most recent glacial periods, massive sediment transport events and rising sea levels that continue to this day. The Wadden Sea is an example of landscape transformation over a relatively short period of time. The islands and the sand bar habitats protected under the Habitats Directive continue to be highly dynamic; subject to the powers of the sea and winds, their shapes and locations are continuously undergoing change.

Towards the mainland, the Wadden Sea transitions from regularly-flooded mudflats to salt marshes, a habitat type also protected at the European level under the Habitats Directive. These salt marshes contain highly specialised plant communities and their corresponding fauna which are tolerant of salt water. Wherever sandy beaches line the coast, there is a dynamic succession of dunes from the recently formed white dunes, to older grey dunes and, finally, to brown dunes. This whole range of dune habitats is also protected at the European level according to the Habitats Directive.

Photo: A. Ssymank

Over time, the shifting white dunes transform into fixed coastal grey dunes (Habitat Type 2130*). These dunes are a priority habitat type according to the provisions of the Habitats Directive. Pictured are dunes from Sylt Island (Federal State of Schleswig-Holstein) covered with extensive dwarf scrub heath.

Photo: H.-J. Augst

The sand beaches along the North Sea coast are separated from the interior by shifting yellow dunes (Habitat Type 2120) of up to 20 metres in height. The dominant plant is the European beachgrass. Picture taken near the City of St. Peter Ording (Federal State of Schleswig-Holstein) in the “Nationalpark Schleswig-Holsteinisches Wattenmeer und angrenzende Küstengebiete” Natura 2000 site.

Mudflats – diversity associated with sand and mud

At first glance, the habitats created by the Wadden Sea do not appear to be highly structured or capable of supporting numerous species of plants and animals. However, a closer look at the mudflats reveals intense activity caused by "underground" inhabitants. The numerous inhabitants of the mudflats, primarily worms, snails, muscles and crustaceans, leave characteristic tracks. Only a few species exist on the surface of the mudflats that are exposed after the water retreats; these include mussels which are capable of forming large living reefs that serve as habitats for other species of plants and animals.

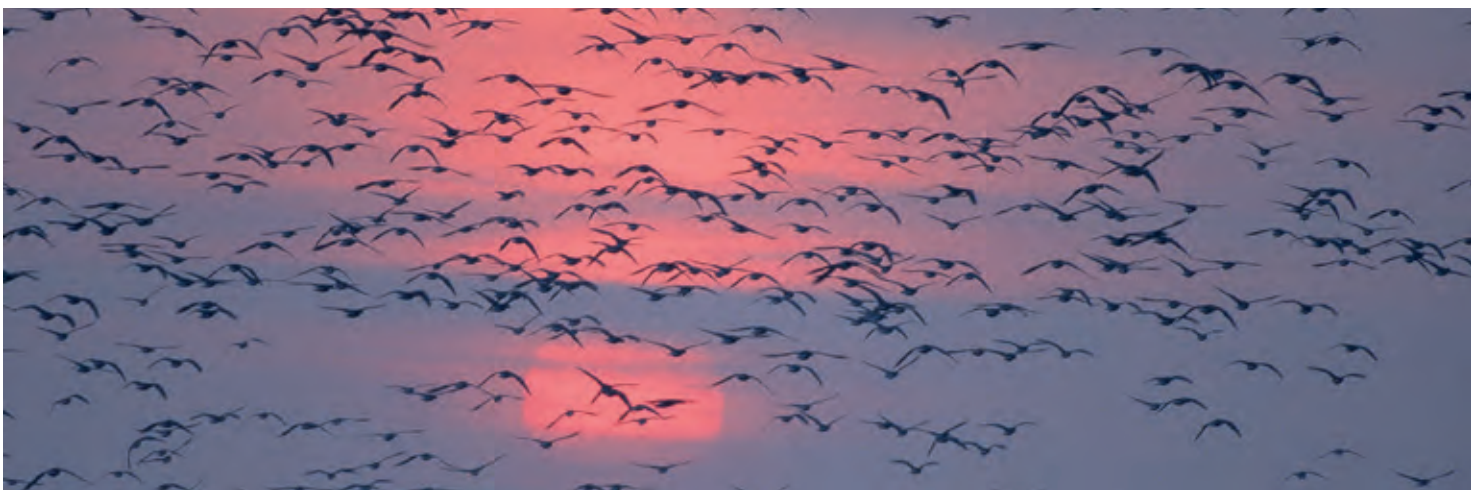
Hermit crabs, starfish, sea urchins, sea anemones and other hydrozoans, as well as numerous species of fish, enrich the characteristic spectrum of species, as do flatfish and shrimps. Not only do the large tidal inlets represent lifelines from the Wadden Sea, they also provide a window into the coastal marine environment. The tidal inlets host typical marine organisms that are not adapted to life outside of the aquatic environment.

Photo: K. Janke

The North Sea shrimp is a keystone species in the Wadden Sea ecosystem. The shrimp is both a predator and an important prey item for fish, birds and seals.

During migration, the Wadden Sea is an important hot spot for migratory birds. It then serves millions of birds as a resting site.

Photo: M. Woike



Ramsar Convention and Natura 2000 in the Federal State of Saxony-Anhalt and Brandenburg

The EU Birds Directive and the Ramsar Convention both target protection for migratory water birds (e.g. geese). Photo: M. Woike

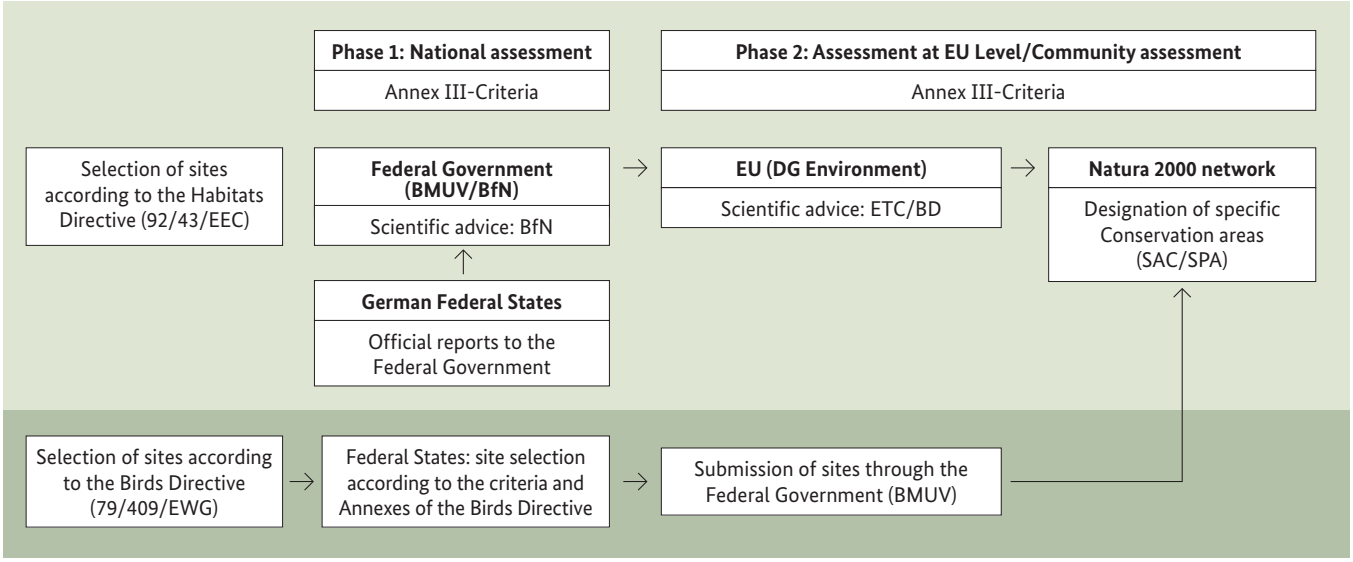
The legally binding Ramsar Convention is an agreement on the protection of internationally important wetlands, for example as a habitat for waterfowl and wading birds. The Ramsar Convention currently protects 2,433 sites encompassing almost 2,5 million km² in 172 nations. This includes 35 sites in Germany (e.g. the Wadden Sea, the Oder Valley, the Lower Rhine floodplain, the Steinhuder Meer and the Chiemsee). Two wetlands of international significance are located in the lowlands of the Elbe and Havel Rivers in the Federal States of Saxony-Anhalt and Braunschweig - the Aland-Elbe-Lowlands/Elbe Floodplain near Jerichow and the Lower Havel Lowlands/Gülper Lake/Schollener Lake. Both Ramsar wetland areas have also been designated as Natura 2000 sites under the EU Birds Directive. Tens of thousands of ducks and geese use these areas as resting and wintering sites. The sites are important on a European scale for the protection of birds such as the crane, the whooper swan and the Bewick's swan, the bean goose and the white fronted goose. Natura 2000 and Ramsar sites — a strong alliance!

Dr. Benjamin Hill & Dr. Christoph Sudfeldt
PGNU & Federation of German Avifaunists

Photo: A. Hoffmann

The Wadden Sea is characterised by rich bird life year-round due to the abundance of food. Birds are particularly conspicuous during migration, when millions of waterfowl and waders rest in the "Wadden Sea" area to replenish energy reserves before continuing their migration.

Selection procedure for Natura 2000 sites



BMUV = Federal Ministry for the Environment, Nature Conservation and Nuclear Safety and Consumer Protection; **BfN** = Federal Agency for Nature Conservation; **EU** (DG Environment) = Directorate-General for the Environment of the European Commission; **ETC/BD** = European Topic Centre on Biological Diversity in Paris; **SAC** = Special Area of Conservation (nationally designated conservation areas according to the provisions of the Habitats Directive); **SPA** = Special Protection Area (nationally designated conservation areas according to the provisions of the Birds Directive)

Table laid for hungry beaks

The Wadden Sea offers an abundance of food to hungry birds. Up to 100,000 snails per m^2 have been recorded in its mudflats; therefore, it is not surprising that it has become a very special habitat for birds. Every year, ten to twelve million birds use the Wadden Sea for breeding, moulting, hibernating or resting, as it serves as a "refuelling station" along the eastern Atlantic migratory route. The Wadden Sea, including the adjacent deeper marine regions, is highly important for the survival of many European waders, ducks, geese, sea swallows, and gulls. This is why it has been designated as a Specific Protection Area (SPA) according to the Birds Directive.

Birds provide a special nature experience for visitors to the Wadden Sea during the autumn and spring. While most of the breeding colonies are off limits, immense and spectacular flocks of migratory birds can easily be observed on the mudflats and in the skies above the Wadden Sea.

Coastal areas containing SACs	Site number	Area (ha)	Federal State
Schleswig-Holstein Wadden Sea National Park and adjacent coastal regions	0916-391	452,101	SH
Lower Saxony Wadden Sea National Park	2306-301	276,956	NI
North Frisian Islands (Sylt, Amrum, Föhr)	0916-392, 1016-392, 1115-301, 1115-391, 1116-391, 1315-391, 1316-301	6,553	SH
Coastal regions in Schleswig-Holstein and estuaries (e.g. Elbe, Weser, Ems estuaries)	1219-301, 1617-301, 1714-391, 1719-391, 2018-331,2316-331, 2323-392, 2417-370, 2507-331	71,960	SH, NI, HB

Coastal areas containing SPAs	Site number	Area (ha)	Federal State
Schleswig-Holstein Wadden Sea National Park and adjacent coastal regions	0916-401	463,907	SH
Lower Saxony Wadden Sea National Park	2210-401	354,882	NI
Coastal regions in SH and estuaries (e.g. Elbe, Weser, Ems estuaries)	1618-404, 2121-401, 2323-402, 2417-401, 2609-401	35,931	SH, NI, HB

Photo: K. Janke

The common glasswort is one of few terrestrial plants that have been able to colonise the tidal zone (Habitat Type 1310). It is specifically adapted for dealing with the high salt concentrations of the sea water.

Photo: BfN; Source: European Union, Copernicus Sentinel Data 2020

Satellite image of German tidal coast with Natura 2000 sites

White border:
Special Areas of Conservation (SAC)

White hatching:
Special Protection Areas (SPA)

Overlapping SAC and SPA areas	Site number	Area (ha)	Federal State
Hamburg Wadden Sea National Park	2016-301	13,750	HH
Hund and Paapsand	2507-301	2,557	NI

	Area (ha)
Total Special Areas of Conservation (SAC)*	823,877
Total Special Protection Areas (SPA)*	871,027

Wadden Sea Natura 2000 sites

(HB = Bremen, HH = Hamburg, NI = Lower Saxony, SH = Schleswig-Holstein);

*The two areas, which are both SAC and SPA, were each included in the total areas for SAC and SPA.
Source: BfN (Federal Agency for Nature Conservation) 2020

In addition to the beech forest types that characterise the low mountain ranges, numerous forest communities on special sites, such as bog woodlands (Habitat Type *91D0), are also protected by Natura 2000. Photo: R. Schaal

8 Natura 2000 in forests

Forests in Germany

In its natural state, Germany would be almost completely covered with forests. Today, only around one third of our country is forested, making Germany one of most densely forested countries in Central Europe. As "pristine" as some forests may seem, however, there are no longer any genuine old-growth forests in our country that have not been influenced by human activity. The economic importance of the forest for man was too compelling for it to be left alone. However, despite their history of more or less intensive use, semi-natural forests in particular perform a variety of functions. They serve as water reservoirs, oxygen donors and CO_2 sinks as well as recreational and economic assets. At the same time, they are home to numerous species of plants and animals in the Central European natural landscape. Forests are recreational areas of the highest order, providing relaxation and recreation away from the hustle and bustle of everyday life. Seclusion, tranquillity, clean air and clear streams draw millions of city dwellers out into the forests every weekend.

The beech – a true European

Natural forests in Germany are dominated by deciduous trees. While the oak is often assigned a central place in German myth and culture, the European Beech, a straight-growing tree with smooth bark, is particularly characteristic of German forests. The European Beech is restricted to Europe and has its centre of distribution in Germany. Therefore, Europe and Germany have a particular responsibility to protect and preserve beech forests. Germany has met this responsibility by designating five national parks and numerous Natura 2000 sites that are primarily devoted to the protection of beech forests.

Photo: F. Grawe

Luzelo-fagetum beech forest (Habitat Type 9110) in the "Hannoversche Klippen" Natura 2000 site (Solling Mountains, Federal State of North Rhine-Westphalia)

But no two beech forests are alike. Depending on geological and soil conditions, the herbaceous communities associated with beech forests differ rather significantly. A rich herbaceous community, with many orchids in particular (including the rare lady's slipper), characterise the Medio-European limestone beech forests (Habitat Type 9150).

Photo: F. Grawe

Before the leaves sprout in the spring, the forest floor of beech forests on limestone (Habitat Type 9130), turns into a sea of flowers. Blossoming larkspur is particularly beautiful ("Schwiemelkopf" Natura 2000 site, Federal State of North Rhine-Westphalia).

Photo: B. Fischer

The black woodpecker is an important keystone species in our forests. The bird makes tree cavities which are subsequently inhabited by numerous other species.

Particularly impressive is the spring flora in the Asperulo Fagetum beech forests. Before the leaves sprout in April and May, this forest floor is covered with corydalis, anemones and Bear's garlic. In contrast, the Luzulo-Fagetum beech forest on more acidic soils is largely lacking in an abundant herbaceous layer. The Natura 2000 network includes all important types of beech forest in Germany.

World natural heritage Beech Forests

Beech forests would naturally cover large parts of Europe's temperate climate zones from the sea coast to the tree line in the mountains. The beech's history of post-glacial propagation as well as its adaptation to extremely diverse site conditions and the formation of multiple forest types constitute an ongoing ecological and biological process that has been accorded exceptional universal value with its registration on UNESCO's World Heritage List. The European Beech Forests World Natural Heritage Site currently comprises 78 sub-areas in twelve European countries. These remnants of former old-growth forests and ancient natural forests are among the most valuable natural heritage in the world.

Prof. Dr. Hans Dieter Knapp
Succow Foundation

Semi-natural beech forest in the Kellerwald-Edersee National Park
Photo: S. Lehrke

Bear's garlic in an "Asperulo-Fagetum" beech forest (Habitat Type 9130) in the "Hinnenburger Forst" Natura 2000 site (Federal State of North Rhine-Westphalia) Photo: F. Grawe

Photo: U. Bense

The Rosalia longicorn beetle is conspicuously colourful, and its body reaches lengths of up to 3.5 cm (Annex II * and IV). It is one of the most beautiful and most impressive beetles in Germany. Its larvae develop in deciduous deadwood that is well exposed to sunlight. The European beech (Fagus sylvatica) is the preferred host for the larvae in central Europe.

Photo: S. Lehrke

Larch and larch/stone pine forests (Habitat Type 9420) form the upper tree line in the Alps and provide important protection against avalanches (Berchtesgaden Alps).

Protection of forest-associated diversity

Forests are one of the cornerstones of the Natura 2000 network in central Europe. While past efforts to protect forests were primarily aimed at specific unusual sites, Natura 2000 reaches beyond that. In Germany, Annex I protects a range of 18 different types of forest. Annex I forest habitat types within Natura 2000 sites cover almost 760,000 ha, corresponding to around half the area of all protected habitat types in Natura 2000 sites and approximately 2 % of the German territory. Apart from the various types of beech forest, oak and oak-hornbeam forests, and bog woodlands, which are restricted to rather small patches, ravine forests and alluvial forests along rivers and streams also contribute to the protected European natural heritage. Coniferous forests are primarily represented by high-mountain and alpine spruce communities found in the Alps and the higher regions of the central low mountain ranges. Certain pine forests and alpine larch and Arolla pine forests are also protected according to Annex I of the Habitats Directive.

Forestry and Natura 2000

In general, forestry-related utilisation is still possible in Natura 2000 sites. The terrestrial Natura 2000 sites in Germany contain a comparatively high proportion of forested areas—more than 50 %. In the Special Areas of Conservation (SAC), almost 40 % of the forested areas can be attributed to the corresponding habitat types listed in Annex I of the Habitats Directive. In Germany, 355,000 hectares of forest, or 3,1 % of the nation's forested area, are currently developing permanently without direct human intervention (forests with natural forest development). Increasing natural development areas in forests to 5 % is a goal of the national biodiversity strategy. Lowland spruce forests, most of the pine forests and all special crops such as poplar forests are not covered by the protection of the Habitats Directive.

There are no restrictions on forestry there, unless these stands provide habitat for species of the Habitats and Birds Directives (e.g. nesting site of the black stork or mating site of the wood grouse), and even in the protected forest types, utilisation is still possible over a large area while taking conservation objectives into account. In the case of secondary oak-hornbeam forests, forestry-related utilisation may even be necessary to ensure their preservation. Sustainable management and the conservation of biodiversity should be even better reconciled in the future. The guide, "Natura 2000 and Forests", published by the EU Commission in 2015, explains how this can be achieved. The guide gives answers to frequently asked questions regarding the management of Natura 2000 forest areas, and presents case studies from several EU member states on good professional practice in Natura 2000 sites.

