

habitat fragmentation due to transportation infrastructure



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EDITORIAL

The application of compensatory measures to road infrastructure projects that affect the Natura 2000 network

As a result of *Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora*, the Natura 2000 network was created to establish a set of protected areas in which biodiversity conservation could be combined with the sustainable use of the resources. The Natura 2000 network is comprised of areas selected in compliance with the Habitats Directive, as well as those designated in accordance with *Directive 2009/147/EC on the conservation of wild birds*. The articles of both European Community regulations describe the obligations of Member States in terms of the measures they must adopt to ensure a good state of conservation of common interests.

The obligations in the Habitat and Bird Directives are incorporated into the Spanish legislation by means of Article 45 of *Law 42/13 December 2007 on Natural Heritage and Biodiversity*. This article establishes that the competent authorities can only approve a specific plan, programme or project that affects a Natura 2000 network area and is not directly related to its management once the environmental integrity of the area has been assured.

The procedure that is defined in EC regulations and laid out in basic state law establishes that an “appropriate assessment” must be carried out of the potential impact that executing a plan, programme or project could have on a specific Natura 2000 network area. If the conclusions of this “appropriate assessment” are negative, then the public interests that make it a priority to undertake the plan, programme or project should be recognized and the necessary compensatory measures adopted to ensure that the overall coherence of the Natura 2000 network is maintained.

Almost a third of Spanish territory is included in the Natura 2000 network. Consequently, it is clear that the planning, design and execution of most transport infrastructure should take into account factors related to the Natura 2000 network. Although the European Commission has published explanatory handbooks on the concepts in the EC regulation, a recent report by the European Parliament on the implementation of Article 6 of the Habitats Directive concludes that there is an urgent need for the European Commission to draw up guidelines for a correct “appropriate assessment”. In fact, some Member States are considering a different procedure to that which is stipulated by environmental impact regulations, whether for plans, programmes or projects.

The Spanish Public Administration is working along the lines of considering that this “appropriate assessment”, and, where applicable, the adoption of compensatory measures, should be linked to the formal procedure of environmental impact assessment. Therefore, a manual has recently been drawn up to clarify the procedure that should be followed in cases of assumed impact on the Natura 2000 network, including the cases in which compensatory measures need to be adopted, and the items that Environmental Impact Studies should contain in relation to the Natura 2000 network.

In practice, it has been found that there are misunderstandings about the definition of compensatory measures in linear infrastructure and other types of projects. In some cases, they are confused with preventive and corrective measures, in others they are far from the objective of compensating for the damage caused in order to ensure the coherence of the Natura 2000 network.

Thus, the conference that will be held in Gijón in the Autumn (see the [Events](#) section) will be an ideal place to exchange experiences of compensatory measures in the framework of the Natura 2000 network and to clarify many related aspects.



WORKING GROUP

The 12th meeting of the Working Group on Habitat Fragmentation caused by Transport Networks, which is part of the State Commission for Nature Heritage and Biodiversity, took place in March in Madrid. The participants were 46 representatives of the environmental and transport departments of the Spanish regional governments and the state government.

In the meeting, participants approved the last draft of Volume 4 of the series *Documents for the reduction of habitat fragmentation caused by transport infrastructure*. This fourth document is titled *Indicadores de fragmentación de hábitats causada por infraestructuras lineales de transporte* (Indicators of habitat fragmentation caused by linear transport infrastructure) and is currently in the process of being published. In addition, a Technical Committee was formed to draw up the fifth document in the series: *Actuaciones de desfragmentación. Oportunidades para permeabilizar vías en funcionamiento y restaurar conectores ecológicos* (Defragmentation activities. Opportunities to make operating roads more permeable and to restore ecological corridors).



Ministry of the Environment and Rural and Marine Affairs (MARM)

In the same meeting, preparations began to organize a technical conference on habitat fragmentation caused by transport infrastructure. Specifically, it was established that the main theme of the conference would be the application of compensatory measures to projects that affect areas in the Natura 2000 network. This conference will be held in Gijón on 4 and 5 November 2010. The Regional Ministry of the Environment, Territorial Development and Infrastructures of the Government of the Principality of Asturias and Gijón City Council will participate in the organization of the event.

