Federal Defragmentation Programme

– Adopted by the Federal Cabinet on 29 February 2012 –

Preliminary Remark

Germany is a densely populated industrial nation with a well-developed traffic network. In 2009, the national road network (motorways, federal roads, state roads and district roads) covered a length of 231,072 kilometres.

The fragmentation of habitats by the traffic network and the increase in traffic density has in places led to an isolation and a qualitative deterioration of remaining habitats for fauna and flora. In particular, the barrier effect of roads hampers exchange within and between populations and impairs the colonisation of new habitats, leading to insufficient genetic exchange between species of fauna and flora. The high traffic volume also results in significant animal losses. Loss of areas, intensified use, fragmentation of habitats, river development and drainage measures have been having serious negative consequences for nature for decades. Climate change is an additional stress factor.

All these factors combine to weaken the stability of ecosystems and the ability of species to adapt to changing environmental conditions. The manifold consequences of climate change increase the threat of species loss. There is a risk that ecosystems will no longer be able to provide the same extent of services for mankind (soil fertility, assimilative capacity of water bodies, air filters, starting materials for drugs, food, etc.). Immediate action must be taken wherever specific remedial measures are possible.

The movement of wild animals reduces safety on our roads and endangers people's lives. In 2009, for example, there were 3,045 accidents in Germany involving wild animals that caused injury to persons and resulted in 27 human fatalities. According to the Deutscher Jagdschutzverband [German Hunting Association], more than 250,000 wild animals are killed annually. According to the Gesamtverband der Deutschen Versicherungswirtschaft [German Insurance Association], accidents involving wild animals cause material damage of around 500 million euros per year. All these examples highlight the need for action.

The Federal Defragmentation Programme aims to re-connect habitat corridors that have up to now been dissected by the national road network (defragmentation). The Federal

Programme is a long-term programme. Its central component is an investment programme for constructing crossing aids for wildlife within the federal trunk road network. Implementation of the investment programme will commence on completion of the construction projects under economic stimulus package II. The programme does not include measures for other traffic modes or measures involving the subordinate road network.

The Federal Government is committed to the vision of sustainable development. Any further fragmentations of habitats have to be prevented, if at all possible, to fulfil the Federal Government's strategy on sustainability. Consequently, this programme also sets out objectives in the fields of road construction, nature and landscape conservation, spatial planning and local land-use planning for measures involving both the existing road network and new construction planning. It also provides information on quality assurance and on national and international cooperation.

The Federal Government is relying on the active participation of the Länder, local authorities and associations in implementing the programme.

A Fundamental principles

A.1 Significance of and threats to biodiversity

Biodiversity represents a fundamental basis for human life and health. In order to guarantee nature's ecosystem services for future generations, we need to preserve the genetic diversity of and diversity of habitats for as many species as possible, especially as their respective roles in the natural balance and their benefits to mankind are not yet fully understood.

The Federal Government also considers the preservation of nature an ethical obligation.

Biodiversity remains under serious threat in Germany. 72.5% of the habitats in Germany are endangered. 43% of native vertebrate species are included in the 2009 Red List of Threatened Species. Almost 28% are currently listed as endangered. In addition, almost 10% are on the current “near-threatened list”. Overall, therefore, Germany is at risk of losing over one-third of its vertebrate species.

Major causes behind the threat to both animal and plant species are the destruction, fragmentation and isolation of their habitats. 60% of the designated nature conservation areas in Germany are smaller than 50 hectares. Due to the evolved settlement and land

use structures, the landscape in Germany tends to be divided into smaller sections than in other European countries. Moreover, during the period under review from 2007 to 2010, an average of 87 new hectares per day was used for settlement and traffic purposes. Undissected low-traffic areas of at least 100 square kilometres account for 25.4% of the landscape.

The process of species extinction

Reduction in size and isolation of animal and plant populations.

Falling below minimal areas results in

- *insufficient individual densities for sustainable reproduction,*
- *a reduction in genetic diversity in remaining populations,*
- *the associated loss of individuals' ability to adapt to changing environmental conditions and*
- *ultimately the extinction of affected species occurrences.*

As well as preventing the colonisation and re-colonisation of habitats, barriers also impede genetic interaction between local populations. Species are then no longer able to adapt to changing environmental conditions by migration.

This trend becomes self-perpetuating and leads to an increasingly rapid loss of animal and plant species. This results in voids in symbiotic communities, e.g. the lack of habitat builders, which in turn leads to a further loss of dependent species.

A.2 Significance of habitat connectivity

Animal and plant species must be able to migrate and establish themselves in new habitats. Habitat connectivity, achieved e.g. by preserving opportunities to migrate between biotopes and by developing crossing structures on roads, safeguards the survival of animal and plant species within an intensively used cultural landscape.