The preservation of the structural diversity of these forest communities is crucial despite forestry use. Animals such as the black woodpecker or bats need habitats with a large assortment of old trees. Only old trees provide the cavities these species depend upon. Hundreds of species of beetles and mushrooms require deadwood as a basic component; these include spectacular beetles such as the Rosalia longicorn beetle and the great Capricorn beetle. Forestry will have to rise to the challenge of preserving structural diversity while continuing to use wood as a basic renewable resource. There are, however, some more demanding forest and deadwood species which require pristine relic areas – forest areas which are to be left untouched by humans. In order to preserve the overall richness of forest species, the proportion of forested area without human intervention set aside within Natura 2000 sites should be increased. This would create synergy with the federal government's wilderness targets, and the importance of other functions such as flood and erosion protection, protection of drinking water and recreation might be strengthened in these sites.

The wildcat – a secret "native inhabitant" of our forests

The wildcat is a shy inhabitant of our indigenous forests. Originally widespread over large parts of Central Europe, in Germany it is now mostly found only in small remnant populations that are isolated from each other by roads, settlements, and agricultural areas; this decline is due, among other things, to centuries of hunting and habitat destruction. Wildcats are not feral domestic cats (which came to us only with the Romans), but real "natives". They prefer semi-natural, structurally rich deciduous and mixed forests with good hiding places. The European wildcat is listed in Annex IV of the Habitats Directive and is therefore a "species of Community interest" that must be protected throughout the EU. Its primary area of distribution today is in Germany with an estimated 6,000 – 8,000 animals, which means that the Federal Republic has an international responsibility for the conservation of this species.

One of the projects that the Federal Agency for Nature Conservation has funded in order to stabilise, expand and connect the wildcat population is the "Wildcat's Leap" project. This project was developed by the BUND (German Association for the Environment and Nature Conservation) within the framework of the Federal Biological Diversity Programme, one of the largest nature conservation projects in Europe with strong public and volunteer involvement ("Citizen Science"). Its scope included supporting important measures for the development of the BUND's Wildcat Routing Map for the Germany-wide connection of forest habitats for the wildcat target species in order to pave the way for the wildcat and many other species to recapture former habitats.

Stefan Lehrke
Federal Agency for Nature Conservation

Photo: S. Lehrke

Wildcat routing map and distribution of the European wildcat in Germany (as of 2019)

Distribution of the European wildcat
(sightings 2008 – 2020)

- Wildcat distribution area
- suitable unsettled habitats (> 500 km²)
- necessary forest connections for wildcats and others

The Kaiserstuhl, an old cultural landscape in the Federal State of Baden-Württemberg, is famous well beyond Germany for its viticulture and extended semi-natural dry grasslands on calcareous substrates (Habitat Type 6210). Photo: B. Beinlich

9 Agriculture and Natura 2000 – preservation of cultural landscapes

Agriculture and landscape change

The varied central European cultural landscape is the result of the labours of many generations of farmers. Until the middle of the last century, farming operations compensated for a lack of machinery with numerous farm workers and draft animals. It was not the power of the available machinery, but rather the condition of the draft animals that determined how much land could be farmed during any given day. Fields and meadows, in fact the whole landscape, were highly structured and patchy. These small, varied landscapes provided abundant suitable habitat for many species. The overall shortage of nutrients produced sites that were sparsely vegetated and favourable for competitively inferior species for that very reason. Today, the input of fertiliser is generally high, with up-to-date technology further contributing to the levelling of differences between sites and resulting in severe negative consequences for species diversity.

Photo: B. Beinlich

Semi-natural dry grasslands on calcareous substrates (Habitat Type 6210) and beech forest (Habitat Types 9130, 9150) dominate the slopes of the Lauter River valley on the Swabian Alb Mountains (Federal State of Baden-Württemberg).

Photo: F. Grawe

Orchid-rich semi-natural calcareous grasslands are among the priority habitat types (Habitat Type 6210*). Pictured is the three-toothed orchid in the "Warmberg" Natura 2000 site (Federal State of Hesse).

Agriculture in Natura 2000 sites

The proportion of farmed land within Natura 2000 sites in Germany amounts to approximately 37 % of the area in the country's terrestrial Natura 2000 sites. Fertile fields and intensively-used grasslands are not among the habitat types protected according to Annex I of the Habitats Directive. However, in some regions, fields and grassland managed for high-intensity production might actually harbour species, such as resting geese and cranes, that are protected according to the annexes of the Habitats and Birds Directives. Overall, open landscape Annex I habitat types comprise approximately 20 % of the area covered by Natura 2000 sites. Most protected habitat types are located in marginal areas or in cultural landscape segments where the intensity of use is low. Protected habitat types include heathlands, dry grasslands, species rich hay meadows in lowland and mountainous regions, and alluvial grasslands. The above-mentioned habitat types, including their characteristic species, were the result of farming activities. Continued use is thus required in order to maintain favourable conservation status at these sites. Farmers who refrain from maximum output preserve our natural resources — biological diversity and landscapes suited for recreation. Under these circumstances, it is obvious that farmers should be compensated for their additional efforts to enhance nature conservation.

Landscape conservation management at the Humperts

Species-rich grasslands have frequently been reduced to small remnant patches. This has hampered economically profitable utilisation. The Humpert family from Löwendorf in Höxter County (Federal State of North Rhine-Westphalia) have demonstrated that low-intensity use of species-rich grasslands can be economically feasible: they manage a total of 40 hectares of grassland with their 400 sheep. This includes five hectares of dry calcareous grassland and ten hectares of pastoral wetlands rich in orchids. The Humperts use old breeds of sheep – Baltic domestic sheep (also called "Skudden" sheep), white hornless heathsheep and German grey heaths. Because these rather small animals are difficult to profitably market via conventional routes, the Humpert family uses the attraction of a 400-year old farm to directly sell their products. Ms Humpert is very concerned about the species-rich grassland and the old breeds of sheep, and so in her function as chair of the Sheep Breeders Association of North Rhine-Westphalia, she also strongly supports the preservation of sheep farming and the protection of the calcareous grasslands and the species-rich cultivated grassland. Success has proven her right! This model should set a precedent.

Dr. Burkhard Beinlich
Bioplan Marburg-Höxter

Photo: F. Grawe

Shepherd Ortrun Humpert with her Skudden sheep.

Cultural landscapes for recreation

Agriculture has created some key elements of our cultural landscapes. Examples include:

- **Heathlands:** Each year the "Lüneburger Heide" heathland attracts thousands of visitors into what are perceived as wild, romantic natural areas. But the flowering heathlands were formed by specific land use practices and can only be maintained by land use practices adapted to the needs of the biological communities. Without the "four-legged lawn-mowers", the heathland sheep, neither the heathland nor the rare animals that are dependent on this habitat type, such as the heath cock, woodlark or European viper would be present.
- **Species-rich meadows:** Once widely distributed, species-rich meadows that are cut once or twice each year are now hard to find. Today, these flower-rich meadows portrayed in the past, and thus "preserved" in so many paintings, are rather a rare sight. They are among the most severely endangered habitat types listed in Annex I of the Habitats Directive.
- **Meadow orchards:** extensive orchards composed of large, scattered fruit trees are another typical habitat type of the cultural landscape. In the spring, the orchards form a sea of flowers made up of colourful meadows and blooming trees. But fruit trees are not just for nature lovers; they also deliver tasty products such as honey, cider and aromatic distilled beverages. Old fruit trees in particular provide holes for cavity-nesting birds such as the Minerva owl and the wryneck.

Each traditional cultural landscape has its associated valuable grassland: Nardus-grasslands with arnica in the siliceous low mountain ranges, dry chalk grasslands in calcareous regions, and alluvial grasslands in the floodplains of large rivers.

Photo: B. Beinlich

The Lüneburg heathlands are an old and particularly charming cultural landscape

Photo: F Grawe

Flower-rich hay meadow with meadow sage (Habitat Type 6510) in the "Kalkmagerrasen bei Ossendorf" Special Area of Conservation, Diemel Valley (Federal State of North Rhine-Westphalia)

Photo: F. Grawe

Orchards provide valuable produce and are also home to a large number of endangered species such as the little owl.

Photo: M. Woike

The little owl (Annex I, Birds Directive) used to be common and widespread in meadow orchards but has become increasingly rare.

Photo: A. Ssymank

Arnica (Annex V) is an important medicinal plant. It typically occurs in Nardus grasslands.

Photo: R. Groß

The common hamster (Annex IV) is a synantropic species that prefers to build its dens in loess and clay fields.

Birds flying...

Certain protected farmland species are important to specific regions — the hamster in the loess regions of eastern Lower Saxony and Saxony-Anhalt, the whiskered brome in south-western Germany, or meadow breeding birds in certain grassland-dominated regions. A different kind of agricultural plot might be temporarily important for migratory birds. Every winter, the grasslands along the lower Rhine and Elbe rivers become hot-spots for geese from northern Europe. In autumn, cranes choose regular fields in north-eastern Germany to rest and gather food; this is where these "birds of fortune" acquire the necessary reserves for their subsequent long-distance flight to their winter roosts in southern Spain.

Photo: M. Woike

Crane courtship display

Photo: M. Woike

Bogs and heathlands are the preferred habitat of the black grouse (Annex I, Birds Directive).

The cultural landscape as an economic factor

Farmers can and should profit from Natura 2000. Funds are available for the maintenance of the cultural landscape and for specific landscape management measures through agri-environment programmes (Chapter 17). In the future, more such funds will be directed to compensate for low-intensity land use practices in Natura 2000 sites. The Natura 2000 network, therefore, will become a reliable source of income for farming operations through the compensation of farmers for refraining from maximum production as well as through the publicity to be gained in agro-tourism and direct farm marketing. There are already farms that count on Natura 2000 for reliable income.

Photo: M. Klüber

European Protected Grassland in the Rhön Mountains

The higher altitudes of the Rhön Biosphere Reserve are home to one of the most diverse and largest contiguous complexes of protected grassland habitats in Central Europe. Mountain hay meadows (Habitat Type 6520) of various types alternate with species-rich Nardus grasslands on siliceous substrates in mountain areas (Habitat Type 6230), and hydrophilous tall herb fringe communities (Habitat Type 6430) grow along the numerous watercourses. The areas have been used by local farmers in the context of contractual nature conservation for more than 25 years. Late cutting, which takes place once a year, does not always yield usable hay. The grassland areas of the High Rhön also have a lot to offer visitors: They are well connected by hiking trails and are adorned with a colourful sea of flowers, especially from mid-May to the end of June.

Michael Geier
Bavarian Administration Rhön UNESCO Biosphere Reserve

Caring for Natura 2000 sites – the landcare associations in Bavaria

Mowing species-rich wet and dry meadows, clearing scrub from nutrient-poor grasslands or rewetting bogs as habitats for rare animal and plant species—classic maintenance measures such as these form the core business of the landcare associations (LCA). The most important support programme is the Bavarian Landcare and Nature Park Guideline of the Bavarian Ministry of the Environment. As of November 2020, there are 64 landcare associations and comparable organisations in Bavaria. Their work focuses on the maintenance and enhancement of habitats for the protection of species, and they are active in around 300 Natura 2000 open habitats in Bavaria. The maintenance work is usually performed by farmers who contribute their experience and knowledge to the conservation effort. The LCAs work with more than 3,500 farmers and shepherds throughout Bavaria, who benefit directly by receiving additional income from their landcare activities: They are reimbursed for their work according to fixed hourly rates based on the effort involved. In addition, the public presentation of landcare projects by the LCA helps to increase the public's appreciation of the time-consuming maintenance work that farmers do to preserve the local cultural landscape.

Landcare in wet bog areas still involves manual labour. Photo: P. Roggenthin

Beate Krettinger
Bavaria State Coordinator, Landcare Germany (DVL)

Natura 2000 within agri-environment programmes – support for the management of species-rich grasslands in Baden-Württemberg

Low-intensity utilisation of agricultural lands creates diversity in terms of plants and animals but reduces agricultural yields. Agri-environment programmes help compensate farmers for lost yields, fostering acceptance of nature and nature conservation. The Baden-Württemberg programme for agri-environment, climate change mitigation and animal welfare (FAKT) is also dedicated to promoting species-rich grassland in Natura 2000 sites. The valuable meadows were mapped by experts within the scope of management planning. Although no proof of qualification by farmers is required for FAKT funding, they have access to recommendations for compatible management, and implementation is the responsibility of the farm. This makes the process less bureaucratic as well as more customisable and attractive. This is the approach of the Habitats Directive translated into practice: goal-oriented support for Natura 2000 instead of rigid regulations.

Prof. Dr. Martin Dieterich
ILN Südwest

In Natura 2000 sites, cutting grasslands with cutter bars, which is more compatible for wildlife, can be specially rewarded under the Baden-Württemberg support programme for agri-environment, climate change mitigation and animal welfare. Photo: J. Einstein

Semi-natural stream in the “Ammergau Alps” Natura 2000 site

Photo: S. Lehrke

10 Europe-wide protection of our inland waters

Water – the source of life

Life on earth originated in water and is inseparably connected with water. People, animals and plants need water—water as sustenance, water as habitat and water for recreation. Rivers, floodplains, bogs and springs are defining elements of the landscape. For good reason, many wetlands and water bodies enjoy special protection under the European Nature Directives.

Diversity is endangered.

Formerly widespread fish species protected by the Habitats Directive, such as salmon and sturgeon, or cyclostomes such as brook and river lamprey, as well as the European pond turtle, the fire-bellied toad and the Common european river mussel have disappeared from our aquatic systems in many places. In addition to these and many other species, various aquatic habitat types such as oligotrophic standing waters, lime-rich ponds, semi-natural watercourses and various types of bog are also strictly protected. Their populations and habitats need to be allowed to recover, because 80 % of Germany’s floodplain and aquatic biotopes are currently endangered. The European Natura 2000 network plays a crucial role here, as more than half of the floodplains on Germany’s major rivers are located in Natura 2000 sites.

Photo: A. Hartl

The European grayling, listed in Annex II of the Habitats Directive

Most native standing waters are particularly polluted by the excessive inputs of nutrients and pollutants, and increasingly by climate change as well. The structures of watercourses are often severely altered by shortening, straightening, bank stabilisation and transverse structures. Two-thirds of the former floodplain areas have been lost due to dike construction and deepening of water bodies. Large parts of the floodplains have been drained. These alterations and pressures have left our aquatic systems ecologically impoverished and have led to high levels of threat to aquatic habitats and their species nationwide. Natura 2000 helps to ensure that water-dependent species can spread again and that their habitats are preserved.

Joining forces to hit the target

Maintaining or restoring a good conservation status of our aquatic systems goes hand in hand with meeting the goals of the EU Water Framework Directive (WFD), which calls for "good status" of surface waters and groundwater. In addition to maintaining or achieving good ecological and chemical status for aquatic systems and good chemical and quantitative status for groundwater, this also includes the long-term protection of water-dependent Natura 2000 sites. In relation to the respective type of aquatic system, a "good" status is one that deviates only slightly from the natural reference status. While the reporting obligation of the WFD is primarily focused on larger aquatic systems (lakes larger than 50 ha and river catchment areas larger than 10 km²), Natura 2000 is about maintaining and improving a good ecological status for all aquatic habitat types protected under the Habitats Directive. To achieve this, it is imperative to reduce the input of nutrients and pollutants in order to protect the oligotrophic habitat types in particular as well as the species that live in them.

In the case of watercourses and floodplains, it is also necessary to ensure that the requirements specific to the aquatic system are met and to focus on restoring semi-natural riparian corridors and allowing them to develop their own dynamics.

Photo: J.-H. Augst

Rivers and streams with floating vegetation (Habitat Type 3260) are protected under the Habitats Directive (flowering aspect of the white water-buttercup, Osterau River, Federal State of Schleswig-Holstein).

Pond landscape in the Oberlausitz

In terms of surface area, the Oberlausitzer Heideland (heathland) is among the largest Special Protection Areas and Special Areas of Conservation in the Federal State of Saxony. On both a national and a European scale, a varied cultural landscape is an important refuge for species that depend on healthy aquatic ecosystems. Here, the otter, which in the past was rigorously hunted for its fur and as a competitor for fish, has its highest population density in Germany. Similarly, the extremely rare floating water plantain (Luronium natans), which depends on oligotrophic ponds exposed to sunshine, is more abundant here than anywhere else in Germany. Many other species listed in the Annexes of the Habitats Directive such as the pond bat, the fire bellied toad, the large white-faced darter, and the moss grass find suitable habitat in the Oberlausitzer heathland ponds.

Dr. Benjamin Hill
PGNU

Heath pond in the "Oberlausitzer Teichlandschaft" (Upper Lusatian heath and pond landscape) biosphere reserve and Natura 2000 site (Federal State of Saxony) Photo: W. Böhnert

Photo: G. Ellwanger

The otter (Annexes II and IV) requires semi-natural watercourses and riparian areas.

The stepping stone concept for the protection of migratory fish – coherence matters

Around 90 of the 450 European species of freshwater fish occur in Germany. Each of these species is migratory; however, their migration distances vary. The fish species that migrate over long distances are in particular need of resting areas (e. g. mouths of tributaries, backwaters or protected zones behind islands). In addition to requiring spawning sites, fish species protected under the Habitats Directive also require protection of all the different habitat types they use during their life cycle. The "stepping stone" concept was developed in the Federal State of Baden-Württemberg in order to ensure migration between different habitat types. This concept requires designated resting and recovery areas in rivers and streams. These designated areas are to be established every 10 – 20 km, extend over at least 2 – 3 km, and span the river from bank to bank.

Dr. Ronald Fricke
Museum of Natural History Stuttgart

Gravel bars above and below the water surface characterise natural streams in German low mountain ranges. Many species of fish such as grayling, trout and salmon depend on gravel bars for spawning.
Photo: F. Grawe

The salmon is the most well-known migratory fish (Annex II). It has been re-established in Germany during the last few years.
Photo: B. Stemmer

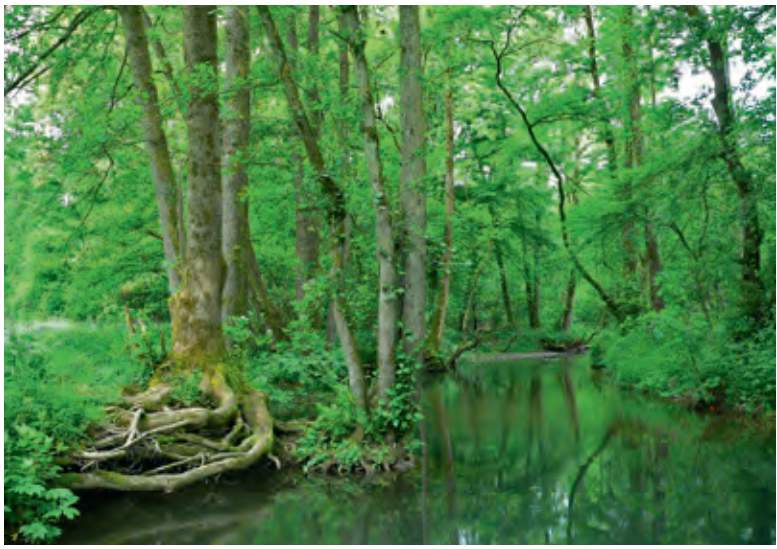


Photo: Ch. Buchen

Alluvial forests (Habitat Type 91E0) are inseparably linked with watercourses. These priority habitats are strictly protected under the Habitats Directive (Sieg River, Federal State of North Rhine-Westphalia).