Other aspects that were covered at the meeting were the selection of topics for the next two volumes in the series *Documents for the reduction of habitat fragmentation caused by transport infrastructure*, which will deal with prevention and correction of edge and synergistic effects between infrastructures (introduction and dispersion of exotic species, noise and light pollution, etc.) and an analysis of sites that need to be defragmented in Spain. Finally, there was the usual presentation of activities and news of interest from each region.



NEWS

The Court of Justice rejects a European Commission appeal on upgrading a rural track in Doñana

The Court of Justice of the European Union has rejected a European Commission appeal. The EC requested the Court to declare that the Kingdom of Spain had breached its binding obligations under the Council's *Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats of natural habitats and of wild fauna and flora*, particularly with respect to Article 12, Section 4, due to a project to upgrade a rural track from Villamanrique de la Condesa (Seville) to El Rocío (Huelva).

The Commission stated that despite the corrective measures adopted by the Spanish authorities, this project, which is located in a particularly sensitive area



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for the survival of the Iberian Lynx, fragments the species' habitat, makes it difficult for young lynxes to disperse, breaks the connection between the various centres of population and exposes mainly young specimens to the risk of collisions with vehicles and death. In its arguments, the EC cited the document *Prescripciones técnicas para el diseño de pasos de fauna y vallados perimetrales* (Technical prescriptions for the design of wildlife passages and perimeter fences) as a reference for the measures that should be applied.

The Court understood that the use of the rural track would change due to its transformation into a road, as there would be an increase in traffic and in vehicle speed. In addition, it considered that linear transport infrastructures can represent a real barrier to some of the species included in the Habitats Directive and, as such infrastructures fragment the species' natural expansion areas, they encourage in-

breeding and genetic drift.

However, after an analysis of the actions undertaken and the monitoring studies, the Court concluded that there was no clear evidence that the road upgrade had had a real impact on the habitat fragmentation of the Iberian Lynx. The improvement in the corrective measures that were initially included in the project could have led to the lack of collisions on this road since 2004. In addition, the establishment of a system for monitoring incidental killing (for example, deaths due to collision) of the Iberian Lynx and the study of conservation measures to ensure that such deaths do not have a considerable negative impact on the species is essential to safeguard the action of the Authorities with respect to non-compliance with the Directive.

Source: Georgina Álvarez (Director-General of the Environment and Forest Policy, Ministry of the Environment and Rural and Marine Affairs).



Presentation in Madrid of wildlife monitoring studies for high speed rail lines

The incorporation of measures to correct the impact of infrastructure projects on wildlife has increased notably in recent years. More recently, studies to monitor the effectiveness of such measures have also become more widespread. To increase the information exchange between the various agents that are involved in this area, the Administrator of Railway Infrastructures (ADIF) organized a meeting to present the results of the monitoring that has take place along some stretches of the high speed rail line.



Minuartia

The meeting was held on 8 April in Madrid (in the ADIF training centre) and was for ADIF technical staff and the consultancies that carry out the environmental management and monitoring of the works.

The various organizations and consultancies that are specialized in wildlife and currently carry out monitoring studies presented initial results obtained in the following stretches of high speed rail line: Madrid-Toledo, Madrid-Zaragoza-Barcelona, Madrid-Segovia-Valladolid, Córdoba-Málaga and Madrid-Extremadura.

In these five stretches, the studies include monitoring the effectiveness of wildlife passages and other transverse structures by means of basic standard methods (recording tracks on bands of marble dust and the use of photographic devices) that are described in the document *Prescripciones técnicas para el seguimiento y evaluación de la efectividad de las medidas correctoras del efecto barrera de las infraestructuras de transporte* (Technical prescriptions for monitoring and evaluating the effectiveness of measures to correct the barrier effect of transport infrastructures), which is the second volume in the series published as part of the project "Habitat fragmentation caused by transport infrastructure". In addition, other aspects of interest were monitored on various stretches.