Core elements of habitat connectivity are in particular conservation areas such as national parks, biosphere reserves or Natura 2000 sites. These are often geographically isolated from each other. Connectivity measures make it possible to optimise the opportunities for species to switch between these protected areas. Therefore, protected areas as well as other areas suitable as habitats should be connected by habitat corridors.

A.3 Connectivity as a joint task of the Federal Government and Länder

The Federal Nature Conservation Act (BNatSchG) obliges the Länder to establish a network of connected biotopes covering at least 10% of the area of each Land (federal state). Habitat connectivity should be established at federal level, transcending Land borders. The Länder must consult with each other in this respect.

The Federal Government supports the Länder in this task by providing conceptual support, especially on aspects of habitat connectivity that extends beyond their boundaries. Another task of the Federal Government is to ensure, within its sphere of responsibility, the functioning of habitat connectivity relationships and to organise cooperation within the European Union.

Through “chance.natur”, a federal scheme promoting the “establishment and safeguarding of conservationally important components of nature and landscapes”, the Federal Government has been making an important contribution to the conservation of nationally important areas of nature and landscapes since 1979. To date, this programme has promoted core areas totalling 254,000 hectares, equating to around 0.7 per cent of the area of the Federal Republic of Germany.

The Federal Government has made a significant contribution by protecting the national natural heritage. In the 16th legislative period, the Federal Government excluded 100,000 hectares of federally owned nature conservation areas of representative significance for the nation as a whole (including “green belt” areas) from privatisation and placed them, free of charge, at the disposal of the Länder, various environmental and nature conservation foundations and nature conservation associations for long-term conservation. A further 25,000 hectares will be transferred in the current legislative period.

The Federal Government's policy aims at ensuring the efficiency and proper functioning of the natural balance. This is the case in particular for a forward-looking settlement and transport policy, for future strategies in energy, agricultural and forest policy and for shaping the structural change in rural areas.

B Concept of defragmentation

In its National Strategy on Biological Diversity, the Federal Government committed itself to ensuring ecological permeability of dissected areas by 2020. Existing traffic routes will then generally no longer impair habitat connectivity.

Achieving this objective is based on the following principles:

- Decisions involving spatial impact must consider the habitat corridor network in Germany.
- When planning projects, the dissection of habitat corridors has to be avoided in order to preserve the permeability of the landscape. Avoidance measures can include crossing aids for animals and for interlinking habitats.
- Within the national traffic network, defragmentation measures must be adopted at key points along habitat corridors that offer maximum possible benefit based on the available financial resources.

In this context, benefit is measured based on the following objectives:

- Defragmentation measures should extend the effectively usable habitat for species that are sensitive to dissection so that populations are stabilised at a level that allows the respective species to survive in the landscape. Species sensitive to dissection are species that, for example, require large undissected habitats (or a high density of such habitats) or whose populations need exchange over long distances.
- Defragmentation measures should ensure the exchange of migrating species between their habitats in the long term and thus contribute to the preservation of such species.
- Defragmentation measures should contribute to the colonisation and re-colonisation of habitats and thus help species that are sensitive to fragmentation adapt to landscape and climate changes.
- Defragmentation measures should contribute to the prevention of game accidents and thus improve traffic safety and help protect road users.

- Defragmentation measures should help enable humans to re-experience fauna and flora in our landscape again. They thus contribute to preserving and restoring our varied cultural landscapes.
- Defragmentation measures help animal protection by preventing animal fatalities due to road crossings.

All measures must be oriented towards large-scale connectivity concepts and should be integrated into habitat connectivity planning both of the Länder and at federal level.

An important scientific basis for such planning concepts is provided by the Federal Agency for Nature Conservation's research results on habitat corridors in Germany, which have been available since 2009. They are based on selective biotope mappings and other landscape information of the Länder and of the GIS planning aid “Habitat-Net”.

A distinction is made between:

- the dry biotope habitat network,
- the wet biotope habitat network,
- the habitat network of valuable forest biotopes and
- the corridor system for silvicolous larger mammals.

This has produced four indicative maps, which combine to represent the network of habitat corridors in Germany. The maps and the underlying data sets are available on the website of the Federal Agency for Nature Conservation (www.bfn.de/0306_Zerschneidung.html).

C Fields of action

The Federal Programme aims to minimise the fragmentation effects produced by the existing federal trunk roads network. Although urban development and other infrastructures as well as agriculture and forestry also have a major impact on the permeability of the landscape, they are not considered in this Federal Programme. It focuses primarily on road construction, nature conservation and landscape management as well as on integrated spatial planning.