In many cases, initial measures are already sufficient for renaturation, enabling the stream or river to re-establish its natural structures and habitats on its own. The continuation of technically-oriented watercourse development works against this and should be avoided wherever possible or reduced to the necessary minimum. In addition, watercourse development must always consider the entire watercourse in combination with its banks and floodplain. Both the Water Framework Directive and the Habitats Directive contain regulations that require EU states to avoid further deterioration of the ecological status of aquatic systems. Both directives require regular inventories and the status of the aquatic system is to be determined based on monitoring. Planning and implementation of suitable management measures must ensure a significant improvement in the status of our aquatic systems. However, nature is not the only beneficiary of intact watercourses, floodplain landscapes, bogs, lakes and other aquatic habitats.

Photo: R. Köhler / DGL AK Tauchen

Lake Stechlin, a clear water lake with several species of stonewort (Habitat Type 3140) in the "Stechlin" Natura 2000 site (Federal State of Brandenburg)

Depending on the type of aquatic habitat, they can retain nutrients such as nitrogen and phosphorus, regulate the water balance (particularly in floodplains), and serve to mitigate climate change (particularly in bogs), among other things.

As a whole, they are popular and indispensable recreational spaces for people and provide indispensable and invaluable ecosystem services to humanity. Giving rivers more space by reconnecting old floodplain areas to the flooding process is also an important contribution to preventive flood protection in accordance with the EU Directive on the assessment and management of flood risks. The floodplain status report (Auenzustandsbericht) by the Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) and the Federal Agency for Nature Conservation (BfN) provides information on the status of floodplains that can still be flooded and the loss of floodplains in Germany. The Federal "Blue Belt Germany" programme is contributing to the establishment of an ecological biotope network along German waterways and their floodplains.

Wide shallow, silted zones with large-leafed floating vegetation and reed beds characterise the habitat type "Natural Eutrophic Lakes" (Habitat Type 3150). Pictured is the Kellener Altrhein, Federal State of North Rhine-Westphalia. Photo: M. Woike

The various policies and programmes offer enormous potential for synergy. Wherever possible, these potentials should be used to implement renaturation measures on as large a scale as possible.

Giving more space back to the river

The German Federation for the Environment and Nature Conservation Centre for floodplains (BUND Auenzentrum) has gradually restored the former floodplain of the middle Elbe river within the scope of several large-scale nature conservation projects. A large-scale dike relocation near Lenzen in Brandenburg reconnected 420 ha of old floodplain to the natural flood dynamics ("Lenzener Elbtalaue" large-scale nature conservation project). A few kilometres upstream in Saxony-Anhalt, the Hohe Garbe peninsula, also 420 hectares in size, had been separated from the river by an old, non-functional dike. The dike was opened in several places to reintegrate the most important old hardwood riparian forest in the region into the active Elbe floodplain ("Living floodplains for the Elbe" in the Federal Programme for Biological Diversity).

Measures such as the reactivation of flood channels, the design of small bodies of water and some preliminary planting served to restore floodplain-typical habitats, which can now develop naturally. These include Annex Habitat Types 91F0 (riparian mixed oak-elm-ash forests of great rivers (Ulmenion minoris)), 91E0 (alluvial forests (Alnio-padion, Alnion incanae, Salicion albae)) and 3270 (rivers with muddy banks with Chenopodion rubri pp and Bidention pp vegetation). Species that depend on these habitats, such as the beaver, the otter, the black stork, the white-tailed eagle, the fire-bellied toad or the northern great crested newt, also benefit from this.*

Photo: BfN/Trägerverbund Burg Lenzen e.V./Katharina Nabel

Dike relocation near Lenzen with new floodplain between old dike (right) and new dike (left)

However, the large-scale restoration of floodplains serves not only the implementation of Natura 2000 and the conservation of biotopes and wildlife, but also the objectives of the EU Water Framework Directive and the Directive on the assessment and management of flood risks. It therefore represents an exemplary cooperation between nature conservation and flood protection as a forward-looking variant of ecological river basin management.

Dr. Meike Kleinwächter
Head of German Federation for the Environment and Nature Conservation Centre for floodplains (BUND Auenzentrum), Lenzen Castle

Large areas of the German North and Baltic Seas are registered as Natura 2000 sites. Photo: S. Lehrke

11 Undiscovered beauty far off the coast

The Natura 2000 European network aims to preserve and restore the diversity of habitats and species on land and in the open sea beyond the twelve-mile boundary. When thinking about the sea, people usually associate the offshore regions with distant horizons, wind, waves, and storms; i.e. the ocean surfaces, far away from more familiar, secure land environments. Rarely do they imagine the abundance of life below the surface. Of course, we also rely on the sea for human commerce. In this context, it is seen by each industry in terms of its practical implications regarding, for example shipping, fisheries, wind power, underwater cables and pipelines, drilling for oil and gas, or sand and cobble extraction. The secrets of marine life are still largely unknown, and only recently has marine ecological research begun to gain insights into this realm.

Some key questions for marine biodiversity research off the German coasts have included:

- Where are the most valuable sand banks and reefs located and why are they so special?
- Where do seals and porpoises obtain their food, where do they rest and what threats do they face?
- Which species of endangered seabirds hibernate, moult and feed off the coast? What trends can we observe regarding the development of their populations?

The coastal waters of the North Sea provide habitat for the harbour seal, which is protected according to Annex II of the Habitats Directive. Photo: K. Janke

The answers can be found in the results of studies initiated by the Federal Agency for Nature Conservation (BfN) in the German exclusive economic zone of the North Sea and Baltic Sea (EEZ, 12 to 200 nautical-mile zone), which are extensive, large-scale research projects conducted by renowned German marine research institutes. They are currently compiled in one report of results each for the North Sea (BfN Publication 477, 2017) and the Baltic Sea (BfN Publication 553, 2020).

Geese and ducks are incapable of flying for a certain period of time while moulting. During this phase, many species, such as the shelduck, depend on remote marine refuges such as sand banks in the coastal areas. Photo: H.-J. Augst

The reason for this commitment is that out at sea, it is not the coastal Federal States, but the Federal government and thus the Federal Ministry for the Environment and the Federal Agency for Nature Conservation that are responsible for nature conservation.

A total of ten Natura 2000 sites have been identified in the German EEZ of the North and Baltic Seas. They were registered with the EU Commission in 2004 and recognised by the Commission in 2007. In 2017, they were grouped into six areas that were designated as nature reserves and placed under national protection. Another milestone was reached in May 2020, when the management plans for the three EEZ nature reserves in the North Sea came into force with their publication in theFederal Gazette ("Bundesanzeiger"). The Federal Agency for Nature Conservation is currently finalising the management plans for the three Baltic Sea nature reserves in the EEZ which are the result of an intensive coordination process with other agencies affected within their jurisdiction, German coastal Federal States, and interested members of the public.

Photo: juniors@wildlife

Harbour Porpoise

With a maximum length of 1.85 m, the harbour porpoise (Phocoena phocoena) is one of the smallest whale species of all. It is a protected species under Annexes II and IV of the Habitats Directive, inhabits shallow coastal waters in the northern hemisphere, and is the only whale species found in larger numbers in both the North Sea and the Baltic Sea. In Germany, different Harbour porpoise populations have been identified in the Belt Sea (in the western part of the Baltic Sea), the central Baltic Sea, and the southern North Sea, with the latter having a significant concentration of harbour porpoises especially in an area north-west of the island of Sylt. The first European whale sanctuary west of Sylt was designated for the long-term protection of the harbour porpoise in 1999. Adjacent to this, in the German Exclusive Economic Zone (EEZ), is the Sylt Outer Reef, the most important reproduction area for harbour porpoises in the German North Sea. Along with five other areas in the EEZ of the German North Sea and Baltic Sea, it was placed under protection as a nature reserve in 2017 and provides important feeding and migration habitats for harbour porpoises. The designation of these conservation areas is an important milestone for comprehensive marine conservation which will serve as a basis for the effective protection of harbour porpoises.

The current population in the German North Sea is estimated to be between 16,500 and 46,000 individuals. Harbour porpoises are still much more common in the German western Baltic Sea, with an estimated 1,900 to 5,300 individuals, than in the central Baltic Sea, where the total population is severely endangered with only around 500 individuals left. A migration possibility is particularly essential to the survival of these individuals which migrate from ice-covered regions to ice-free zones in the winter. The principal threats are still considered to be high bycatch rates in gillnetting, a fishing method that uses gillnets, as well as maritime traffic, underwater noise, pollutant loads and overfishing of forage fish..

Mirko Hauswirth
Federal Agency for Nature Conservation

Bird protection in the Baltic Sea – the Pomeranian Bay nature reserve

During the dark, cold winter, when the northern parts of the Baltic Sea are covered with ice, many sea ducks, divers and auks gather in the southern parts of the Baltic Sea on the banks of the Oder in the Pomeranian Bay.

Even during very harsh winters, the Baltic Sea retains open water in these areas. Here, the sandbanks and reefs provide easy-to-access feeding grounds which, at the same time, are far away from the disturbances of major shipping routes. More than 200,000 ha in this region are reserved for the protection of birds. This considerable size is necessary, as up to 140,000 long-tailed ducks (more than 23.5 % of the Baltic Sea population) and 55,000 velvet scoters overwinter in this area on the sea. In addition, birds such as red-throated divers and black-throated divers, red-necked and horned grebes arrive from their summer breeding grounds, which are further north in Scandinavia and Russia, to spend the winter on the Pomeranian Bay. In summer, it is frequented by more than 125,000 common and velvet scoters during their moulting season.

Dr. Jochen Krause
Federal Agency for Nature Conservation

These nature reserves host outstanding examples of sandbank and reef communities, providing habitat for benthic organisms such as leathery corals, sea anemones and mussels, as well as endangered migratory fish species such as the twaite shad and river lamprey. Migrating long distances, common seals, harbour porpoises and grey seals use the protected marine areas for feeding and reproduction. Offshore, in the German EEZ, rare birds such as red-throated and black-throated divers, long-tailed ducks, common and velvet scoters occur in densities that are significant at the international level. Outside of the breeding season, these birds rest, feed and moult in these important foraging grounds.

The development of the status of these marine protected areas is now being documented and monitored by the Federal Agency for Nature Protection (BfN). With the Natura 2000 network established, a major step has been taken toward preserving marine biodiversity, and more must follow. During the next years, it is important balance the extend and methods of human use with the resilience level of marine nature and the marine environment, particularly with regard to site management.

Photo: FotoNatur / H. Duty

The Baltic Sea is a major wintering site for the long-tailed duck (Annex II, Birds Directive).

Photo: BfN / D. Schories

Reef (Habitat Type 1170) in the Baltic Sea with red algae and starfish

Photo: BfN / D. Schories

Plumose anemones find their eastern limit of distribution here.

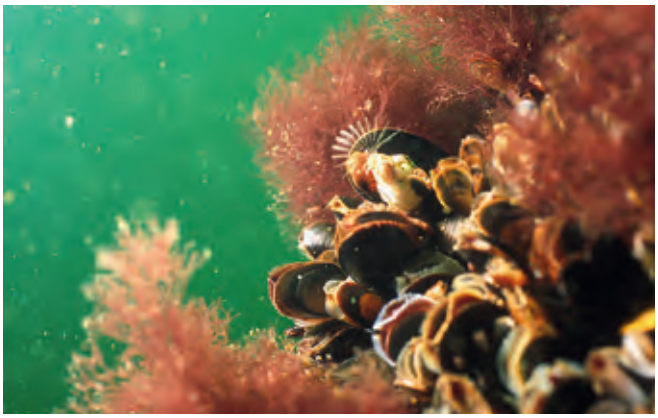


Photo: BfN / J. Krause / P. Hübner

Common mussels build biogenous reefs (Habitat Type 1170) that provide habitat for numerous marine organisms ("Adlergrund" in the Baltic Sea).

Photo: BfN / J. Krause / P. Hübner

Rather bizarre inhabitants of the North Sea reefs (Habitat Type 1170) – Plumose anemone (upper right) and sea urchins (lower right).

Reefs in the North and the Baltic Seas

In earlier times, before the advent of accurate nautical charts, underwater reefs had a bad reputation among sailors, as they posed an invisible underwater hazard upon which ships could founder. Today, many scuba divers, snorkelers and photographers have peered beneath the surface to discover the diverse, sometimes bizarre, and often colourful organisms encountered on reefs. Reefs in the German North and Baltic Seas are usually built of rock deposits formed during the last ice age. The hydromorphological differences in both seas facilitate the settlement of different plant and animal communities. In the Baltic Sea, algae and mussel beds dominate the reef communities of the Adlergrund and the Kadetrinne, whereas the outer reefs along the Island of Sylt in the North Sea are predominantly colonised by sea anemones, keeled tubeworms and dead man's fingers. Sea urchins graze the microorganisms on the surface of the boulders. In Germany 2,280 km² of reefs have been described and inventoried. Approximately 64 % of these reefs are currently protected by the Natura 2000 network.

Dr. Jochen Krause
German Federal Agency for Nature Protection

Photo: BfN / Krause-Hübner

Dead man's fingers, a leathery coral attached to the rocks of Sylt Island's outer reef (Habitat Type 1170)

The A20 motorway crossing of the "Peene Valley" Special Area of Conservation (Habitats Directive) and Special Protection Area (Birds Directive)
Photo: DEGES

12 Protection with a sense of proportion – appropriate assessments for plans and projects

Natura 2000 – what does it mean for development?

The Natura 2000 network is designed to secure the beauty and values of European natural heritage for future generations. Natura 2000 contains Europe's most endangered habitat types and species. It is absolutely essential that the EU protects these habitat types and species from further loss. Consequently, deterioration of conservation status within Natura 2000 sites is not permissible (Art. 6, Sec. 2 of the Habitats Directive and § 33, Sec. 1 of the German Federal Nature Conservation Act). There is no explicit ban on plans and projects like e.g. in the construction and infrastructure sectors. However, there is an obligation to conduct appropriate assessments at different levels to ensure the protection of habitat types and species within the affected sites.

Plans and projects which, individually or in combination with other plans and projects, might negatively affect the conservation objectives of protected species and habitat types in Natura 2000 sites are required to undergo appropriate assessments (Art. 6, Sec. 3 of the Habitats Directive and §§ 34, 36 of the German Federal Nature Conservation Act). Significant impact may also result from plans and projects to be conducted outside a conservation area itself. Roads, for example, might cause increased noise and emission of pollutants, dissection of important migration routes and lowering of the water table, thus, impacting Natura 2000 sites. In order to maintain administrative efficiency, appropriate assessments are conducted in three subsequent phases: initial screening, appropriate impact assessment and assessment for exemption.

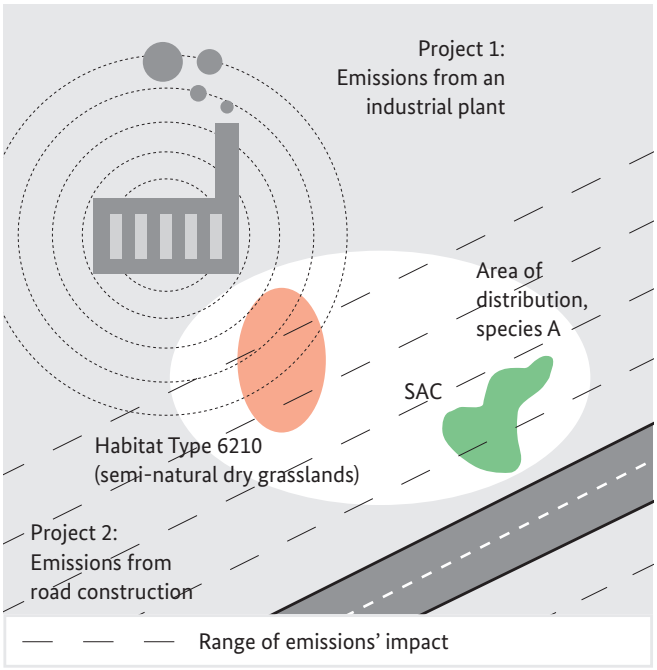
Screening – a quick and efficient procedure for cases that are not critical

The initial screening determines if there are possible implications for the site in view of the site's conservation objectives of protected species and habitat types within a Natura 2000 site due to a plan or proposed project.

If the possibility of negative impacts can be excluded with certainty, then a project may go ahead without a more detailed assessment. The precautionary principle has to be applied in these initial screenings, as the Habitats Directive clearly states that a more detailed assessment is mandatory when a negative impact cannot be excluded. The initial screening procedure can aid the implementation of small projects and other projects that border Natura 2000 sites, without the necessity of a more detailed assessment.

Appropriate (impact) assessment – checking for significant impacts

An appropriate assessment requires a detailed analysis of the possible impacts of plans, proposed projects and measures on the conservation status of protected habitat types and species, and the conservation objectives defined for a given Natura 2000 site. At the same time, measures designed to minimise damage can and should be devised. Possible modifications that would prevent significant impacts should be considered while plans are being devised. If significant impacts to the Natura 2000 site remain, then in principle, the project in question is not permissible. However, if under these circumstances, the project is to be continued after all, an exemption assessment may be conducted.



Ssymank, modified

Cumulative effects – When considered in isolation, smaller impacts might not affect the conservation status, but when added up all together for a specific area or site, they could create an overall impact that does. Appropriate assessments (impact assessments) must take cumulative impacts into account. For example, in order to produce a valid appropriate assessment that would gauge the effects on conservation status, emissions from an industrial plant combined with impacts from nearby road construction must be considered together.

Photo: DEGES / Rochow

Motorways constitute insurmountable barriers for wildlife. A total of nine "green bridges" were built across the A20 motorway in order to minimise fragmentation effects.

Example of an appropriate assessment – the A20 motorway between Lübeck and Stettin

The Peene Valley, listed as a Special Area of Conservation according to the Habitats Directive, and as a Special Protected Area according to the Birds Directive, had to be crossed for the construction of the A20 motorway between the cities of Lübeck and Stettin. Permission to build the road was subject to specific alignment restrictions, reduced width of the bridge and the ramps leading to the bridge, and requirements for environmentally-friendly construction methods. In spite of these restrictions, protected habitat types of the Peene Valley Natura 2000 site were significantly affected. Therefore, permission to build the road was dependent on the exemption clause of § 34, Sec. 3-5 of the German Federal Nature Conservation Act as well as Art. 6, Sec. 4 of the Habitats Directive. Because priority habitat types were concerned, an opinion by the EU Commission was required. The EU Commission agreed to the Peene Valley crossing only after intense scrutiny and after issuing additional restrictions. During the construction phase, a working group was established to monitor compliance with all the restrictions imposed. Measures for assuring the continued integrity and coherence of the Natura 2000 sites have included the development of large habitat patches and the establishment of biotope ecological networks.

Dirk Bernotat
German Federal Agency for Nature Conservation

Assessment for exemption – projects that may cause significant impact

The exemption assessment first examines possible alternatives that might allow the desired project goals to be attained, but at the same time are more favourable for the preservation of the existing conservation status. If there are reasonable alternatives, then these must replace the original plans. If there are no reasonable alternatives, then the project can only be completed if there are imperative reasons of overriding public interest. These reasons must rank higher than the public interest associated with the protection of biodiversity to be achieved through the Natura 2000 network. In any case, impacts must be mitigated in order to permanently secure the functionality of the Natura 2000 network.

Species protection - the European way

Certain rare or endangered plants and animals listed in Annex IV of the Habitats Directive enjoy special protection both inside and outside the network. Protection includes prohibition of the deliberate disturbance, capture or killing of specimens, the deterioration or destruction of breeding sites or resting places and sale (Art. 12, 13 of the Habitats Directive and §44 of the German Federal Nature Conservation Act).

As for plants, the picking, collecting, cutting, uprooting or destroying, as well as the transport and sale of these species, is prohibited (Art. 13 of the Habitats Directive, § 44 of the Federal Nature Conservation Act). Member states must establish and effectively implement a strict conservation regime for these species with the aim of contributing to a favourable conservation status for the species. This includes a legal framework of coherent, coordinated measures, as well as information and guidance by the relevant authorities for implementation on the ground.

However, if a plant is needed for research purposes, for example, or if the capture or disturbance of an animal is necessary to prevent serious harm, member states may grant an exemption from the protection regime. This is done under special conditions when there is no satisfactory alternative, and it will not result in the deterioration of the conservation status of the population of a species (Art. 16 of the Habitats Directive or § 45, Sec. 7 of the Federal Nature Conservation Act). In conclusion, species and habitats require appropriate protection concepts and initiatives in and around Natura 2000 sites, adapted to each species, as well as appropriate assessment.

Photo: F. Grawe

Long migrations are typical of large wild animals such as red deer, wildcats or the European lynx. Motorways and other busy roads can only be crossed safely on appropriate structures built for wildlife crossing.

Crested newt population size assessment with bow nets Photo: F. Grawe

13 Modern concepts – monitoring success at the European level

No corporation functions well without a business report

Corporations cannot be managed without regular business reports. Similarly, the implementation of the Birds and Habitats Directives legally requires monitoring and reporting. The reports must address not only means and measures but also assess actual success. Success does not simply correspond to the number of conservation areas delineated or to the number of ordinances passed. It is linked to achievements made on the conservation status of species and habitat types (see Chapter 4). A publicly available report to the EU Commission is due every six years for the Habitats Directive (Art. 17) and the Birds Directive (Art. 12). The EU Commission assembles and analyses the reports of the member states and then produces its summary report on the state of biodiversity within the European Union as a whole.

The "traffic light scheme" provides an overview

In order to be able to compare and combine the reports mentioned above, uniform rules for the assessment of conservation status for Special Areas of Conservation introduced the traffic light scheme with green indicating favourable status, yellow indicating unfavourable/inadequate status, and red indicating unfavourable/bad conservation status. Separate evaluations are provided for every habitat type and species listed in the Annexes of the Directives. The various biogeographical regions serve as reference areas, which allows for the consideration of key regional differences in the evaluation. For example, for a species whose range is scattered throughout Germany, there will be three separate German evaluations assessing the conservation status of this species in the Atlantic, Continental and Alpine biogeographical regions.

Assessment criteria – the facts behind the balance

Standardised criteria for the assessment of the habitat types and species protected under the Habitats Directive were established for the EU as a whole. The assessment criteria for the conservation status of species include four parameters — range, population, habitat for the species and future prospects. Four parameters are also used to assess the conservation status of habitat types. Assessment criteria for habitat types replace the populations and habitats parameters by "total current area covered by habitat type" and "specific structures and functions (including typical species)". Standardised limits for assessment categories and the resulting classification in the "traffic light scheme" have been established. These limits provide science-based standards that are similar to the more familiar technical standards relating to air and water quality.

Only save the gems?

Systems of conservation areas like Natura 2000 are important cornerstones for the protection of species and habitats. However, even a European network like Natura 2000 is not sufficient to effectively protect all the endangered species populations and habitat occurrences, just a limited number of them. For an overall assessment, the EU directives require a comprehensive statement relating to the conservation status inside and outside the listed Natura 2000 sites. Comparing conservation status inside and outside the conservation areas allows for a proper assessment of Natura 2000 efficiency.

If the conservation status degrades throughout the entire territory, the overall assessment will provide for the timely initiation of counter measures. The national and composite reports will, thus, serve as an early warning system to indicate unfavourable changes.

In order to provide an effective overall assessment, monitoring the conservation status of endangered species and habitat types according to the EU Habitats Directive cannot be restricted to the Natura 2000 sites. Rather, monitoring programmes must also include selected sampling areas outside the boundaries of the Natura 2000 sites (monitoring according to Art. 11).

Setting out with a good road map

Would these reports be "just for Europe" or simply to provide a report for the sake of it? Certainly not! Solid knowledge about the conservation status of habitat types and species, their actual "well-being" or "poor condition", allows us to set sensible priorities for nature conservation, initiate well-targeted measures, guide site management and actually react to changes. The reports also provide important guidelines for policy makers, e.g. when deciding on funding priorities and programmes, and they promote cross-boundary management and cooperation. The reports point out both successes and failures. Failures require a detailed analysis of causes. It is quite possible that conservation measures and management plans will have to be adapted based on the reports. With immanent global climate change, reports might also serve as early warning systems and help promote international counter measures.

What reports and when?

	Monitoring and conservation status/Derogations to the effectiveness of the Directive:	Species protection
Birds Directive	Art. 12 (1): National report on the implementation of national provisions (every six years)	Art. 9 (3): Annual report on derogations from bird species protection
	Art. 12 (2): Composite report (EU)	
Habitats Directive	Art. 11: Monitoring of the Habitat Types (I) & Species (II, IV, V, independent of conservation areas)	Art. 16 (2): Report on derogations from species protection (every two years)
	Art. 17 (1): National report on the implementation of measures and conservation status: every six years	
	Art. 17 (2): Composite report (EU)	

Photo: F. Grawe

The peregrine falcon was almost extinct in Germany due to large scale application of the pesticide DDT, but under the protection according to Annex I of the Birds Directive, their numbers have increased in recent years. Today, this elegant predator can again be found in nearly all of the major landscapes in Germany.

Photo: F. Grawe

Bird monitoring – biologist conducting a bird census

Bird inventories: Monitoring provides qualified bases

"Bird monitoring" is the observation and recording of population size, population development and distribution of our bird life through space and time. Nationwide bird monitoring has always relied on the involvement of volunteers. There are currently around 6,000 people collecting monitoring data on breeding and resting birds according to specified standards. This type of bird monitoring is supplemented by the "Monitoring of European bird species and their habitats" in EU Special Protection Areas. Since 2008, the implementation of bird monitoring has been supported by the Administrative Agreement on Bird Monitoring, in which the federal and state governments jointly declare their willingness to provide long-term support for the supervision of volunteers by the Federation of German Avifaunists (Dachverband Deutscher Avifaunisten (DDA) e. V.) as the national coordinating body. The data are used to analyse the population and endangerment situation of the bird life, update Red Lists, perform annual updates of the indicators of the state of species diversity, make significant contributions to the reporting obligations of the EU Birds Directive and give qualified advice to governments and administrators.

Dr. Christoph Sudfeldt
Federation of German Avifaunists

The semi-natural dry grasslands on calcareous substrates (Habitat Type 6210) around the volcanic basalt cone in the "Desenberg" Special Area of Conservation are isolated islands in the Warburger Bördenlandschaft (Federal State of North Rhine-Westphalia). Photo: F. Grawe

14 Coherence and embedding into the landscape – a good neighbourhood matters

Islands in stormy waters

In our increasingly fragmented and transformed cultural landscape, it would be inconceivable to try to conserve nature without considering spatial and functional coherence and connectivity as well as the ecological biotope network. Like islands in stormy waters, Natura 2000 sites offer safe haven to their inhabitants. Unfortunately, the surroundings of these "islands" often resemble hostile deserts which do not provide the necessary means for survival. Large "conservation islands" offer space for many inhabitants and species. Small islands can be species-rich only if they are located close to other such islands. Small islands do not provide adequate refuge during disasters. A single catastrophe may be sufficient to wipe out the populations of small conservation areas. However, the slow change of key environmental parameters, such as nutrient-poor calcareous grasslands becoming overgrown or aquatic systems drying out, can also cause the loss of entire "islands".

On safe paths

In addition to the Natura 2000 network, the Habitats Directive provides support for the establishment and maintenance of landscape features that, by virtue of their linear and continuous structure or their function as stepping stones, are essential for the migration, dispersal and genetic exchange of species (Art. 10). If we are to secure the long-term survival of species and habitats in "conservation islands", animals and plants must be able to move between these islands. Migration allows for recolonisation after catastrophic disturbances or for spatial avoidance of changing environmental conditions. Migration can be enhanced by the presence of numerous small stepping stones that help "lower the barrier" between suitable patches, while making the surrounding desert less hostile. Creating corridors or generally improving the permeability of the landscape surrounding habitat islands are other possible ways to enhance the survival of endangered species and habitats (see map on p. 95).

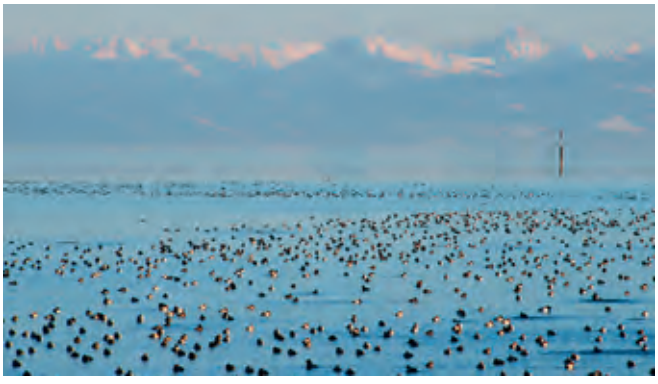


Photo: A. Hafen

Preservation of regular resting sites for migratory birds outside the Special Protection Areas is also important. Pictured is one such important resting site at Lake Constance (Federal State of Baden-Württemberg).

Photo: K. Leidorf

The former border between the two Germanys offers refuge for a large number of endangered species. Due to its extent and permeability, the "Green Belt" has become one of the most important nature conservation corridors in Germany. Pictured is the "Green Belt" near Coburg-Sonneberg between the Federal States of Thuringia and Bavaria.

Independent of the European nature conservation provisions, the German government has recognised the significance of coherence. The Federal Nature Conservation Act requires the establishment of provisions to create an ecological biotope network for all habitats and wild species. The Federal States are encouraged to secure 10 % of their respective territories as core areas for this ecological biotope network. This requirement in the Federal Nature Conservation Act aids the Natura 2000 network. Natura 2000 sites are usually considered core areas in the ecological biotope network. Restoration zones, connectivity elements such as corridors or stepping stones, and possibly buffer zones, may be needed to complement the core areas. Not only does the national ecological network improve the overall quality of the Natura 2000 network, but it also provides the flexibility for species and habitat types to be able to deal with environmental change, e.g. global climate change.

Photo: A. Didion

Over the past couple of years, the pyramidal orchid has spread within the "Himsklamm" Natura 2000 site (Federal State of Saarland).

Photo: A. Didion

The orchid-rich semi-natural dry grasslands on calcareous substrates (Habitat Type 6210) along the slopes of the Buchenberg Mountain are protected by the French-German transboundary Natura 2000 sites "Pelouses à Obergailbach" and "Himsklamm".

German-French cooperation in the management of Natura 2000 sites

Nature has no national borders. "Semi-natural dry grasslands on calcareous substrates with important ochid sites" straddle the German and French border (Saar-Lorraine area) from the "Himsklamm" Natura 2000 site in Germany to the "Pelouses à Obergailbach" Natura 2000 site in France. In order to protect and restore these orchid-rich dry grasslands, LIFE-nature projects co-funded by the European Union were implemented on both sides of the border. The projects were administered by private conservation organisations: Saar Nature Foundation in Germany and Conservatoire des Sites Lorrains in France. Conservation measures were coordinated, land was acquired, and a cross-boundary trail was established. Bilingual boards provide information relating to the Natura 2000 sites. They include information on German-French cooperation as well as information on flora and fauna. This cooperation has generated a common French-German Natura 2000 site without bureaucratic involvement.

Dr. Axel Didion & Joachim Gerstner
Saar Nature Foundation &
retired, formerly Saar Nature Foundation

Ecological coherence is more than simply linking identical elements

The concept of coherence encompasses a suitable population size, distribution and density of occurrences of species and habitat types, as well as low spatial resistance in the landscape surrounding conservation areas. Coherence allows for genetic exchange, migration and dispersal, and is indispensable for sustaining favourable conservation status. For habitat types, coherence means the complete preservation of ecological variation, including different development and successional stages, and the full maintenance of the species that are characteristic and typical of that habitat. It also includes characteristic interactions of habitats with the surrounding landscape (e. g. wetlands and water catchment area). The necessary mosaic of habitats, or habitat complex, must be provided for species that require different habitats to satisfy basic needs. Such species, along with many migratory species, require corridors or functional habitat complexes to successfully complete their life cycles. Bats that lack hibernation sites or caves to raise their young will go extinct. The same holds for fish that can no longer reach their spawning grounds.

Not every patch or linear landscape element is equally suited for ecological networks. Therefore, measures for fostering coherence must be targeted to the individual needs of the species and habitat types in question. Such measures cannot be prescribed or planned at the EU level. Rather, they must be designed according to specific regional needs.

Migrants living between worlds

Coherence is particularly important for animal species that migrate over long distances, for example, amphibians among others. There are, however, other less known groups and species that migrate at a large scale. These include bats, certain species of fish, and large mammals such as otter, lynx and red deer. Central Europe is densely populated, and many former migration routes have become ineffective due to insurmountable barriers such as busy roads or dams. Therefore, from a nature conservation perspective, additional fragmentation of the landscape should be avoided as much as possible, and the effects of existing barriers should be minimised. An important first approach to overcoming these barriers is the 2012 Federal Defragmentation Programme (see also “green bridges”, p. 61).

Photo: H.-J. Augst

Streams are the life lines of landscapes and provide natural corridors in ecological networks.

Sheep function as living transport systems in ecological networks. Migratory herding of sheep provides outstanding connectivity between different habitat types. Photo: F. Grawe

Transhumance – tradition meets up with today

The term transhumance describes the migration of herdsmen/herdswomen and their animals between summer and winter pastures. Particularly in mountainous regions, migration allows livestock owners to get by without stables or having to buy winter fodder. In southern Germany, right up until the middle of the 20th century, large flocks of sheep were an integral part of the landscape. This has changed drastically; today, there are less than 20 shepherdesses and shepherds still migrating from the Swabian Alb mountain range to the more favourable climatic conditions of the lowlands and back each year. They are a true example of traditional land use in a high-tech region! Sheep grazing maintains the precious dry calcareous grasslands. In addition, sheep’s wool functions as a carrier of plant seeds and animals with limited mobility such as snails and grasshoppers. Moving sheep ensures the exchange of individuals between isolated pastures. Sheep provide a means for ecological coherence, which is badly needed for the long-term survival of the communities of species in nutrient-poor grasslands.

Dr. Benjamin Hill, Dr. Burkhard Beinlich &
Prof. Dr. Martin Dieterich
PGNU, Bioplan Marburg-Höxter & ILN Südwest

Many cultural landscape biotopes, e.g. semi-natural dry grasslands on calcareous substrates, such as the one shown here in the "Hellberg-Scheffelberg" Special Area of Conservation, are now dependent on regular management measures to ensure a good degree of conservation, as they are used only sporadically today. Photo: F. Grawe

15 No undertaking without management – flexibility in implementation

The success of a company depends on good management. Likewise, the conservation of our European Natural Heritage also requires management to set concrete goals, define measures for implementing these goals, and monitor the success of their implementation. The reports on the Special Areas of Conservation (SAC) and Special Protection Areas (SPA) specify the preservation and, if necessary, development of certain habitat types and species in these areas as a fundamental aim. How this aim can be achieved in individual cases must then be determined locally for the respective areas.

Management plans – avoidance of conflicts

The development of a management plan forms the basis for the implementation of measures and the monitoring of success. Although management plans are not mandatory under the Habitats Directive (Art. 6, Sec. 1), they have been prepared for almost all Special Areas of Conservation (SAC) and a large share of the Special Protection Areas (SPA) since the areas were designated. Management plans are used to concretise general conservation and development goals from conservation area ordinances or other documents of legal protection. They also serve to define necessary maintenance and development measures or to harmonise uses with conservation objectives, to resolve conflicts of objectives, and to avoid or eliminate impairments. Integrated management plans help reconcile claims on utilisation and nature conservation by defining the type of use and protection measures in a plan.

Guidelines must specifically address the conservation and development objectives for the habitat types and species occurring in the respective Natura 2000 site.

For a species-rich lowland hay meadow, two mowings with moderate fertilisation can be effective, whereas a calcareous grassland with junipers can best be maintained by extensive grazing with sheep. The forests in the Special Areas of Conservation are generally also managed. In these areas, management is aimed primarily at allowing natural processes, such as the ageing and death of old trees, to occur. Old and dead wood is of existential importance as a habitat for numerous animals and fungi (see Chapter 8).

It is therefore crucial to most of the habitat types and species protected in the Special Areas of Conservation for land uses to be in harmony with nature conservation objectives. If necessary, appropriate restoration measures (e.g. the renaturation of bogs) should also be implemented.

Emphasis on participation

It is important to involve landowners and land users in the planning process at an early stage, as a continuous and efficient dialogue is a prerequisite to achieving acceptance for Natura 2000 planning. Coordination and having information available at an early stage are essential for including agricultural and forestry operations in the planning of maintenance and development measures. The required management can then be implemented in a targeted manner and by mutual agreement. However, it is not always possible to fully consider all utilisation interests in a conservation area. A limit is reached when the conservation and development objectives of the Special Areas of Conservation are endangered. For example, in Natura 2000 sites, protected grasslands may not be converted to cropland, and wetlands may not be drained, but unreasonable restrictions on land users in the cultivation of their land that could lead to yield losses may be compensated (see Chapter 17).

Photo: H. Klugkist

Eco-friendly ditch clearing in the Hollerland in Bremen

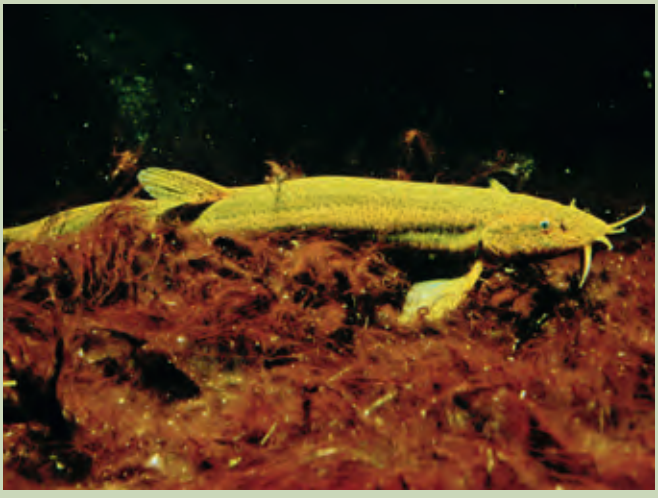


Photo: B. Stemmer

The weatherfish is an Annex II species and a specialist among fishes; it is even able to survive the drying out of its habitat while buried underground.

Eco-friendly ditch clearance in the Bremen Marshland

The city of Bremen is surrounded by a ring of humid grassland laid out as early as the 12th century, with a system of ditches that is significant in terms of cultural and natural history. As a habitat for the spined loach, weather loach and the green hawker, which are among the Annex species of the Habitats Directive, the humid grassland is part of the Natura 2000 network. Because the ditches would naturally silt up and thereby lose their ecological significance, they are cleared every three to five years in the fall. This is done in an eco-friendly manner using a mowing bucket according to a specialist evaluation. Long-term studies show that this can preserve the flora and fauna of the ditches.