C.1 Road construction as a field of action

The Federal Government subscribes to the polluter-pays-principle. Since the federal trunk roads network constitutes one of the causes of habitat defragmentation, road construction is considered a key field of action. In addition to the existing legal obligation to avoid fragmentation effects when planning and implementing new road construction and road expansion projects, the Federal Government is also using this Programme and the available funds to address the issue of defragmentation within Germany's existing road network.

C.1.1 Traffic infrastructure planning

The habitat corridors in Germany must be considered when developing the Federal Traffic Infrastructure Plan (BVWP). The Federal Government will adapt this plan to current needs and developments.

A strategic environmental assessment (SEA) must be conducted when drawing up a new Federal Traffic Infrastructure Plan. In this context,

- national parks, nature parks, biosphere reserves and other nature conservation areas,
- Natura 2000 sites,
- the network of habitat corridors,
- undissected functional areas (UFAs) and
- undissected low-traffic areas larger than 100 square kilometres,

are decisive criteria for recording and assessing the fragmentation of landscapes, habitat corridors and core elements of national habitat connectivity.

C.1.2 Avoiding fragmentation in new road construction and road expansion projects

Stringent planning requirements must be applied to new road construction projects in order to prevent conflicts with habitat corridors. The fragmentation of habitats and habitat corridors must be avoided wherever possible. Mitigation measures have to be adopted at key sections of habitat corridors.

C.1.3 Defragmentation measures

In order to implement the concept outlined under **B** above, the Federal Government will in future give priority to measures within the federal traffic network at places that include the most important defragmentation sections in the network of habitat corridors and where at the same time road safety will be increased.

Defragmentation measures on federal trunk roads can include:

- Crossing aids for animals and to connect habitats over roads. These include large-scale measures such as green bridges as well as smaller measures such as amphibian protection systems.
- Optimising existing building structures (overpasses and underpasses),
- Additional measures to improve crossing opportunities for animals and thereby enhance road safety, e.g. animal warning systems,
- Accompanying measures such as guide and barrier systems to offer additional improvements in the direct vicinity of crossing structures.

Requirements on location, size, the design and integration of crossing aids and the corresponding guide and barrier systems are given in the recommended leaflets issued by the Federal Ministry of Transport, Building and Urban Development (Merkblatt zur Anlage von Querungshilfen für Tiere und zur Vernetzung von Lebensräumen an Straßen (MAQ) [Leaflet on constructing crossing aids for animals and on connectivity measures for habitats on roads], 2008 edition issued by Forschungsgesellschaft für Straßen- und Verkehrswesen and Merkblatt zum Amphibienschutz an Straßen (MAmS) [Leaflet on amphibian protection on roads], 2000 edition[1]).

In anticipation of this Federal Programme, the Länder established 14 green bridges under economic stimulus package II. The Federal Defragmentation Programme will be implemented once these investments have been completed.

The Federal Ministry for Transport, Building and Urban Development (BMVBS) will then work towards ensuring that the Länder, who carry out planning and construction of federal trunk roads on behalf of the Federal Government, accord preference to implementing suitable measures in sections with high defragmentation priority. The BMVBS decides on these measures in consultation with the Federal Environment Ministry (BMU).

[1] Both leaflets can be obtained from FGSV-Verlag (www.fgsv-verlag.de).

Where measures (new construction and expansion) are to be implemented according to a requirement plan in sections with high defragmentation priority in the next few years, it is expedient to implement defragmentation measures in the form of preventive or, in individual cases, compensation measures. In sections with no requirement plan measures, defragmentation measures should be implemented wherever possible. These are to be classified as voluntary rehabilitative measures without any legal entitlement. To count them against future impacts as stock of compensation measures would be in conflict with the Programme's aims and raise legal concerns.

The “List of sections with high defragmentation priority” [Liste der prioritären Wiedervernetzungsabschnitte] should be used as a basis for future habitat defragmentation measures. The Länder may suggest alternative sections for the list that serve a comparable purpose in terms of nature conservation. Reasons for alternative proposals may include: integration in individual habitat connectivity plans of the Länder, topographic conditions, ownership factors, more favourable cost-benefit ratio, special suitability for environmental design and hinterland connection of defragmentation measures within the landscape or competition with other important uses that are required for the well-being of the general public.

In addition to the defragmentation measures that have been given priority by the Federal Government, other measures are also expedient. These include measures to defuse wild animal accident blackspots and regional or local interlinking of habitats (e.g. for amphibians or bats).