Henrich Klugkist
Senator for the Environment, Construction, Transport and Europe, Natura 2000 Department, Bremen

Photo: R. Götte

Photo: W. Schubert, Biol. Stat. HSK

Increased biodiversity consulting in farmbird focal areas in North Rhine-Westphalia (here: Medebacher Bay)

Conservation of birds of the agricultural landscape through biodiversity consulting

The improvement of the conservation status for numerous birds of the agricultural landscape such as the Eurasian skylark, corn bunting or whinchat currently poses a particular challenge. Special Protection Areas (SPA), such as the Medebach Bay in North Rhine-Westphalia (NRW), have been specifically designated to protect them.

A plan of action that was developed for this area in 2019 includes specific actions and specifies areas where at least 10% of the agricultural land is to be managed in a way that is suitable for target birds (farmland bird focal areas). To support a good local partnership, North Rhine-Westphalia funds biodiversity consultants at the Chamber of Agriculture who, in close cooperation with the relevant local Nature Conservation Authority and the Biological Station, provide targeted advice to farms and implement suitable agri-environmental and, above all, contractual nature conservation measures. Beyond Natura 2000 sites, biodiversity consultants, biological stations and local nature conservation authorities are also committed to improving the situation for agricultural biodiversity, particularly in the country's farmland bird focal points.

Dr. Georg Verbücheln (retired)
North Rhine-Westphalia State Office for Nature, Environment and Consumer Protection

Pasture wilderness in Brandenburg

With their mosaic of open sandy areas, heathlands, ponds and forests, the former Soviet military training areas of the Federal State of Brandenburg are an El Dorado for countless species listed in the Annexes of the Habitats and Birds Directives. However, open habitats are particularly threatened by succession and the associated encroachment by scrub. In many cases, mechanical maintenance of these areas is not possible due to the ammunition residues in the soil. In the Döberitzer heathlands conservation area, just outside the gates of Berlin, wild animals ensure the preservation of open habitats: On almost 2,000 hectares, European bison, Przewalski's horses, red deer and roe deer live year-round largely uninfluenced by humans and create a diverse forest and pasture landscape. The resulting mosaic of forest, glades and diverse successional stages will continue to be an essential basis for the area's high level of biodiversity in the future. The large-scale deployment of a community of several large herbivorous mammal species with varied food preferences, particularly European bison and Przewalski's horses, is a unique attempt in Germany to maintain favourable conditions for species of semi-open and open habitats on areas heavily contaminated with munitions residues.

Large herbivores such as the Przewalski's horse contribute to the conservation of endangered open habitats on former military training areas in Brandenburg. Photo: FotoNatur / T. Askani

Dr. Thomas Schoknecht
Brandenburg State Office for the Environment

Network of Natura 2000 stations in Thuringia as a driving force for the implementation of Natura 2000

An area-wide network of Natura 2000 stations was established in 2016. Today, it comprises ten regional and two supraregional stations. As an interface between official and voluntary nature conservation, the stations initiate species and biotope conservation measures, advise land users and perform press and public relations work. Their overall objective is to safeguard and improve the conservation status of the habitats and species protected in the Natura 2000 sites. The Thuringian Ministry for the Environment, Energy and Nature Conservation finances the network of stations with approximately 1.9 million euros annually. As a central coordinating body, the German Federation for the Environment and Nature Conservation of Thuringia (BUND Thüringen) founded the "Natura 2000 Stations Competence Centre" in cooperation with the Nature and Biodiversity Conservation Union of Thuringia (NABU Thüringen) and Landcare Germany (DVL). Together with the Thuringian Ministry of the Environment, it supports the stations in clarifying state-wide issues, prioritising measures, exchanging information and providing training. They also have a special cooperation with the University of Applied Sciences in Erfurt where joint professional events and training are held, and project ideas such as the training of "Natura 2000 managers" are developed. The "Thuringian Way", consisting of the Natura 2000 stations and the Competence Centre, has become a real success story in just four years and was enshrined in the Thuringian Nature Conservation Act in 2019, ensuring the continuity necessary for actively promoting Natura 2000.

Sebastian König
Natura 2000 Stations Competence Centre, Thuringia

Fire management in matted dry grassland
Photo: N. Heinrich

Implementation of the management plan in Special Area of Conservation No. 146 "Friessnitzer See-Struth Special Area of Conservation" Photo: K. Ewald

Network of Natura 2000 stations in Thuringia

Map: S. König

U-shaped valley and remains of a glacier (Habitat Type 8340) in the Ötztal Alps Photo: S. Lehrke

16 Natura 2000 and climate change – synergies and impacts

Climate change and biodiversity

Climate change and biodiversity are closely linked and influence each other. The long-term changes in temperature and precipitation and the increasing number of extreme weather events are also clearly noticeable in Germany. In some cases, they massively threaten the current distribution and status of Annex species and habitats of the Habitats Directive. Therefore, nature conservation needs to be adapted, both inside and outside of Natura 2000 sites, in order to strengthen the adaptive capacity of species and ecosystems in the future. At the same time, new thermophilic species and habitat types will arrive in Germany or benefit from the new conditions, such as steppic grasslands.

Climate change affects where species occur and therefore which species live in Special Areas of Conservation. Some species may also disappear, if their habitat undergoes major changes, and they are unable to adapt or populate new habitats.

Photo: A. Ssymank

Steppic grasslands (Habitat Type 6240) are expected to benefit from climate change.

Photo: P. Wilhelm

Closing the drainage ditches in the fen will retain water and raise the water table.

Renaturation of bogs in the Pfrunger-Burgweiler Peatlands

The steady drainage of bogs must be stopped in order to prevent them from drying up. Installation of weirs will retain rainwater and raise the water table. At the same time, bogs may only be used very extensively or not at all in order to preserve the vegetation typical of these habitats and prevent the decomposition of peat, which has an impact on the climate. Bogs are important carbon sinks, so they interact closely with climate. However, some of the research on the impacts of climate change on specific types of bogs is not yet advanced enough and should be developed further.

The Pfrunger-Burgweiler Peatlands in south-western Germany is an example of a bog with different types of bog being successfully restored to a bog-typical state. Previously, large amounts of water had been withdrawn from the bog area, and it was used intensively for agriculture. But a large-scale conservation project prevented the steady drainage of the area from 2002 to 2015 by closing drainage ditches and interrupting pipe drains, among other measures. Extensive grazing with robust cattle now replaces intensive agricultural use on over 300 hectares. In addition, part of the trail network there was decommissioned and replaced with new trails (some on boardwalks), and there are now bog guides to provide information about the Natura 2000 site to visitors.

Pia Wilhelm
Director, Wilhelmsdorf Nature Conservation Centre of the Pfrunger-Burgweiler Peatland Foundation for Nature Conservation

Photo: P. Wilhelm

The hare's-tail cottongrass belongs to the Cyperaceae family and is a characteristic plant of ombrogenous, or peat-forming, bogs. Its fibrous decaying leaves contribute to the formation of peat.

Habitats are changing

The bog and forest habitat types, as well as habitats on the coast, at higher elevations in the Alps and low mountain ranges, and aquatic systems with riparian and headwater regions are considered to be particularly affected by the impacts of climate change. Bogs are one of the Annex habitats of the Habitats Directive that are most severely affected by the impacts of climate change, as increasing temperatures often exacerbate the desiccation of bogs induced by human activity. This, in turn, releases the large amounts of carbon stored by bogs into the atmosphere, further accelerating climate change.

Warming also causes nutrient enrichment, which exerts a negative influence on the characteristic species of these habitats. The populations of many moisture-dependent plant and animal species are therefore predicted to decline (e.g., the raised bog ground beetle).

The expected consequences of climate change, such as drought and storm events, for the German forest habitat types listed in Annex I of the Habitats Directive include regional shifts from beech to oak forest. This is exacerbated by pest infestations (e.g. oak feeding communities) or locally even by an increase in forest fires. Although these changes have negative impacts on forest management practices and may also negatively alter forest habitat types, from a conservation perspective, they also lead to re-dynamisation of forests, if the corresponding areas are not interfered with, and should not be viewed negatively per se. However, the far greater forest damage is to non-native coniferous forests (e.g., bark beetle infestations on spruce and the pine shoot moth), which are not Annex habitat types of the Habitats Directive.

Coastal moraine cliffs with vegetation (Habitat Type 1230) on the island of Rügen Photo: S. Lehrke

In the Alps, an upward displacement of the tree line can be observed at high elevations, for example mixed mountain forests consisting of spruce, fir and beech, have partially moved to higher elevations. However, there are limits to the displacement process: On the one hand, the heights of the summits themselves curb migration to higher elevations, and on the other hand, natural cliffs or even alpine pasture management limit the spread of Natura 2000 mountain forests.

Photo: A. Symank

Raised bogs such as the Pietsch Bog are severely affected by climate change.

Coasts and seas and their flora and fauna are also affected by climate change in many ways. The warming of the oceans may make it easier for alien species to colonise coastal habitats protected under the Habitats Directive and the offshore ocean as well, but it can also alter reproductive patterns and disrupt the marine food chain. Increasing storm surges resulting from rising sea levels pose an additional threat. Particularly in low-lying coastal habitats, shorebirds are thereby losing their feeding and breeding grounds.

Opening up new habitats through the creation of ecological networks

The connectivity of Natura 2000 sites is an important strategy for conserving biodiversity in the habitats protected by the Habitats Directive during climate change. The dismantling of dikes can help improve the connectivity of coastal habitats. Connectivity through core areas and connecting elements, such as stepping stones or corridors, also plays an important role for other inland habitats protected by the Habitats Directive. These can be linear elements, such as hedgerows, as well as core areas of habitat types of the Habitats Directive and other biotope types (e.g. wet meadows such as marsh marigold meadows or swamp woods, including outside Natura 2000 sites), which connect the habitats of species listed under the Habitats Directive. This ability to migrate between habitats is particularly important when certain species lose their original habitat due to climate change and must move to another (range shifts).

However, despite the availability of concepts, the creation of ecological networks and coherence of areas that are part of the Natura 2000 network has thus far been implemented far too hesitantly in practical terms.

Photo: U. Rieken

The Green Belt in Thuringia

Research and the exchange of information

There can be no doubt that there is a connection between climate change and the occurrence of species or biodiversity in general. What is uncertain, however, is how exactly climate change will affect ecosystems and the interaction between species. Constant scientific research is required, so that we can address these gaps in our knowledge and devise the appropriate measures to take in Natura 2000 sites. The development of a biodiversity monitoring system can play a key role in this. The existing Habitats Directive monitoring and the future insect monitoring by the Federal Agency for Nature Conservation could serve as an initial building block for the nationwide monitoring of the occurrences of species and the effects of climate change on Special Areas of Conservation.

The establishment of networks for the provision, active dissemination and harmonisation of valid conservation information is of great relevance to the management of Natura 2000 habitat types undergoing climate change. As part of the EU-wide Natura 2000 network, Natura 2000 sites in Germany also benefit from the exchange of experience with other EU member states.

Contribution of Natura 2000 to climate change mitigation and adaptation to climate change

Natura 2000 sites are the foundation for the protection of important habitat types and species in the EU. They promote stable, intact habitats and therefore make an important contribution to both the conservation of biodiversity and the resilience and adaptation of ecosystems to climate change. Many Natura 2000 sites are also carbon reservoirs, which have an extremely important function in terms of mitigating climate change. In addition to forest ecosystems, the bogs and floodplains Natura 2000 habitat types are particularly rich in carbon. Protecting these valuable habitats in the Natura 2000 network helps maintain or increase carbon storage capacity.

Nature-based approaches are important for the mitigation of and adaptation to climate change. They create synergies between sectors and are also often cost-effective compared to technical solutions in the area of climate change mitigation and adaptation. Nature-based approaches can also be implemented in Natura 2000 sites, e.g. through the protection and renaturation of bogs or river floodplains. Management plans are an important steering tool for this, and adaptive management can also usually be used to respond flexibly to future climate changes.

Natura 2000 sites can make an important contribution to the protection and conservation of ecosystems and thus play an important role in adapting to climate change. However, if Natura 2000 sites are to fulfil this role, more measures must be taken in the future to ensure favourable degrees of conservation for habitats and species protected by the Habitats Directive in Natura 2000 sites and to reduce existing pressures. To this end, conservation measures must incorporate future scenarios, and their effectiveness must be verified through regular monitoring.

Beyond this, climate change demands rethinking in all areas of life. If Natura 2000 sites are to be able to make effective contributions towards mitigating and adapting to climate change in the future, harmful influences outside conservation areas, such as inputs of nutrients and pesticides from intensive agriculture or harmful fishing practices, must also be significantly reduced. In addition, the creation of ecological networks to link conservation areas and a more environmentally-friendly reorientation of land use must be intensified. This requires greater integration of nature conservation goals into other policy areas.

The conservation status of Annex habitats of the Habitats Directive is often inadequate and must be restored to a favourable conservation status through preliminary restoration and management measures, as illustrated here by the example of a fallow calcareous fen in the "Nethe" Special Area of Conservation (North Rhine-Westphalia). Photo: F. Grawe

17 Financing Natura 2000

Natura 2000 pays off

Natura 2000 and European wildlife conservation contribute significantly to the preservation of biodiversity. Many products such as drinking water, food, genetic resources and thus our well-being and quality of life depend on biodiversity and the performance of ecosystems. Natura 2000 is life insurance for the future. The monetary benefits of the Habitats Directive are disproportionately higher than the costs incurred and are estimated at 200 – 300 trillion euros annually for the EU as a whole. Direct positive effects of an intact nature can often already be seen in health care, recreation, and tourism as well as the marketing of organic products. Art. 8 of the Habitats Directive provides for Prioritised Action Frameworks (PAFs) for the effective management of the Natura 2000 sites. PAFs are strategic multi-year planning tools designed to provide a comprehensive overview of the actions needed to implement the EU-wide Natura 2000 network and associated green infrastructure. They specify the funding requirements for these measures and allocate them to the corresponding EU funding programmes.

Natura 2000 does not come for free

The protection of our natural environment for future generations does not come without a cost. It requires continuous work, which is primarily covered by public budgets. The European Union sees a financial requirement of approximately six billion euros per year for the implementation of the Habitats and Birds Directives throughout the EU. This is what it will cost to establish the Natura 2000 network, manage these conservation areas, implement the measures for protecting and improving the conservation status of the protected habitat types and species, and monitor for success. Also included are costs for experiences in nature and for environmental education. According to a 2016 estimate, the annual cost of implementing Natura 2000 in Germany's terrestrial area is approximately €1.4 billion. This cost of preserving our natural heritage is modest compared to the overall budget, but of immeasurable value to people, nature and the environment.

Who pays the costs?

In principle, the financing of Natura 2000 is to be provided by the member states but is supported by EU co-financing, primarily under the EU Rural and Regional Development Funds. This EU funding complements funding from the Federal States. In order to be able to use the funds, the Federal States must set up their own implementation programmes and have them approved by the EU. The German Federal States have also created their own opportunities for funding without EU co-financing. Agri-environmental programmes and contractual nature conservation have proven to be suitable instruments for strengthening biodiversity and nature conservation-compliant agriculture and forestry. Services in agriculture, forestry, fisheries and landcare are remunerated by the programmes for the protection of flora and fauna, biotopes and cultural landscapes.

Photo: S. Harms

Rewetting of a drained bog by closing drainage ditches as part of the "Blitzenreuther Seenplatte Habitat Optimisation" LIFE project

Atlantic sand landscapes

With the "Atlantic Sand Landscapes" Integrated LIFE project, the German states of North Rhine-Westphalia and Lower Saxony aim to promote oligotrophic habitats on sandy soils, which are home to a large number of specially-adapted species, and to counteract the loss of species. To this end, they develop a methodological and conceptual approach on how to improve conservation status for all non-marine habitat types and species in the Atlantic region. In addition, a large number of concrete measures, primarily in Natura 2000 sites, are being implemented to improve the conservation status of 15 selected habitat types and ten focal species. At the halfway point of the project, more than 100 measures have been implemented, including the optimisation or restoration of existing heath landscapes, species-rich xeric sand grasslands and oligotrophic standing waters, and the strengthening of the common spadefoot, sand lizard and floating water-plantain populations. The project has a budget of 16,875 million euros over a ten-year period (until the end of September 2026) and is 60 % co-financed by the EU.

Dr. Martina Raffel
Münster District Government

Photo: T. Hübner

Westrup Heath

Funding through foundations

The Natura 2000 network is designed to help preserve Europe's biodiversity. In Germany's northernmost state, the Schleswig-Holstein Foundation for Nature Conservation plays a key role in its implementation. The financial commitment of the Schleswig-Holstein Foundation for Nature Conservation is based on three pillars. The strongest pillar is the targeted investment of public funding in the Natura 2000 network, either through the acquisition of required areas with the help of replacement funds from the districts and subsidies from the state, or as a package of measures within the framework of projects funded by the Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) via the Federal Agency for Nature Conservation (BfN) or as LIFE projects by the European Commission.

The second pillar takes the form of investment in eco-accounts which are targeted to benefit the Natura 2000 network. In this process, the proceeds from the sale of eco-points are invested in new eco-accounts.

And thirdly, the Schleswig-Holstein Nature Conservation Foundation channels funds from private sources into the Natura 2000 network for very specific purposes. These private funds are given as donations, endowments, and often in the form of inheritances and bequests. In some cases, they are pooled in endowment funds, trust foundations and registered foundations and invested in Natura 2000 sites either in their entirety or in the form of annual returns on assets.

Dr. Walter Hemmerling
Foundation Nature Conservation Schleswig-Holstein

Galloways in the Trave Valley Photo: M. Friedemann

Funding for many things

In theory, all of the above-mentioned policy areas for Natura 2000 are eligible for funding through EU financial instruments with the European Agricultural Fund for Rural Development being the most important in Germany (see table p. 79). The extent to which funding is actually possible ultimately depends on the specific content of the implementation programmes and the funding options of the individual Federal States.

For example, extensive mowing and grazing in Natura 2000 sites can be funded through agri-environment programmes and contractual nature conservation. Securing and expanding sheep grazing is particularly important for connectivity between species' habitats (see Chapter 14). In the forests, for example, forest environment programmes can be used to fund the preservation of old trees and dead trees, the installation of nesting boxes, and the replanting of valuable tree species in accordance with the programmes of the Federal States. Applications for funding can be submitted to the nature conservation, agricultural and forestry administrations or to landcare associations or biological stations. Within this framework, EU funds can only be used to support activities that go beyond what is legally required.

Some Federal States also grant compensation for farmers and foresters, supported by EU co-financing, if they have to comply with management requirements in conservation areas. Compensation is provided, for example, when farms refrain from using fertilisers and pesticides or make limited use of grassland. Limitations on management also apply to breeding, resting, and feeding habitats for rare birds such as aquatic warblers, great bustards, and corn crakes. Applications for compensation for management restrictions can usually be submitted to the agricultural and forestry authorities.

In some Natura 2000 sites, for example, special measures are required for restoring the water balance (e.g., to protect bog habitat types), restoring natural river dynamics, or creating migration opportunities for fish. The dismantling of drainages, the relocation of dikes, the renaturation of rivers and the installation of fish ladders can also be co-financed through the EU funding programmes. Natura 2000 measures that also contribute to regional economic development, such as the promotion of ecotourism (e.g. information centres and hiking trails) are particularly eligible for EU regional development funds.

Exemplary innovative projects for Natura 2000 sites or initiatives for communications or monitoring can also be funded through the EU programme for environmental and climate policy (LIFE programme), again with national co-financing.

Voluntary agreements

Instead of regulatory requirements, Germany is increasingly relying on dialogue and contractual agreements to achieve the goals of European nature conservation. As a rule, therefore, the Federal States do not impose legal requirements prescribing, for example, how a meadow should be managed. Rather, the conservation objective is firmly specified in terms of the species or habitat types to be protected. The form of management and where it can best be implemented is agreed upon by the concerned parties, e.g. agricultural or forestry enterprises by seeking a consensus while taking operating procedures and the experiences of the agricultural or forestry company into account. This is then recorded in voluntary agreements, e.g. within the framework of agricultural or forest environment programmes.

Abbreviation & administrative code of Directive	Designation	Importance for Natura 2000
ELER 1305/2013	European Agricultural Fund for Rural Development	++
EMFF 508/2014	European Maritime and Fisheries Fund	+
ESF 1304/2013	European Social Fund	+
EFRE 1301/2013	European Regional Development Fund	+
LIFE 2021/783	Programme for the Environment and Climate Action (LIFE programme)	++
Horizont 2020 1291/2013	Horizon 2020 – The EU Framework Programme for Research and Innovation	+

The applicability of the funding options listed in the table depends on the specific funding criteria of the funds and the programmes of the federal states.

Examples of funding opportunities can be found in: "Financing Natura 2000"

Experience Natur(a) in the Western Erzgebirge Mountains

For many years, the Western Erzgebirge landcare association has endeavoured to present the considerable network of the many different Natura 2000 sites in the region to as many residents and visitors as possible and to make the concerns of the European system of conservation areas clear. To that end, the "Experience Natur(a) in the Erzgebirge Mountains" project funded by the Free State of Saxony and the Rural Development Programme (EPLR) via the "Natural Heritage" Directive has established:

- *the Natur(a) Western Erzgebirge Discovery Trail (see figure),*
- *a 200-page brochure entitled, "Experience Natur(a) in the Erzgebirge Mountains",*
- *a travelling exhibition, and*
- *an Internet site (www.naturimerzgebirge.de) featuring extensive information on all offers and activities relating to Natura 2000 as well as detailed descriptions of the conservation areas in the region.*

Matthias Scheffler
Westerzgebirge Landcare Association

Mountain meadow in Stützengrün in the Western Erzgebirge mountains, Saxony Photo: M. Scheffler

The densely wooded low mountain ranges are attractive destinations for hikers. Photo: F. Grawe

18 Tourism, sports and recreation in Natura 2000 sites

Nature tourism is trendy

Nature is attractive! Doing sport, experiencing and enjoying nature, finding relaxation—there are many reasons to spend weekends and vacations in nature. From densely wooded low mountain ranges, to romantic heaths to clear lakes—recreation seekers are spending their time in Natura 2000 sites without even realising it. Among the many opportunities that natural landscapes offer to all sporting enthusiasts are activities such as hiking, cycling, horse riding and water sports. Nature sports such as mountain biking, climbing, canoeing and canyoning are also becoming increasingly popular, and the experience of nature is gaining in importance as a vacation motif, so the number of visits to the conservation areas is increasing year after year. This underscores the importance of valuable natural areas to tourism.

In terms of nature and landscape, the German conservation areas offer everything that makes the heart beat faster—the largest contiguous mudflat landscape on earth in the north (Wadden Sea), high mountains in the south, plus coasts, rivers, forests and enchanting cultural landscapes. And everyone knows from their own experience that the recreational value of a venerable beech forest is greater than that of a gloomy spruce forest, and that of a semi-natural river landscape greater than that of a watercourse degraded to a canal. For these reasons, our large conservation areas, which are a central component of the Natura 2000 network, are particularly popular. The most popular holiday regions within Germany are also the regions with the largest proportion of Natura 2000 sites — first and foremost, the North Sea and Baltic Sea coasts, the low mountain ranges and the Alps.

Tourism and nature conservation: Contradiction or co-existence?

The relationship between tourism, sport and nature is characterised by mutual dependence. On the one hand, recreation seekers benefit from the attractiveness of an intact natural environment. However, overexploitation can make the environment less attractive.

The negative effects are complex and multifaceted, ranging from adverse impacts on animals and plants as well as their habitats to massive traffic problems and increased consumption of resources.

For example, disturbances to the habitats of black storks or black grouse caused by tourism and recreational activities can lead to massive pressures with negative effects on breeding success and therefore on the conservation of these species.

Management plans with guidance concepts for visitors offer good opportunities to successfully combine protection and tourism on the ground. In principle, the management plan has the task of ensuring sustainable use or management of a Natura 2000 site. It also serves as the basis for the area-specific monitoring of success and measures. Comprehensive information and communication as well as timely involvement of tourism stakeholders (e.g. tourist boards), sporting associations and other key stakeholders in the sport and leisure sector are needed in order to solve existing problems and avoid more problems in the future.

Photo: F. Grawe

Cycling in Natura 2000 sites – a leisure activity that is becoming increasingly popular.

Pfaueninsel – successful synthesis of nature conservation and the preservation of historical monuments

Berlin's Pfaueninsel (Peacock Island) is one of the most valuable nature reserves within the metropolitan area and, as a landscape park, forms part of the Palaces and Parks of Potsdam and Berlin UNESCO World Heritage Site. As a semi-natural historic cultural landscape element, it combines a varied mosaic of extremely valuable habitat types with the occurrence of significant species, including the hermit beetle and the great Capricorn beetle as well as a rich bat and breeding bird fauna. The flower-rich hay meadows and xeric sand grasslands, most of which were established while the landscape park was being designed in the 19th century, as well as the mixed oak forests with their numerous old oaks, also give the landscape a special appearance. Pfaueninsel has long been one of the most popular destinations in Berlin, attracting several hundred thousand visitors per year.

The sometimes differing interests of nature conservation and historic preservation have already been successfully coordinated in the past in cooperation with the Prussian Palaces and Gardens Foundation (Stiftung Preussische Schlösser und Gärten). A particular problem is the preservation of the old trees with regard to traffic safety. With the designation of the Pfaueninsel as a Natura 2000 site, this coordination will be continued during the course of management planning, whereby the nature conservation requirements with regard to a favourable conservation status for the area will be further specified.

Photo: J. Halfmann

The harmonious coexistence of culture and nature are what characterise Pfaueninsel (Berlin).

Martina Wagner (retired) & Dr. Jochen Halfmann
Senate Department for the Environment, Urban Mobility, Consumer Protection and Climate Action & Umweltvorhaben in Brandenburg Consult GmbH

Photo: F. Grawe

Semi-natural rivers are preferred destinations for water tours.

NATURA 2000 as a tourist destination?

Natura 2000 plays an important role in keeping conservation areas attractive for recreation and tourism and is, therefore, making a significant contribution to the economic strengthening of regions: increasing numbers of visitors mean rising tourism revenues, a strengthening of the regional economy and consequently, the safeguarding and creation of jobs as well.

In many places, the tourist valorisation of Natura 2000 sites is still an untapped potential. Herein lies the opportunity to bring the European significance of these areas closer to the people, for example as "Natura" tours for hiking or canoeing activities. Sustainable tourism supports the economic development of regions. It helps improve the image and acceptance of Natura 2000 sites and the necessary nature conservation measures.

Photo: F. Grawe

Eurasian eagle-owls and peregrine falcons prefer to breed in rock faces. It should go without saying that recreational uses must be considerate of the concerns of species susceptible to disturbance.

An intact natural environment and the preservation of biodiversity are essential to us and to a genuine nature sport experience as well, so it is not surprising that nature sport associations have understood the need for large-scale networks of conservation areas such as Natura 2000 from the very beginning. However, in order to achieve a positive outcome for nature by working collectively as a team that involves all stakeholders, we must ensure the timely involvement of sport associations along with other interests and find a fair, mutually agreeable compromise. And—it works! It has specifically been the regulations developed over the past decades as a result of this joint effort that have spurred nature-sport associations on to more and more commitment, projects and sympathetic coexistence. A good multiplier effect has raised an awareness of the need for nature conservation in the minds of many people who actively participate in sport, and it has also created an understanding across the board that protecting our home base sometimes requires prudent compromises.

Prof. Dr. Franz Brümmer
Board of Trustees of
the "Sports and Nature"
Association

Natur(a) Discovery Trail in the Western Erzgebirge Mountains

This approx. 130 km long circular trail through the Western Erzgebirge Mountains, which is divided into 15 sections, is a new hiking offer. Its route was designed from the special perspective of European nature conservation to enable hikers to get to know all the Natura 2000 sites of the region, and you couldn't wish for a better insight into the nature and landscape of our region. The Natur(a) Discovery Trail includes 15 themed trails which go into more detail about specific habitats such as bogs, flowing watercourses and mountain meadows. This includes a fruit and insect discovery trail that starts at the Affalter Nature Hostel, which is operated by NABU Aue-Schwarzenberg. In addition to the 200-page hiking guide that was published for the discovery trail, there is a leaflet or accompanying brochure for each of the themed trails.

Matthias Scheffler
Westerzgebirge Landcare Association

Photo: M. Scheffler

On the fruit and insect discovery trail, Affalter Nature Hostel

Karwendel Mountains – Experience pure nature

The "Karwendel mit Isar" Natura 2000 site is one of the last wilderness landscapes in Germany. The rugged mountain peaks and narrow valleys have preserved a variety of closely interwoven habitat types, from semi-natural watercourses, to mountain meadows and forests, to mountain pine thickets and alpine grasslands, to scree formations and bare rock. The Karwendel has a 150-year tradition as a recreational region. As many visitors as possible should have an opportunity to experience nature. However, particularly popular sports, such as mountain biking and hang gliding, can cause conflicts with the protection of sensitive species and habitats. Concepts for environmental information and the targeted guidance of visitors can help with this, and solving those conflicts in consensus and cooperation is the goal in one of the largest conservation areas in the Eastern Alps. Education and offer instead of regulation and prohibition can ensure sustainable tourism and the preservation of natural resources.

Dr. Rainer Fetz
Bavaria State Office for the Environment (LfU)

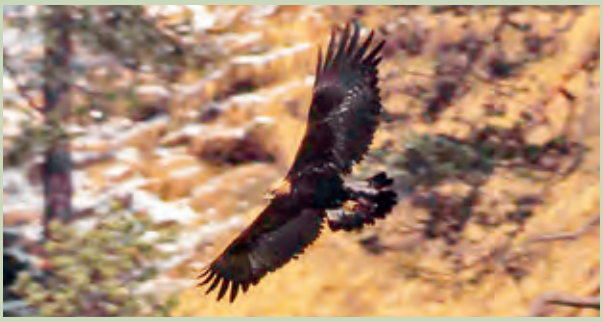


Photo: H.-J. Fünfstück

The golden eagle – undisputed ruler of the skies and protected rare bird species according to Annex I of the Birds Directive ("Karwendel mit Isar" Special Area of Conservation and Special Protection Area, Bavaria)

Photo: M. Vischer-Leopold

Rugged mountains: view of the Karwendel mountains ("Karwendel mit Isar" Natura 2000 site, Bavaria)

Photo: Nationalparkt Berchtesgarden

Millions of blossoms, like those of the stemless gentian shown here, transform the high mountains into a sea of colours during the summer.

Glossary

Term	Definition
Appropriate Assessment according to the Habitats Directive	The assessment, pursuant to the → Habitats Directive (Art. 6), of plans and projects with regard to their impact on the objects of protection (habitat types of Annex I and species of Annex II) of the Habitats Directive. See also §§ 34, 36 of the Federal Nature Conservation Act.
Art.	Article, uppermost hierarchical level in laws.
Bern Convention	Council of Europe convention on the conservation of European wildlife and its natural habitats (ETS No. 104). The international convention, adopted in 1979, provides for the preservation of endangered habitat types and species outside of the EU with the establishment of the → Emerald Network (similar to the Natura 2000 network).
Biogeographical regions	Assessment framework for the selection of Sites of Community interest (SCIs) under the Habitats Directive; currently nine regions within the EU: Continental (Central European), Atlantic, Mediterranean, Alpine (high mountain regions), Macronesian (Canary Islands, Azores, Madeira), Boreal, Pannonian, Black Sea and Steppe regions. In the national reports according to Art. 17 of the → Habitats Directive, the marine areas within the EU are now additionally divided into five marine biogeographical regions (marine Atlantic, marine Baltic, marine Mediterranean, marine Macronesian and marine Black Sea). A map showing the boundaries of the regions can be found at the European Environment Agency: https://www.eea.europa.eu/data-and-maps/figures/biogeographical-regions-in-europe-2
Biotope	"Habitat of a biological community (biocenosis, in the sense of i.e. a regularly recurring species community) of a certain minimum size and uniform (quasi-homogeneous) nature that can be demarcated from its surroundings [...] A biotope is a recognisable section of space that can be demarcated from its surroundings in the field, usually in terms of vegetation type or landscape ecology [...]" (Ssymank, Riecken et al. 1993).
Biotope complex	Characteristic, frequently recurring combination of → biotope types in a fixed spatial structure. These include sequences of biotopes along an ecological factor gradient (natural or anthropogenic) as well as biotope complexes that often reflect regional characteristics (including historical, geological/pedogenetic situations) (Ssymank, Riecken et al. 1993). Examples: Throughflow bog complex, reed and reed bed complexes.
Biotope type	"[...] An abstract class/grouping of similar biotopes ('habitats')" (Ssymank, Riecken et al. 1993). There is a German Red List of endangered biotope types in Germany (3rd Edition, Finck, Heinze et al. 2017) which contains the endangerment status and other important information on the respective biotope types. Examples of biotope types include white dunes, mesotrophic shallow lake, blue moor-grass beech forest, grey alder alluvial forest. Regular biotope surveys in the form of biotope mappings, which provide important data for the national reports according to Art. 17 of the Habitats Directive, are conducted in the Federal States.
Birds Directive	Directive on the Conservation of wild birds (Directive 2009/147/EC or Birds Directive for short) with Annexes I (Species at Special Risk or in Need of Protection), II (Huntable Species), III (Species for which Certain Activities of Killing, Capture or Trade are Permitted), IV (Prohibited Methods or Devices for Capture or Killing), V (Topics to be Researched), VI (Amendments to the Directive and Deadlines for Implementation) and VII (Correspondence Table for Old and New Versions).
Coherence	Designation of a functional and spatial network of → biotopes and conservation areas that takes into account the interrelationships of species and → habitat types with their environment and is thus intended to ensure their long-term survival.
Community assessment	Procedure for the selection of sites of Community interest according to Annex III, Phase 2 of the → Habitats Directive. The selection process led to the establishment of the European → Natura 2000 network of conservation areas. Any change in the areal coverage of the Special Areas of Conservation requires this review of the Community list again and must be confirmed by the EU.
Conservation	According to Art. 1(a) of the → Habitats Directive, the term includes measures for preservative conservation and the restoration or renaturation of habitats and species, including the possible reintroduction of extinct animal and plant species. When planning the management of → Special Areas of Conservation and the Special Protection Areas, however, a consistent distinction should be made between conservation objectives in the narrow sense (maintenance of the status of all protected natural assets at least in the status when the Directive came into force) and development measures (significant improvement of the status, development of new occurrences of habitat types, reintroduction projects).
Convention on Biological Diversity (CBD)	International, multilateral agreement on the conservation of global biodiversity, taking ecological, economic and social factors into account.

Term	Definition
Court of Justice of the European Union	European Court of Justice in Luxembourg, consisting of a Court of Justice (one judge per member state and 11 Advocates General) and the General Court (two judges per member state). Principal tasks: Legal protection in actions brought by the → European Commission against member states, actions brought by states against each other, actions for annulment against the Council or the Commission, and actions for failure to act, among others.
Directive	Legal text of the European Union. Must normally be transposed into the national law of the member states within a transposition period. Provided that the provisions are sufficiently precise, there may also be direct application after the transposition deadline.
Ecological network (biotope network)	Spatial/functional linkage of biotopes or biotope complexes, which does not necessarily have to be guaranteed by immediate proximity. The aim is to allow an exchange of plant and animal species, which form the characteristic biocoenosis in the respective habitat type, between the individual sub-areas. This preserves or promotes biodiversity in the area under consideration.
Emerald	"Gems of Nature Conservation"; name of the conservation area network of the Council of Europe (Resolution 3/1996) within the framework of the → Bern Convention. Continuation of the Natura 2000 network of the European Union outside the EU for all member states of the Council of Europe. The provisions for the Emerald Network are coordinated with → Natura 2000, with annexes for the habitat types to be protected, etc. (Council of Europe 1996b, Council of Europe 1998).
Endemic, endemism	Species that occur only in a narrowly defined geographic area, e.g. on an island or exclusively in the Alps. Mostly used in the Directive in the "political" sense for species or habitat types whose occurrence is restricted to one member state and which do not occur outside the EU.
EU Biodiversity Strategy for 2030	Long-term plan to restore or enhance biodiversity in the European Union by 2030 and promote nature conservation.
EU Pollinators Initiative	EU measures benefiting pollinators, among others with the help of the EU Nature Directives (EU Pollinators Initiative).
European Commission (COM)	Implementing body (executive) of the European Union based in Brussels, additionally endowed with the sole right of initiative for EU legislation. Consists of commissioners with assigned cabinets and a Commission president. Among its administrative bodies are the Secretariat General, the Legal Service, and 33 Directorates General (as of 2020) including, for example, DG AGRI Agriculture and Rural Development, DG ENV Environment, DG RTD Research and Innovation, and DG MARE Maritime Affairs and Fisheries.
European Topic Centre on Biological Diversity (ETC/BD)	European Topic Centre on Biological Diversity led by the European Environment Agency (EEA), based in Paris. The ETC/BD, in cooperation with the → European Commission, assesses the Community importance of the national lists of proposed sites (pSCI's) pursuant to the → Habitats Directive (Annex III, Phase 2). In collaboration with the EEA, it also prepares the Community Report or State of Nature Report at the EU level and advises the Commission and the member states on the implementation of → Natura 2000.
Exclusive Economic Zone (EEZ)	External economic zone, Exclusive economic zone. Maritime area seaward of the territorial waters from the 12-nautical-mile line to a maximum of the 200-nautical-mile limit in which the adjacent coastal state may exercise limited sovereign rights and jurisdiction, in particular the right of economic exploitation, including fishing. For the sake of nature conservation, all provisions of the → Habitats and Birds Directives apply within this area, including the obligation to designate → Natura 2000 sites.
Expert Group on Reporting (ERG)	Scientific research group of the Habitats (ORNIS) Committee. The ERG includes representatives of all member states (Germany is represented by BfN, BMUV and one Federal State representative) under the leadership of the → European Commission.
Favourable conservation status	Assessment of a natural habitat if, in the long term, a) its natural distribution and the areas it occupies in that range are stable or increasing, b) the structures and specific functions necessary for its long-term maintenance exist and are likely to exist for the foreseeable future, and c) the conservation status of its typical species is favourable. Assessment of a wild species if, in the long term, a) it is likely to form or remain on a long- term basis a viable element of its natural habitat, b) its range is neither being reduced nor is it likely to be reduced in the foreseeable future , and c) the habitat is and probably will continue to be sufficiently large for its populations to be maintained on a long term basis.