List of sections with high defragmentation priority

Land	Road	Section
BW	A 5	südlich Rastatt/Niederbühl Oberrhein-Schwarzwald (gemeinsam mit Bahnüberführung lösen)
BW	A 5	nördlich Riegel (gemeinsam mit Bahnüberführung lösen)
BW	A 5	südlich Karlsruhe Hardtwald (gemeinsam mit Bahnüberführung lösen)
BW	A 5	südwestlich Freiburg Mooswald
BW	A 8	westlich Ispringen Nordschwarzwald
BW	A 8	östlich Pforzheim Schwarzwald-Teilraum Hagenschieß
BW	A 8	nördlich Laichingen (Widderstall) – östlich Merklingen Schwäbische Alb
BW	A 81	östlich Oberdorf am Neckar Schwäbische Alb und Schwarzwald
BW	B 10	südlich Geißlinger Steige/Raum Amstetten Schwäbische Alb (gemeinsam mit Bahnüberführung lösen)
BW	B 14	zwischen Herrenberg und Nufringen Schwarzwald – Naturpark Schönbuch) (gemeinsam mit Bahnüberführung lösen)
BW	B 31	östlich Titisee Neustadt Schwarzwald
BW	B 35	südlich Maulbronn Stromberg
BY	A 3	zwischen westlich Velburg und östlich Parsberg Mittlere Frankenalb
BY	A 3	östlich Neumarkt Mittlere Frankenalb
BY	A 3	nordwestlich Rohrbrunn Spessart
BY	A 3	westlich Geiselwind Steigerwald
BY	A 6	zwischen Nürnberg und Altdorf Mittlere Frankenalb
BY	A 8	östlich Feldwies Chiemsee, Tiroler Aachen
BY	A 9	zwischen Plech und Simmelsdorf Nördliche Frankenalb
BY	A 9	zwischen Bad Berneck und Münchberg Fichtelgebirge – Thüringer Wald
BY	A 9	südlich Hummeltal Nördliche Frankenalb

Land	Road	Section
BY	A 9	östlich Thalmässing oder Raum Kinding/Altmühl Südliche Frankenalb (“Albachse”) (gemeinsam mit Bahnüberführung lösen)
BY	A 9	Köschinger Forst zwischen Denkendorf und Stammham Südliche Frankenalb (gemeinsam mit Bahnüberführung lösen)
BY	A 70	nördlich Hollfeld Nördliche Frankenalb
BY	A 93	bei Wiesau Oberpfälzer Wald
BY	A 93	südlich Nabburg oder bei Teublitz, Samsbacher Forst nordwestlich Regenstaufodern ördlich Zeitlam Verbindung Frankenalb und Bayerischer Wald
BY	A 95	zwischen Eschenlohe und Murnau Verbindung Murnauer Moos mit Loisach Aue
BY	B 2	östlich Garmisch-Patenkirchen Werdenfelser Land
BY	B 2	zwischen Krün und Mittenwald Buckelwiesen
BY	B 23	westlich Oberau Ammergauer Alpen
BY	B 308	zwischen Sonthofen und Bad Hindelang Allgäuer Alpen
BB	A 2	südlich Wenzlow Vorfläming
BB	A 10	westlich Ludwigsfelde Naturpark Nuthe-Nieplitz
BB	A 10	nordwestlich Marquardt Havelland
BB	A 11	östlich Parlow Schorfheide
BB	A 12	südwestlich Fürstenwald Spreegebiet
BB	A 13	bei Bronkow Lausitz
BB	A 24	nordwestlich Fretzdorf Wittstock-Ruppiner Heide/Dosse
BB	A 24	südlich Fretzdorf /nördlich Warsleben Wittstock-Ruppiner Heide/Dosse
BB	B 2	bei Angermünde Schorfheide – Odertal
HE	A 5	nördlich Grebenau Fulda-Werra-Bergland

Land	Road	Section
HE	A 5	westlich Alsfeld Unterer Vogelsberg Feldatal
HE	A 7	Bereich Ellinghausen Knüll
HE	A 66	östlich Gelnhausen Spessart (gemeinsam mit Bahnüberführung lösen)
HE	B 456	nördlich Bad Homburg Taunus
MV	A 19	südwestlich Dobbin-Linstow (AS 15) Naturpark Nossentiner/Schwinzer Heide
MV	A 24	nordöstlich Hagenow Lewitz
MV	B 96	südlich Altentreptow kleiner Landgraben
MV	B 109	nördlich Anklam Peenetalquerung (gemeinsam mit Bahnüberführung lösen)
MV	B 111	westlich Wolgast Ziesebruchquerung
NI	A 2	nördlich Hülsede/Süntel Weserbergland
NI	A 2	westlich Bad Nenndorf (AS 38) Weserbergland – Deister
NI	A 2	östlich Helmstedt, Lappwald (gemeinsam mit Bahnquerung lösen)
NI	A 7	östlich Wilsede bei Evensdorf Lüneburger Heide
NI	A 7	nordöstlich oder südöstlich von Soltau Lüneburger Heide
NI	A 7	westlich Wietze Aller Talsandebene
NI	A 7	zwischen Ausfahrt Echte und Ausfahrt Seesen Harz
NI	A 7	nördlich Nörten-Hardenberg Leine-Senke
NI	A 7	bei Hann. Münden Kaufunger Wald
NI	A 7	nördlich Bockenem Hainberg
NI	A 31	östlich Emden (FFH) Fehntjer Tief