Term	Definition
Federal Agency for Nature Conservation (Bundesamt für Naturschutz, BfN)	Federal Agency for Nature Conservation (until 1993 BFANL, Federal Research Institute for Nature Conservation and Landscape Ecology); national nature conservation coordination agency for the implementation of the → Habitats Directive, implementation of the → national assessment according to Art. 4 of the Habitats Directive; this includes e.g. the preparation and compilation of the national reports according to Art. 17 of the Habitats Directive and Art. 12 of the Birds Directive every six years in coordination with the relevant Federal State authorities, the coordination of the Habitats and Birds monitoring, the annual update of the → standard data forms (reporting data) of the Natura 2000 sites, representation in technical committees at the → European Commission, as well as the regular exchange of information and advice to the BMUV and the Federal States on the implementation of the directives. The designation and management of conservation areas, on the other hand, are the sole responsibility of the Federal States, with the exception of the marine areas of the → EEZ (exclusive economic zone).
German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (Bundesministerium für Umwelt, Naturschutz, nukleare Sicherheit und Verbraucherschutz (BMUV))	The BMUV focuses primarily on the protection of the environment and nature and the mitigation of climate change. Political responsibility and legal implementation of the → Habitats Directive at the Federal level.
German Federal Nature Conservation Act	The German Federal Act for Nature Conservation provides the legal framework for legislation related to nature conservation adopted by the Federal States.
Green bridge	Planted wildlife crossing designed to allow safe crossing of traffic areas (e.g., highways, Federal highways, railroad tracks) that dissect wildlife habitats. Green bridges contribute to the reduction of habitat fragmentation by traffic routes and thus support the conservation of biodiversity.
Green Belt	Area of the former border between East and West (Iron Curtain) in Europe, in which a coherent band of partly valuable biotopes were able to develop over decades due to their seclusion and a relative lack of exploitation, today's "Green Belt". It forms an important axis of the supraregional ecological network in Germany.
Habitat network	System of similar, spatially adjacent habitats, each worthy of special protection, that are potentially in close functional connection with one another. They represent functional ecological interactions.
Habitat of a species	Designation for the (partial) habitat, living space or site occupied by a species in one of the stages of its developmental and life cycle and shaped by biotic and abiotic environmental factors.
Habitat types	Certain → biotope types or → biotope complexes of Community importance protected under Annex I of the → Habitats Directive in the → Natura 2000 network.
Habitats Directive	Habitats Directive (Directive 92/43/EEC), 1992 text of the Directive with Annexes I (habitats), II (species), III (criteria for selection of Natura 2000 sites), IV (strictly protected species) and V (species whose removal and use must be specially regulated). The annexes have been amended several times during the course of the EU‘s eastward expansion, and the biogeographical regions have been expanded, with the latest amendment being Council Directive 2013/17/EU of 13 May 2013.
LIFE	Funding programme for the conservation of nature and the environment in the European Union. In nature conservation, financial support for the implementation of the → Habitats and Birds Directives is its priority task.
List of national sites	Proposed Sites of Community Importance (pSCI) were due for submission to the → European Commission in national lists for the Habitats Directive (Article 4, Annex III, Phase 1) by June, 1995.
Management plan	According to the → Habitats Directive (Art. 6 para. 1), a special plan that determines the necessary conservation measures for the respective natural assets (→ habitat types, species) in Natura 2000 sites.
Monitoring/surveillance requirements	General requirement for the monitoring of the conservation status of the species listed in Annexes II, IV and V and habitat types listed in Annex I of the → Habitats Directive according to Art. 11 of the Habitats Directive.
National assessment	Assessment of the Special Area of Conservation proposals performed in accordance with the Habitats Directive (Art. 4, Annex III, Phase 1).

Term	Definition
Natura 2000	Coherent EU-wide network of protected sites consisting of Sites of Community Importance according to the → Habitats Directive (Special Areas of Conservation, SACs) and the → Birds Directive (Special Protection Areas, SPAs).
Natural range	Denotes the entire area in which a given species or habitat type naturally occurs.
Nature reserve	Conservation area category pursuant to §23 of the Federal Nature Conservation Act
Priority habitat types and species	Species or natural → habitat types whose → conservation is of particular importance within the territory of the European Union: Marked in Annexes I or II of the Habitats Directive with an asterisk (*). Consequences: Immediate recognition of corresponding sites of the → lists of national sites in the Community assessment, better financial support possibilities through → LIFE, stricter rules for derogations; an opinion of the → European Commission is required for interventions in certain cases.
Prohibition of deterioration	According to Article 6, para. 2 of the → Habitats Directive, deterioration of natural habitats and → species habitats, as well as disturbance of species for which the → Natura 2000 sites have been designated, must be avoided in the → conservation areas, and appropriate measures must be taken to prevent deterioration.
Proposed Sites of Community Importance (pSCI)	→ List of national sites proposed for inclusion in the Natura 2000 network and submitted to the → EU Commission by the member States according to the provisions of the → Habitats Directive.
Ramsar Convention	Agreement regarding Wetlands of International Importance (Ramsar sites) concluded in 1971 in Ramsar, Iran in the form of a treaty between the participating states. In force since 1975 (No. 14583). Ramsar sites meet the criteria of the → Birds Directive and should therefore be designated as sites under Art. 4 of the Birds Directive.
Reporting requirement(s)	Summary presentation of the status of implementation, conservation status achieved or exceptions granted, and measures implemented to control the → Natura 2000 networkof conservation areas. The → Habitats Directive specifies two-year reporting requirements for species protection and six-year comprehensive reporting requirements for implementation (Art. 17).
Screening	Preliminary first step in the → appropriate assessment procedure for projects and plans.
Site of Community Importance (SCI)	Sites of Community Importance; for the national lists of sites (→ pSCI) under the → Habitats Directive, the → European Commission carries out an evaluation procedure that identifies sites of Community importance within a maximum of three years (Art. 4, Annex III, Phase 2). This assessment is a prerequisite for the inclusion of the sites in the → Natura 2000 network.
Special Areas of Conservation (SAC)	Special conservation areas designated under Art. 3(1) of the → Habitats Directive (92/43/EEC) for the protection of natural habitat types listed in Annex I and the habitats of species listed in Annex II.
Special Protection Areas (SPA)	Special Protection Areas designated under Art. 4 (1) of the → Birds Directive (79/409/EEC) for the protection of wild bird species and their habitats.
Standard data form	Natura 2000 information sheet. Standardised form to be used for the designation of sites according to the → Habitats Directive and the Birds Directive, which is adopted as an official document via the scientific working group of the Habitats Committee (Implementation decision of the EU Commission C [2011] 4892, see Chapter 2).
Status Report on German Floodplains	Report on the nationwide assessment of the status of floodplains in Germany. It provides an overview of the spatial extent of floodplains, the loss of floodplains, and the status of neontologic floodplains in Germany. The second Status Report on German Floodplains was published in 2021.
Stepping stones	Habitat structures that are usually not well suited for the long-term persistence of a species but help link core habitats by providing temporary refuge for the dispersal of individuals and, thus, increasing the biological permeability of landscapes.
Water Framework Directive (WFD)	Directive 2000/60/EC of the European Parliament and the European Council of 23 October 2000 establishing a framework for Community action in the area of water policy (for short, the Water Framework Directive) with the aim of harmonising the legal framework for water policy in the European Union (EU) in order to prevent further deterioration of the status of bodies of water in the EU and to achieve good status for Europe‘s rivers, lakes and groundwater.

Additional Notes

Chapter 1: Introduction

- **Federal Agency for Nature Conservation topic page on the Habitats and Birds Directives and Natura 2000:** www.bfn.de/rechtliches
- **River lowland mire in Mecklenburg-Western Pomerania:**
  - Fact sheet on Tollensetal Special Area of Conservation with tributaries (DE2245-302): www.bfn.de/natura-2000-gebiet/tollensetal-mit-zufluessen
- **Habitats Directive (RL 92/ 43 /EWG):**
  - Legal text of Habitats Directive: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32009L0147&from=EN
  - Overview of the Habitats Directive: www.fauna-flora-habitatrichtlinie.de/, www.bfn.de/themen/artenschutz/regelungen/ffh-richtlinie.html and https://ec.europa.eu/environment/nature/legislation/habitatsdirective/index_en.htm
  - Special Area of Conservation Searcher in Germany: http://www.ffh-gebiete.de/ffh-gebiete/
- **Birds Directive (RL 2009/147/EG):**
  - Legal text of Birds Directive: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32009L0147&from=DE
  - Overview of the Birds Directive: www.nabu.de/tiere-und-pflanzen/voegel/artenschutz/vogelschutzrichtlinie/index.html and https://www.bfn.de/abkommen-richtlinie/vogelschutzrichtlinie-richtlinie-2009147eg-des-europaeischen-parlaments-und-des https://ec.europa.eu/environment/nature/legislation/birdsdirective/index_en.htm
- **Natura 2000 network:**
  - EU FAQ on Natura 2000: https://ec.europa.eu/environment/nature/natura2000/faq_en.htm
  - EU overview page on Natura 2000: www.ec.europa.eu/environment/nature/natura2000/index_en.htm
  - Federal Agency for Nature Conservation (BfN) Natura 2000 topic page: https://www.bfn.de/natura-2000-gebiete
  - Natura 2000 information page of the Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection: https://www.bmuv.de/themen/naturschutz-artenvielfalt/naturschutz-biologische-vielfalt/gebietsschutz-und-vernetzung/natura-2000

Additional Literature:

Ssymank A.; Ellwanger, G. et al. (2021): Das europäische Schutzgebietssystem Natura 2000. BfN-Handbuch zur Umsetzung der Fauna-Flora-Habitat-richtlinie und der Vogelschutzrichtlinie: Lebensraumtypen der Meere und Küsten, der Binnengewässer sowie der Heiden und Gebüsche. [The European Natura 2000 network of conservation areas. Federal Agency for Nature Conservation handbook on the implementation of the Habitats and Birds Directives: Habitat types of seas and coasts, inland waters, and heaths and scrub. Naturschutz und Biologische Vielfalt. [Nature conservation and biodiversity.] Issue 172 (2.1) Volume 2.1 of this Federal Agency for Nature Conservation handbook is the first of three partial volumes of a considerably expanded new edition (the basic volume, Volume 1, and the partial volume, Volume 2.2, with habitat types 6110 to 9430 are in preparation).

Chapter 2: Goals and concepts of nature conservation in the EU

- **Natura 2000-Viewer:** https://natura2000.eea.europa.eu
- **National Strategy on Biological Diversity:** www.biologischevielfalt.bfn.de/ and https://biologischevielfalt.bfn.de/fileadmin/NBS/documents/Veroeffentlichungen/BMU_Natio_Strategie_en_bf.pdf
- **EU biodiversity strategy for 2030:** https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020DC0380&from=DE
- **International Convention on Biological Diversity (CBD):** https://www.bfn.de/en/agreements-directive/convention-biological-diversity-cbd
- **Natura 2000 goes to school:** www.lfu.rlp.de/fileadmin/lfu/Naturschutz/Dokumente/Natura2000_macht_Schule.pdf

Chapter 3: What to protect? – species and habitats of Community interest

- **Red Lists of Germany:** https://www.rote-liste-zentrum.de/en/index.html https://www.rote-liste-zentrum.de/en/Red-List-Development-and-Methodology-1710.html
- **Anhänge der FFH-Richtlinie:**
  - Habitats and species of the Habitats Directive: https://www.bfn.de/en/natura-2000-habitats and https://www.bfn.de/arten
  - Annex I of the Habitats Directive: www.ffh-gebiete.de/lebensraumtypen/steckbriefe/
  - Annex II of the Habitats Directive: www.ffh-gebiete.de/arten-steckbriefe/
  - Annexes IV and V of the Habitats Directive: www.ffh-gebiete.de/natura2000/ffh-anhang-iv/
- **Annex I of the Birds Directive:** https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32009L0147&from=EN

- **The Lesser Spotted Eagle – Germany's most endangered raptor:** www.schreiadler.org/
- **Opportunity for Elbe water dropwort:** www.stiftung-lebensraum-elbe.de/massnahmen/schierlings-wasserfenchel.html

Chapter 4: Favourable conservation status – the measure of all things

- **Concept of favourable conservation status:** https://www.bfn.de/eu-naturschutzrichtlinien-und-rechtliche-umsetzung#anchor-2846
- **Assessment schemes for the Annex habitat types and species of the Habitats Directive:** www.bfn.de/monitoring-ffh-richtlinie
- **Assessment of conservation status for Natura 2000 sites (Beech forest habitat type):** www.nul-online.de/artikel.dll/NuL04-11-AK3-101-110-1_MjIxNDc2NQ.PDF?UID=2763211FD395BFD00124D957085032AEF98A84EB8B0B17
- **Steppic grasslands at the Kyffhäuser:**
  - "Conservation and development of steppic grasslands in Thuringia" LIFE project (2009 – 2015): https://umwelt.thueringen.de/fileadmin/001_TMUEN/Unsere_Themen/Natur_Artenschutz/Biologische_Vielfalt/Steppenrasen/laymansreport.pdf
  - Kyffhäuser Nature Park: www.naturepark.de

Chapter 5: The state of nature in Germany and Europe

- **State of Nature Report (2020):** www.bmu.de/fileadmin/Daten_BMU/Download_PDF/Naturschutz/bericht_lage_natur_2020_bf.pdf
- **2019 Habitats Directive Report:** www.bfn.de/ffh-bericht-2019
- **Birds Directive Report:** www.bfn.de/vogelschutzbericht-2019
- **Report on the state of nature in the EU:** https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020DC0635&from=DE, https://op.europa.eu/en/publication-detail/-/publication/911cf28a-5ad1-11eb-b59f-01aa75ed71a1
- **EU biodiversity strategy 2030:** https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020DC0380&from=DE
- **Green Deal:** https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en
- **EU Fitness Check of the Nature Directives (Habitats and Birds Directives):** www.ec.europa.eu/environment/nature/legislation/fitness_check/index_en.htm und www.bfn.de/effizienz-und-wirksamkeit

Chapter 6: We can't do without them – insects and their importance for Natura 2000

- **Federal Agency for Nature Conservation (2020): Insect decline: Facts and figures:** www.bfn.de/insektenrueckgang
- **BMUV website on insect protection:** https://www.bmuv.de/insektenschutz/
- **Insect decline studies:**
  - Gatter, W., Ebenhöh, H., Kima, R., Gatter, W. & Scherer F. (2020): 50-jährige Untersuchungen an migrierenden Schwebfliegen, Waffenfliegen und Schlupfwespen belegen extreme Rückgänge [50-year studies of migrating hover flies and soldier flies and ichneumon wasps exhibit extreme declines] (Diptera: Syrphidae, Stratiomyidae; Hymenoptera: Ichneumonidae). in: Entomologische Zeitschrift [Entomological Journal], Schwanfeld, 130 (3): 131-142.
  - Hallmann, C.A.; Sorg, M.; Jongejans, E.; Siepel, H.; Hofland, N.; Schwan, H. et al. (2017): More than 75 percent decline over 27 years in total flying insect biomass in conservation areas. PLoS ONE 12(10): e0185809. www.doi.org/10.1371/journal.pone.0185809
  - Potts, S. G.; Imperatriz-Fonseca, V. L.; Ngo, H. T. (2016): The assessment report of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services on pollinators, pollination and food production. Secretariat of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, Bonn, Germany. 552 pages. www.doi.org/10.5281/zenodo.3402856
  - Ries, M., Reinhardt, T., Nigmann, U. & Balzer, S. (2019): Analyse der bundesweiten Roten Listen zum Rückgang der Insekten in Deutschland. [Analysis of nationwide Red Lists on the decline of insects in Germany.] Natur und Landschaft [Nature and landscape] (6/7): 236-244; https://www.natur-und-landschaft.de/de/news/analyse-der-bundesweiten-roten-listen-zum-ruckgang-der-insekten-in-deutschland-1195
- **EU Pollinators Initiative:** www.ec.europa.eu/environment/nature/conservation/species/pollinators/policy_en.htm

Chapter 7: Envisioning Natura 2000 sites

- **Trilateral Wadden Sea Cooperation:** https://www.bmuv.de/en/topics/nature-species-protection/nature-and-biological-diversity/international-/-eu/unesco-world-heritage-convention/wadden-sea-world-natural-heritage und https://www.waddensea-worldheritage.org/
- **Wadden Sea National Park:** www.nationalpark-wattenmeer.de/
- **Wadden Sea Habitat:** www.nabu.de/imperia/md/content/nabude/meeresschutz/2011-nabu-lebensraum_wattenmeer.pdf
- **Ramsar-Konvention:** https://www.bmuv.de/en/topics/nature-species-protection/nature-and-biological-diversity/international-/-eu/ramsar-convention

Chapter 8: Natura 2000 in forests

- **EU Guidelines:**
  - Topic page of the Federal Agency for Nature Conservation on forest conservation and sustainable forest management: https://www.bfn.de/waldnaturschutz-und-nachhaltige-waldbewirtschaftung
  - EU Commission Guidelines for Natura 2000 and Forests – Parts I-II: https://op.europa.eu/en/publication-detail/-/publication/855ca711-8450-11e5-b8b7-01aa75ed71a1
  - EU Commission Guidelines for Natura 2000 and Forests – Part 3 Case Studies: https://op.europa.eu/en/publication-detail/-/publication/3d9c9228-16e8-4801-96db-4f74ebfd38e3/language-en/format-PDF/source-search
- **EU-FAQ: Natura 2000 and the forest:** https://ec.europa.eu/environment/nature/natura2000/management/faq_en.htm
- **Additional Literature:**
  - Ssymank, A.; Buschmann, A.; Röhling, M.; Ellwanger, G.; Brandt, K.; Jay, M. (2019): Natura 2000 Forest habitat types on secondary sites – conservation and management strategies. Naturschutz und biologische Vielfalt [Nature conservation and biodiversity]. Issue 167.
  - Lehrke, S.; Ellwanger, G.; Buschmann, A.; Frederking, W.; Paulsch, C.; Schröder, E.; Ssymank, A. (Publisher) (2013): Natura 2000 im Wald [Natura 2000 in the forest]. Lebensraumtypen, Erhaltungszustand, Management, Naturschutz und biologische Vielfalt [Habitat types, conservation status, management, conservation and biodiversity]. Issue 131.
- **Beech Forests UNESCO World Heritage:** https://www.europeanbeechforests.org/
- **The wildcat – a secret "native inhabitant" of our forests / BPBV (Federal programme for biological diversity) project "Wildcat Jump":** https://biologischevielfalt.bfn.de/bundesprogramm/projekte/projektbeschreibungen/wildkatzensprung.html
- **Forest development data:** www.bfn.de/pressemitteilungen/aktuelle-daten-zur-natuerlichen-waldentwicklung-deutschland-0