Land	Road	Section
NI	B 243	südöstlich Osterode Südharz
NW	A 4	westlich BAB-Kreuz Olpe Süd Sauerland
NW	A 33	nördlich BAB-Kreuz Wünnenberg-Haaren Forst Böddeken
NW	A 45	südlich Wilnsdorf Siegerland
NW	A 560	Siegquerungen zwischen Bergheim und Hennef (zusammen mit A 3, B 56, A 59 prüfen)
NW	B 8	Aggerquerung zwischen Troisdorf und Siegburg
NW	B 54	westlich Liebenscheid/Bereich TÜP Daaden Westerwald
NW	B 478	westlich Winterscheid Bröltal
RP	A 1	südlich Hermeskeil “Schwarzwälder Hochwald”
RP	A 3	nördlich Ransbach Westerwald
RP	A 6	östlich Enkenbach-Alsenborn Pfälzer Wald Nord
RP	A 6	südöstlich Waldmohr Kaiserslauterer Senke (gemeinsam mit Bahnüberquerung lösen)
RP	A 48	östlich Bendorf Montabaurer Höhe – Westerwald
RP	A 61	westlich Boppard Hunsrück
RP	A 61	westlich Bad Breisig Eifel
RP	B 256	nördlich Rengsdorf **oder** zwischen Bonefeld und Straßenhaus Westerwald
RP	B 49	zwischen Kadenbach und Montabaur Westerwald
SL	A 8	zwischen Limbach (AS 28) und Einöd (AS 30) Anbindung Pfälzerwald
SN	A 4	bei Großröhrsdorf Verbund Oberlausitzer Bergland – Tieflandwälder
SN	A 9	Elster-Luppe-Aue westlich Leipzig

Land	Road	Section
SN	B 156	zwischen Weißwasser und Boxberg Muskauer Heide
ST	A 2	westlich Theeßen Vorfläming
ST	A 2	östlich Theeßen Vorfläming
ST	A 9	östlich Dessau Biosphärenreservat Mittlere Elbe
SH	A 1	südöstlich Reinfeld Holstein
SH	A 1	nördlich Autobahnkreuz Bargteheide Holstein
SH	A 7	Sorgetalquerung bei Tarp Geest – Angeln
SH	A 21	nördlich Autobahnkreuz Bargteheide in Verbindung mit A 1 Holstein
SH	A 24	am Sachsenwald bei Kasseburg Ostholsteinisches Hügel- und Seeland
TH	A 4	nördlich Gerstungen westlich Thüringer Wald (gemeinsam mit Bahnüberführung lösen)
TH	A 4	östlich Jena Verbund Kernberge – Elster-Saale Sandstein Platte
TH	A 9	südlich Schleitz Thüringer Wald

The list was compiled as follows:

As a first step, the geographical information from the road traffic network was overlayed with the network of habitat corridors. This revealed a number of areas where the road network dissects habitat corridors. The most important conflict areas (defragmentation sections) between habitat corridor and road network listed above were then ascertained based on the criteria below.

Criteria for determining defragmentation sections are

- The fragmentation of larger functional areas with a high share of biotopes that need to be protected,
- Roads with a traffic volume of more than 10,000 vehicles per day,
- Defragmentation of particularly important sections of habitat corridors,

- Representation of Germany's characteristic landscapes,
- Location in the national habitat corridors/axes of the biotope network.

For large mammals, a traffic volume of more than 30,000 vehicles per day was taken as a basis, along with the importance for selected animal species. Sections with obvious conflicts with other land uses were not included in the list. Also not included are new construction measures implemented within the last 10 years.

C.2 Nature and landscape conservation as a field of action

Intensified nature and landscape conservation efforts are needed both in protected areas and throughout Germany as a whole. All land users are called upon to ensure sustainable efficiency and functioning of the natural balance.

The Länder must press ahead with their work on the designated European Natura 2000 network and on national habitat connectivity. The habitat connectivity axes of national importance play an important role here.

The Federal Defragmentation Programme has been initiated to mitigate the negative effects of the Federal Government's infrastructure measures on the functional capacity of habitat connectivity. The effectiveness of crossing structures is largely determined by nature and landscape conservation measures in the direct vicinity of the structures and their hinterland.

C.2.1 Environmental design and hinterland connection from a nature conservation perspective

The effectiveness of crossing measures depends on their location in relation to valuable biotopes. A crossing measure is particularly effective if the road runs close to important habitats. If the distance to such habitats is longer, additional connecting habitat structures must be created to ensure the necessary exchange of species, taking into account existing permissible land use.

Hence, suitable environmental design and hinterland connection are key prerequisites for the effectiveness of crossing structures. This must be considered appropriately in suitable plans (e.g. landscape plans and accompanying landscape management plans).

Defragmentation measures should be integrated into an overall concept at local and regional level. This includes:

- Integration within existing habitat connectivity and species protection concepts of the Länder,
- Integration within municipal landscape planning,
- Involvement of local land users (e.g. agriculture and forestry, hunting and fisheries) in environmental design,
- Cooperation with local stakeholders and associations of both parties, i.e. conservationists and users.

The Länder and the municipalities are responsible for the environmental design and for the hinterland connection. The Federal Government contributes to the elaboration of proposed solutions through model projects.

Testing and development project of the Federal Agency for Nature Conservation:
"Holsteiner Lebensraumkorridore" (Holstein habitat corridors)

The project is a beacon project of the Federal Government within the framework of the National Strategy on Biological Diversity. It demonstrates how the east-west habitat network in the region of Kiel-Eckernförde-Rendsburg-Neumünster and the metropolitan region of Hamburg, which is dissected by the motorways BAB 21 and BAB 7 and by the planned Hamburg northern bypass (BAB20), can be restored and preserved.

The aim is to secure the survival of animal and plant species within the cultural landscape through connectivity measures and strategies for a suitable hinterland connection of crossing aids.

This project involves close cooperation between nature conservation, hunting, forestry, highway and road departments and various local authorities; this allows measures to be consolidated to deliver the maximum possible benefit for biological diversity.

The Federal Government supports the required measures on an exemplary basis over an area of approximately 400 square kilometres.

C.2.2 Use of nature conservation and environmental protection instruments

One of the objectives of the new Federal Nature Conservation Act [Bundesnaturschutzgesetz, BNatSchG], which came into force on 1 March 2010, is "to preserve viable populations of wild animals and plants including their habitats" according to their respective vulnerability and "to facilitate exchange between their populations, migrations and recolonisations" (Section 1, subsection 2 BNatSchG) in order to maintain biological diversity in the long term. For this purpose, the Federal Nature Conservation Act provides a number of instruments, which are also meant to be used specifically for defragmentation measures.

The mitigation impact regulation [Eingriffsregelung] (Sections 13 ff. BNatSchG) is the key instrument of nature conservation for safeguarding the efficiency of the natural balance at national level. To support the objectives of the Federal Programme, compensation (in-kind onsite) or substitution (out-of-kind offsite) measures for interventions involving the construction of federal trunk roads should be increasingly directed at safeguarding and developing existing connectivity relationships and the functioning of habitat corridors. Compensation measures may also include specific defragmentation measures.

The Federal Government expects the increased flexibility of the mitigation impact regulation contained in the new Federal Nature Conservation Act to be applied to a greater extent. Where compensation is planned on the basis of eco-accounts (compensation pools), priority should be given to multifunctional measures, which in addition to offering compensation for the affected protected resources also promote hinterland connection and environmental design for crossing structures. The Institute for Federal Real Estate [Bundesanstalt für Immobilienaufgaben] checks if suitable federal properties within the habitat corridors can be made available, preferably via eco-accounts, for compensation measures.

The ecological impact assessment under the Habitats Directive (Section 34 BNatSchG) provides nature conservation with a tool for giving advance consideration to potential major adverse effects of plans and projects on Natura 2000 sites. Defragmentation measures contribute to the coherence of the European Natura 2000 network. They must also be geared to enhancing the functioning of national habitat connectivity.

Strategic environmental assessments (SEA) and environmental impact assessments (EIA) can be used at "preceding planning levels" (e.g. Federal Traffic Infrastructure Plan,

regional planning procedures and routing procedures for roads) to determine areas in which conflicts arise between nature and landscape conservation and road network. Depending on the scale of the planning instruments (SEA, EIA), measures to avoid/minimise the environmental impact can be put more and more in concrete terms. When processing the environmental impact assessment at the level of the routing procedure, the designated sections of the habitat corridors should be considered.