Chapter 9: Agriculture and Natura 2000 – Preservation of cultural landscapes

- **EU guidelines: Agriculture for Natura 2000:** www.ec.europa.eu/environment/nature/natura2000/management/docs/FARMING%20FOR%20NATURA%202000-final%20guidance_de.pdf
- **EU brochure "The economic benefits of the Natura 2000 network":** www.ec.europa.eu/environment/nature/natura2000/financing/docs/ENV-12-018_LR_Final1.pdf
- **Topic page of the Federal Agency for Nature Conservation on nature conservation in the landscape:** https://www.bfn.de/naturschutz-der-landwirtschaft
- **Topic page of the Federal Agency for Nature Conservation on agriculture in Natura 2000 sites:** www.bfn.de/kooperation-mit-nutzern-beim-natura-2000-management#anchor-6380
- **Grassland conservation in agriculture (Chapters 2.5 & 2.6):** www.hs-rottenburg.net/fileadmin/user_upload/Forschung/Forschungsprojekte/Management/GAPGRUEN/BfN_Skript_539.pdf
- **German Landcare Association (DVL):** www.dvl.org
- **DVL brochure "Natura 2000 and farms – facts and background" (2017):** www.dvl.org/uploads/tx_ttproducts/datasheet/DVL-Publikation-Fachpublikation_Natura_2000_und_landwirtschaftliche_Betriebe.pdf
- **DVL brochure "With Heart and Hand for Landscapes – Examples from Rural Conservation" (2020):** www.dvl.org/uploads/tx_ttproducts/datasheet/DVL-Publikation-Fachpublikation_Mit_Herz_und_Hand_fuer_Landschaften.pdf
- **Landscape conservation management at the Humperts:** www.schaeferei-humpert.de/ueber_uns.html
- **Natura 2000 in agri-environment programmes – support for the management of species-rich grasslands in Baden-Württemberg (FAKT (Funding programme for agri-environment, climate protection and animal welfare)):** https://mlr.baden-wuerttemberg.de/de/unser-service/publikation/did/fakt-foerderprogramm-fuer-agrarumwelt-klimaschutz-und-tierwohl/

Chapter 10: Europe-wide protection of our inland waters

- **Topic page of the Federal Agency for Nature Conservation on aquatic systems and floodplains:** https://www.bfn.de/gewaesser-und-auen
- **Germany's Blue Belt Programme:** https://www.bfn.de/en/topic/germanys-blue-belt-programme
- **Giving more space back to the river – Renaturation of floodplains in Germany:** www.bfn.de/publikationen/broschuere/den-fluessen-mehr-raum-geben
- **Blue Belt Germany:** www.blaues-band.bund.de/
  - Federal government Blue Belt website (ENG): https://www.bundesregierung.de/breg-en/news/-germany-s-blue-belt-programme-394228
- **EU-Guidelines:**
  - EU Guidance on Inland waterway transport and Natura 2000: https://ec.europa.eu/environment/nature/natura2000/management/docs/iwt_en.pdf
  - EU guidance on the requirements for hydropower in relation to EU Nature legislation: https://ec.europa.eu/environment/nature/natura2000/management/docs/hydro_final_june_2018_en.pdf

- **Water Framework Directive:**
  - EU Water Framework Directive:
  - https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32000L0060&from=EN
  - Water Framework Directive – Germany's aquatic systems: www.umweltbundesamt.de/sites/default/files/medien/1968/publikationen/wrrl_englische_version_dez_2016.pdf
  - Water Framework Directive – Implementation in Germany/Austria: www.bfn.de/publikationen/schriftenreihe-naturschutz-biologische-vielfalt/nabiv-heft-85-wasserrahmenrichtlinie
  - Water Framework Directive – Implementation in Germany (ENG): https://www.bmuv.de/en/topics/water-resources-waste/water-management/policy-goals-and-instruments/water-protection-policy-in-germany/implementation-of-european-water-framework-directive-in-germany
  - EU-FAQ: Links between the Water Framework Directive and Nature Directives: www.ec.europa.eu/environment/nature/natura2000/management/docs/FAQ-WFD%20final.pdf
- **Flood protection:**
  - EU Flood Risk Management Directive: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32007L0060&from=DE
  - Eco-friendly flood protection: www.bfn.de/hochwasserschutz
- **"Lenzener Elbtalaue" large-scale nature conservation project:** www.burg-lenzen.de/burg_lenzen/projekte/naturschutzgrossprojekt/naturschutzgrossprojekt.html and https://www.bfn.de/en/project/elbe-river-alluvial-plain-lenzen-lenzener-elbtalaue
- **"Living Floodplains for the Elbe" (Federal Programme for Biological Diversity):** https://biologischevielfalt.bfn.de/bundesprogramm/projekte/projektbeschreibungen/lebendige-auen-fuer-die-elbe.html and https://www.burg-lenzen.de/burg_lenzen/projekte/lebendige-auen-fuer-die-elbe/auenentwicklung-und-auenverbund-der-unteren-mittelelbe.html
- **Pond landscape in the Oberlausitz:** https://www.biosphaerenreservat-oberlausitz.de/en and www.oberlausitz-heide.de/erleben/unesco-biospharenreservat/

Chapter 11: Undiscovered beauty far off the coast

- **Information from the Federal Agency for Nature Conservation on the subject of marine conservation:**
  - General information page of the Federal Agency for Nature Conservation on marine conservation: https://www.bfn.de/en/topic/oceans
  - Marine Conservation Challenge: https://www.bfn.de/en/publications/position-paper/challenges-marine-nature-conservation
  - Federal Agency for Nature Conservation nature conservation planning contribution for the EEZ (2020): https://www.bfn.de/sites/default/files/BfN/meeresundkuestenschutz/Dokumente/2020-08-14_naturschutzfachlicher-planungbeitrag-fortschreibung.pdf
  - Federal Agency for Nature Conservation North Sea Publications (2017): www.bfn.de/publikationen/bfn-schriften/bfn-schriften-477-die-meeresschutzgebiete-der-deutschen
  - Publications of the Federal Agency for Nature on the Baltic Sea (2020): www.bfn.de/publikationen/bfn-schriften/bfn-schriften-553-die-meeresschutzgebiete-der-deutschen
- **Strategies for the Baltic Sea Region:**
  - EU Strategy: www.balticsea-region-strategy.eu/
  - EU Baltic Sea Strategy in Mecklenburg-Western Pomerania: www.europa-mv.de/ostseekooperation/strategie/
- **EU Special Report on the Marine Environment 2020:** https://www.eca.europa.eu/Lists/ECADocuments/SR20_26/SR_Marine_environment_EN.pdf
- **Implementation of the European Marine Strategy Framework Directive (MSFD) in Germany:** www.meeresschutz.info/msrl.html
- **Marine monitoring of harbour porpoise:** www.bfn.de/wirbeltiere#anchor-3841
- **Bird protection in the Baltic Sea:** Pomeranian Bay nature reserve: https://www.bfn.de/en/pomeranian-bay-protected-area-odra-bank-area-iii

Chapter 12: Protection with a sense of proportion – appropriate assessments for plans and projects

- **Appropriate assessment information:**
  - Appropriate assessment of projects with significant impact: https://ec.europa.eu/environment/nature/natura2000/management/docs/art6/natura_2000_assess_en.pdf
  - Appropriate assessment: www.bfn.de/ffh-vertraeglichkeitspruefung
  - EU Guidance document on assessment of plans and projects in relation to Natura 2000 sites: https://op.europa.eu/en/publication-detail/-/publication/a3a639e3-b943-11ec-b6f4-01aa75ed71a1/language-en/format-PDF/source-256755860
  - Species protection and derogations (Art. 12, 13, 16): https://www.bfn.de/rechtliches
- **EU guideline on the strict protection of animal species of Community interest:** https://ec.europa.eu/environment/nature/conservation/species/guidance/pdf/guidance_en.pdf

Chapter 13: Modern concepts – monitoring success at the European level

- **National Report of Germany (pursuant to Art. 17 of the Habitats Directive):** www.bfn.de/nationale-ffh-berichte
- **National Birds Report (pursuant to Art. 12 of the Birds Directive):** https://www.bfn.de/nationale-vogelschutzberichte

- **Methodology and process for report preparation:** www.bfn.de/ffh-bericht-2019#anchor-2547
- **Habitats monitoring (pursuant to Article 11 of the Habitats Directive):** https://www.bfn.de/monitoring-ffh-richtlinie
- **Bird monitoring:** www.dda-web.de or www.bfn.de/vogelmonitoring
- **Habitats Directive reports of the EU member states (pursuant to Art. 17 of the Habitats Directive):** https://www.eea.europa.eu/themes/biodiversity/state-of-nature-in-the-eu/article-17-national-summary-dashboards
- **EU Birds Report (pursuant to Art. 12 of the Birds Directive):** https://www.eea.europa.eu/themes/biodiversity/state-of-nature-in-the-eu/article-12-national-summary-dashboards

Chapter 14: Coherence and embedding into the landscape – a good neighbourhood matters

- **Ecological network:**
  - Coherence (ecological network): https://www.bfn.de/kohaerenz-biotopverbund
  - Care and networking: https://www.bfn.de/pflege-und-verbund
  - **Additional Literature:** Fuchs, D.; Hänel, K.; Lipski, A.; Reich, M.; Finck, P. and Riecken, U. (2011): Länderübergreifender Biotopverbund in Deutschland. [Transnational ecological network in Germany]. Grundlagen und Fachkonzept. [Basic principles and technical concept]. Naturschutz und biologische Vielfalt [Nature conservation and biodiversity]. Issue 96.
- **Handbook for Ecological Networks in Germany:** www.bund.net/fileadmin/user_upload_bund/publikationen/naturschutz/naturschutz_handbuch_biotopverbund_deutschland.pdf
- **Green Belt:** https://www.bmuv.de/themen/naturschutz-artenvielfalt/naturschutz-biologische-vielfalt/gebietsschutz-und-vernetzung/gruenes-band and https://www.bfn.de/gruenes-band
- **European Green Belt initiative:** https://www.europeangreenbelt.org/
- **Reconnection Information:**
  - Federal Reconnection Programme: https://www.bmuv.de/en/download/federal-defragmentation-programme
  - Green bridges, fauna tunnels and fauna culverts. Requirements for wildlife crossings. (Federal Agency for Nature Conservation Publication 522): www.bfn.de/publikationen/bfn-schriften/bfn-schriften-522-gruenbruecken-faunatunnel-und-tierdurchlaesse
  - **Additional Literature:** Hänel, K. & Reck, H. (2011): Federal ecosystem reconnection priorities: Overcoming road-related barriers. Naturschutz und Biologische Vielfalt. [Nature conservation and biodiversity.] Issue 108.
- **LIFE Project: Regeneration and conservation of semi-natural dry grasslands in Germany:** www.nls-saar.de/stiftung/trockenrasen/
- **Transhumance – tradition meets up with today:**
  - Importance of transhumance to biodiversity in Germany: http://dipbt.bundestag.de/dip21/btd/19/127/1912778.pdf

Chapter 15: No undertaking without management – flexibility in implementation

- **Federal Agency for Nature Conservation topic page on management in Natura 2000 sites:** www.bfn.de/management-0
  - Status of management plan implementation (Federal Agency for Nature Conservation): www.bfn.de/management-0#anchor-6393
  - EU COM – Managing Natura 2000 sites: https://ec.europa.eu/environment/nature/natura2000/management/docs/art6/EN_art_6_guide_jun_2019.pdf
- **Eco-friendly ditch clearance in the Bremen Marshland:** Nagler, A. & Müller, H.U. (2012): Ecological ditch maintenance programme of the state of Bremen – 25 years of successful conservation of species-rich ditch habitats in grassland. https://www.researchgate.net/publication/290554840_Ecological_ditch_maintenance_programme_of_the_state_of_Bremen_-_25_years_of_successful_conservation_of_species-rich_ditch_habitats_in_grassland
- **Biodiversity consulting for agricultural enterprises in NRW:** www.landwirtschaftskammer.de/landwirtschaft/naturschutz/beratungbiodiversitaet/index.htm
- **Pasture wilderness in Brandenburg:** www.doeberitzerheide.de/wilde-weiden
- **Network of Natura 2000 stations in Thuringia as a driving force for the implementation of Natura 2000:** https://umwelt.thueringen.de/themen/natur-artenschutz/natura-2000 https://natura2000-thueringen.de/
- **Additional Literature:** Ellwanger, G.; Schröder, E. (2006): Management of Natura 2000 sites. Naturschutz und biologische Vielfalt [Nature conservation and biodiversity]. Issue 26.

Chapter 16 – Natura 2000 and climate change – synergies and impacts

- **Information from the Federal Agency for Nature Conservation:**
  - Contribution of nature conservation to climate change mitigation and adaptation: www.bfn.de/naturschutz-und-klimawandel-eine-nationale-aufgabe#anchor-6561
  - Ecosystem-based approaches to climate change adaptation and mitigation in German-speaking countries (Federal Agency for Nature Conservation Publication 395): https://www.bfn.de/publikationen/bfn-schriften/bfn-schriften-395-oekosystembasierte-ansaetze-zur-anpassung-den
  - Ecosystem-based approaches to adaptation and mitigation – good practice examples and lessons learned in Europe (Federal Agency for Nature Conservation, Publication 306): https://www.bfn.de/sites/default/files/BfN/service/Dokumente/skripten/skript306.pdf

  - Success factors in planning and implementing nature-based approaches to climate change mitigation and adaptation (Federal Agency for Nature Conservation Publication 406): https://www.bfn.de/publikationen/bfn-schriften/bfn-schriften-406-erfolgsfaktoren-bei-der-planung-und-umsetzung
  - Cornerstones of an action concept for wildlife conservation in Germany under climate change (Federal Agency for Nature Conservation Publication 466): www.bfn.de/publikationen/bfn-schriften/bfn-schriften-466-eckpunkte-eines-handlungskonzepts-fuer-den
- **Biodiversity and climate: Thinking about nature conservation and climate change mitigation concomitantly. Public expert interview in the Environment Committee of the German Parliament on the topic of "Biodiversity and Climate". Federal Agency for Nature Conservation 2020:** http://www.bfn.de/publikationen/positionspapier/stellungnahme-der-praesidentin-zum-thema-biodiversitaet-und-klima
- **EU guideline on climate change and Natura 2000:** https://op.europa.eu/en/publication-detail/-/publication/59c03f44-f672-4f61-bbf7-5422479cf6bb
- **Additional Literature:**
  - Essl, F. & Rabitsch, W. (2013): Biodiversity and Climate change. Implications and options for action for nature conservation in Central Europe. Heidelberg. DOI 10.1007/978-3-642-29692-5.
  - Fritz, S.; Lindow, M.; Petschow, U. (2014): Working paper in preparation for the stakeholder dialogue on climate adaptation
  - Adapted conservation or conservation as adaptation. Institute for Ecological Economic Research. www.umweltbundesamt.de/sites/default/files/medien/656/dokumente/arbeitspapier_stakeholderdialog_naturschutz_webseite.pdf
- **Peatlands renaturation in Baden-Württemberg**
  - Peatland Conservation Programme in Baden-Württemberg: https://pudi.lubw.de/detailseite/-/publication/66926
  - Wilhelmsdorf Nature Conservation Centre in the Pfrunger-Burgweiler Peatlands: www.pfrunger-burgweiler-ried.de/
  - Natura 2000 and management in peatland areas: Vischer-Leopold, M.; Ellwanger, G.; Ssymank, A.; Ullrich, K.; Paulsch, C. (2015): Natura 2000 and management in peatland areas. Naturschutz und biologische Vielfalt [Nature conservation and biodiversity]. Issue 140.

Chapter 17: Financing Natura 2000

- **Funding and financing of Natura 2000:** www.bfn.de/finanzierung
- **"EU nature conservation funding/CAP 2020", position paper of the LANA (Federal Consortium for Nature Conservation, Landcare Management and Recreation) expert group on the effectiveness of EU nature conservation funding in Germany (2016):** www.dvl.org/fileadmin/user_upload/Themen/1_Agrarpolitik/Agrarreform/160901_LANA_Kuenftige-EU-Naturschutzfinanzierung-in-Deutschland.pdf
- **EU Financing of Natura 2000:**
  - General EU information page: www.ec.europa.eu/environment/nature/natura2000/financing/index_en.htm
  - EU Funding Opportunities for Natura 2000: https://op.europa.eu/en/publication-detail/-/publication/686e40b8-e089-11ec-a534-01aa75ed71a1/language-en/format-PDF/source-259034635
  - European Agricultural Fund for Rural Development (EAFRD): https://www.bmel.de/EN/topics/rural-regions/rural-development-support/european-agricultural-fund-rural-development-EAFRD.html
  - EU LIFE Programme: https://www.bmuv.de/en/topics/europe-international/europe/life-the-eu-funding-instrument-for-the-environment and https://www.z-u-g.org/aufgaben/beratung-zum-eu-life-programm/eu-life-programm/ and https://ec.europa.eu/info/funding-tenders/find-funding/eu-funding-programmes/programme-environment-and-climate-action-life_en
- **Atlantic sand landscapes LIFE Project:** https://www.sandlandschaften.de/en/index.html
- **"Experience natur(a) in the Western Erzgebirge Mountains" project:** www.natur-im-erzgebirge.de/

Chapter 18: Tourism, sport and recreation in Natura 2000 sites

- **Topic page of the Federal Agency for Nature Conservation on eco-friendly tourism and sport:** https://www.bfn.de/en/topic/tourism-and-sport and https://www.bfn.de/natura-2000-und-sport
- **Linking cultural heritage and Natura 2000 – case studies:** https://op.europa.eu/en/publication-detail/-/publication/1fb9c9f9-727c-11e7-b2f2-01aa75ed71a1/
- **Europe's cultural and natural heritage in Natura 2000:** www.ec.europa.eu/environment/nature/natura2000/management/pdf/Nature-and-Culture-leaflet-web.pdf
- **Scoping Study: Management of tourism and recreation activities in Natura 2000 sites:** www.ec.europa.eu/environment/nature/natura2000/management/pdf/Scoping_Tourism_Natura2000_final.pdf
- **Pfaueninsel – successful synthesis of nature conservation and the preservation of historical monuments:** www.berlin.de/sen/uvk/natur-und-gruen/naturschutz/schutzgebiete/naturschutzgebiete/pfaueninsel/
- **Natur(a) Discovery Trail in the Western Erzgebirge Mountains:**
  - Affalter Nature Hostel: www.naturherberge.de
  - Fruit and Insect Discovery Trail: http://www.natur-im-erzgebirge.de/Themenweg01.html
  - Nature(a) discovery trail in the Western Erzgebirge Mountains: www.natur-im-erzgebirge.de/Erlebnisweg.html

Photo: A. Ssymank

Photo: A. Ssymank

Molinia meadows on chalk and clay (Eu-Molinion) (Habitat Type 6410) in the Siegaue near Bonn with common devil's-bit and great burnet (top image), a habitat of the scarce large blue butterfly (bottom image) – The flowers of the great burnet serve as a food source (nectar) for butterflies as well as a place for roosting, resting, courtship, mating and egg laying. The caterpillars feed on the flowers during their first stage of life.

The Natura 2000 sites and ecological network axis in Germany

- Special Area of Conservation and Special Protection Area
- Special Area of Conservation only
- Special Protection Area
- Green Belt
- Large mammal axis
- Wet axis
- Forest axis
- Dry axis

Source: Federal Agency for Nature Conservation (2022).
Geo base data © GeoBasis - DE/BGK 2019 dl-de/by-2-0
(www.govdat.de/dl-de/by-2-0) EuroGlobalMap:
© EuroGeographics