C.3 Integrated spatial planning as a field of action

The Federal Government is committed to the vision of sustainable development. This means reducing the use of open land outside of settlement areas for settlement and traffic purposes as far as possible. Unavoidable impairments of the natural balance as a result of interventions must be compensated, and the needs of habitats connectivity must be taken into account. Landscape planning for habitats connectivity and for network development must be considered when drawing up plans under the Land, regional and local land-use planning processes. Regional planning is the central instrument for sustainable action in matters pertaining to land; local authority planning sets out the message in concrete terms.

Under the decision adopted by the Ministerial Conference on Regional Planning on 27 November 1992, all ministries were called upon to contribute to the development of the ecological network, to safeguard it from a regional planning perspective and to facilitate its implementation. The conference called for connections of the habitat connectivity system across busy traffic routes.

C.3.1 Spatial development objectives

For the Federal Government, the central ideas of regional planning (Section 1 of the Regional Planning Act [ROG]) on developing, safeguarding and preserving spaces are also extremely important for fauna and flora. Sustainable spatial development unites the social and economic demands made on space with its ecological functions. Länder-wide spatial development plans, regional plans and land-use plans of local authorities should also incorporate balanced objectives on open space structures, including large-scale trans-regional open spaces and the protection of open spaces. It is important to preserve functional areas for the genetic exchange of species between conservationally important habitats.

C.3.2 Trans-regional planning requirements

In order to mark large-scale habitat connectivity, habitat corridors should be included in regional development plans for information purposes. The ability to specify priority and reserve areas also provides regional planning within the Länder with a tool that enables certain areas to be safeguarded on a priority basis for the purpose of conserving open spaces and for habitat corridors. To preserve the functioning of defragmentation measures for the long term, habitat corridors should be included in all spatial development plans of the Länder.

Close coordination of all planning concepts is required. Land users should be involved in the development of objectives and measures.

C.3.3 Reporting

In the chapter on land use and structural land use, the Regional Planning Report 2011 discusses the issue of dissection and fragmentation of the open landscapes by settlement belts and infrastructure corridors. In its statement on the Regional Planning Report, the Federal Government will in future also consider the objectives of the green space network within the overall catalogue of objectives for spatial beneficiary interests.

D Quality assurance

To ensure the Federal Programme can be implemented efficiently and effectively, the fields of action must always be implemented on the basis of the latest findings. Data must therefore be kept up to date, success must be monitored, cost-benefit analyses must be conducted, reports on the Programme's implementation must be produced, and accompanying scientific research must be conducted on specific issues where required.

D.1 Further development of data sources

Current data on the status of and changes in nature and landscape are a vital basis for specific defragmentation measures. The network of habitat corridors provides an up-to-date GIS-based data set for Germany. It is available on the website of the Federal Agency for Nature Conservation.

Five years after the presentation of the Federal Defragmentation Programme there will be a review of whether the data on which the habitat corridors are based need to be updated.

The crossing aids for animals and for connecting habitats, including the measures under this Federal Programme, should be recorded in a database of the Federal Highway Research Institute [Bundesanstalt für Straßenwesen]. This institute also maintains data on the road network and on traffic volume and manages road traffic accident statistics.
The Länder data on biotope mapping are not standardised across Germany and reveal Länder-specific differences. Extensive, nationwide comparable biotope mappings by the Länder would further improve the quality of the data basis for the habitat corridors. Irrespective of the above, updating the habitat corridors concept on the basis of updated Länder data remains a key task.

D.2 Efficiency review

The effectiveness and efficiency of every crossing structure should be proven and documented on the basis of uniform criteria.

D.3 Implementation report

An interim report on the implementation status will be presented in five years. This report will include information on

- The development of the indicators used to describe land take and fragmentation effects (increase in the area used for settlement and traffic, number and size of undissected low-traffic areas of more than 100 square kilometres, average level of land fragmentation, status of undissected functional areas),
- The measures that have been implemented on federal trunk roads within the framework of processing the list of sections with high defragmentation priority,
- The funds deployed for this,
- The measures for monitoring the effectiveness and efficiency of the green bridges that have been constructed.

D.4 Accompanying research

In order to optimise investments, further scientific research is still needed on certain aspects such as:

- Improved impact forecasts to increase planning certainty,
- Design and dimensioning of crossing structures for different target species,
- Effectiveness of green bridges for animals with a high indicator value,
- Possibilities for further standardising size, design and integration of crossing structures,
- Importance of road edges as part of a habitat network for endangered species.

These topics will be integrated into the research programmes of the BMU and the BMVBS as required.

E Cooperation

Implementing the Federal Defragmentation Programme requires close cooperation of all stakeholders.

E.1 Coordination within the Federal Government

The Federal Defragmentation Programme is implemented under the joint aegis of the BMVBS and the BMU. The existing joint interministerial working group will thus continue. It will

- Coordinate the overall process,
- Supervise the selection of projects,
- Ensure monitoring of success and efficiency,
- Prepare the interim report on the programme's implementation and
- Coordinate cooperation with the associations and public relations.

E.2 Participation of the Länder

The Länder play a key role in implementing the Federal Defragmentation Programme:

- Planning and implementation of defragmentation measures on federal trunk roads is the responsibility of the Länder, who work on behalf of the Federal

Government. The Länder discuss and agree on the planned defragmentation measures within the scope of their usual cooperation with the BMVBS.

- The Länder are responsible for the development, functioning and legal safeguarding of habitat connectivity and for implementing nature conservation and landscape management. The Federal Government/Länder Working Party on Nature Conservation, Landscape Management and Recreation (Bund/Länder-Arbeitsgemeinschaft Naturschutz, Landschaftspflege und Erholung, LANA) ensures a regular exchange between the Federal Government and the Länder on this subject. In this framework, the BMU will also inform the Länder about progress in implementing the Federal Defragmentation Programme and inform the federal ministries about the exchange of information.
- The Länder are responsible for drawing up and implementing the regional development plans. They decide on spatial use in accordance with the respective priorities set by each Land. In doing so, they must comply with the objectives and principles of Federal development planning.

E.3 Participation of associations

The associations played an important role in preparing the Federal Defragmentation Programme. They developed their own defragmentation concepts early on. These concepts have been incorporated into the research on the network of habitat corridors under the Federal Defragmentation Programme.

DJV/BfN map: Indicative map of the German Habitat Network (GHN) (2004)

The map of habitat corridors for humans and for nature reflects the overall concept of habitat corridors in Germany. It comprises habitat corridors for species of woodlands and semi-open landscapes, for species of lowlands and fluvial valleys with wet and dry habitats, for species of coastal habitats and for species that inhabit predominantly dry landscapes.

NABU Federal Plan for Wildlife Paths (2007)

Based on the map of habitat corridors for humans and for nature, NABU proposed 125 priority conflict points on traffic routes for defragmentation measures.

BUND wildcat routing map (2007)

The BUND wildcat routing map is based on wildcat occurrences and potential wildcat settlement areas throughout the Federal Republic of Germany. Wildcat occurrences and large woodlands in neighbouring countries were also considered in order to ensure linking of the corridors across borders.

The associations play an active role in implementing the Federal Defragmentation Programme. Steps should be taken to ensure that locally active representatives of conservation and user associations are involved in the planning and implementation of measures in order to benefit from their local knowledge. It should be checked whether associations could take on responsibility for management and maintenance measures at crossing structures.

The Interministerial BMVBS and BMU Working Group on Defragmentation will organise a regular exchange of information on the programme's implementation with nature conservation associations at federal level and also with the General German Automobile Association (Allgemeiner Deutscher Automobilclub, ADAC).

E.4 International cooperation

E.4.1 Bilateral cooperation with neighbouring countries

Migrating wild animals do not stop at national borders. We need to ensure ecological permeability of the landscape across national borders. Defragmentation activities in Germany must be coordinated with connectivity plans and defragmentation measures in neighbouring countries. The "list of sections with high defragmentation priority" underlying this programme has been harmonised with corresponding plans of neighbouring countries.

Activities by neighbouring countries

Germany's neighbours are also committed to restoring a coherent network of habitats for wild fauna and flora:

There are national defragmentation programmes in the Netherlands (Meerjarenprogramma Ontsnippering), Austria (Lebensraumvernetzung Wildtiere), Switzerland (Wildtierkorridore Schweiz) and the Czech Republic.

Belgium, France and the Netherlands have regional defragmentation concepts.

There are planning aids for restoring connectivity across the road network in Belgium, Denmark, France, Luxembourg, the Netherlands, Austria, Poland, Switzerland and the Czech Republic.

E.4.2 Conference of European Directors of Roads (CEDR)

The BMVBS will incorporate the Federal Defragmentation Programme into the work of the CEDR. European coordination on defragmentation concepts and on avoiding dissection effects caused by road construction takes place under the umbrella of the CEDR. Working group 7 on "wildlife and traffic" was, amongst other things, set up to exchange experiences within the different countries and to use this as a basis for developing a European standard for crossing aids.

E.4.3 Infra Eco Network Europe (IENE)

The Federal Agency for Nature Conservation will incorporate the Federal Defragmentation Programme into the work of "Infra Eco Network Europe" (IENE).

Members of the network include representatives of transport and nature conservation authorities from European countries as well as nature conservation associations and scientists. It aims to facilitate an exchange of information on defragmentation activities in Europe. The Federal Government will host the next IENE conference in 2012.