For example, the efficacy of an anti-collision screen for bats is being monitored along the Córdoba-Málaga stretch (see [Bulletin nº 7](#)) and the effectiveness of systems for animals to escape from the perimetral fence is being assessed along the Madrid-Segovia-Valladolid stretch. In the latter case, initial results have shown that animals do not use the escape systems frequently. In addition, problems have been highlighted in the design, execution and maintenance of the systems, for example, the rusting of doors that are permanently left open, inappropriate designs, the fitting of padlocks onto doors to stop people from entering, etc. The final results of this monitoring study will enable us to clarify whether the installation of such devices is really necessary and, if it is, to propose more effective designs.

Other works included in these studies are: monitoring the effectiveness of measures to avoid collisions with birds, monitoring the effects of electricity substations (formation of roosts), estimations of the relative abundance of rabbits in embankments and monitoring the adaptations of inspection chambers and pipes to reduce wildlife mortality.

Source: Management of Quality and the Environment, ADIF.



Ponds are recovered to connect two centres of population of Agile Frog that are affected by habitat fragmentation in Navarre

The Agile Frog (*Rana dalmatina*) population in the special conservation area (SCA) "Oak groves of Ultzama and Basaburua" has been affected in recent years by numerous factors that have threatened its survival. In 2001, the effective size of the population was below a thousand adult females. These reproduced naturally in only 11 pools distributed in two apparently disconnected areas: Auza and Orgi. Between these areas is a local road that has contributed to the fragmentation of the species' habitats. The limitation of the population to these two areas and the distance between them are signs that the centres of population have entered a phase of isolation and fragmentation prior to extinction, which could occur in the mid-term unless recovery measures are implemented.



Department of Rural Development and the Environment, Government of Navarre

In recent years, a project has been carried out to conserve the Agile Frog in the area. Five ponds have been recreated in the oak grove of Orgi and have been repopulated with specimens from other spawning sites in the Auza pool. In addition, more ponds have been built in other areas of the SCA, according to the determinations of the Forest Plan.

The latest project was begun in 2009 by the Government of Navarre through the social work of the "La Caixa" savings bank. It is being carried out by the company Gestión Ambiental Viveros y Repoblaciones de Navarra, S.A. and consists in creating six ponds inside the SCA. The sites of the new pools are the object of one of the measures considered in the Management Plan for this SCA, which refers to the conservation of the key elements 'Ponds and pond-forming areas' and the 'Agile Frog'.

The proposed measure is part of the Conservation Plan for the Agile Frog that has been carried out in the SCA since 1999. This species is listed in EC, national and regional legislation. The Plan's two areas of action are species population monitoring and the recovery of habitat for reproduction of the species by building ponds.

Wetlands that could be recovered as pools for the reproduction of this frog have been selected according to the criteria that are usually established in recovery projects, such as: the strategic location and the geographic proximity of sites for future connection with the centre of population managed in Orgi; the proven capacity of the soils for water retention; the suitability of the site for the amphibian's aquatic lifecycle; and the opportunities for the experience to be monitored by the team of biologists that is in charge of the project to reintroduce the Agile Frog into the Orgi Oak Grove.

Source: Helena Baigorri (Department of Rural Development and the Environment, Government of Navarre).



The environment administration authorizes the fencing off of a hunting areas to avoid collisions with ungulates on a road in Castilla y León

One of the main impacts of the expansion in ungulate populations (wild boar and cervids) in recent decades is the increase in the number of collisions with vehicles. Castilla y León is one of the autonomous communities in which this problem is greatest. To reduce the number of animals coming out onto the roads and to avoid accidents, this autonomous community's Department of the Environment has recently authorized the construction of a fence around the Otero de Bodas hunting area, along the road N-631.



Minuartia

In 2005, a sixth supplementary provision was added to the Traffic Law, by which payment of damages after accidents in which vehicles strike game can only be demanded from the owners of the hunting facilities when the accident is "the direct consequence of hunting activity or of a lack of diligence in the maintenance of the hunting area". However, several court sentences have maintained that these areas are responsible in such cases, and must pay compensation to those affected by the accident. This has led to an increase in the premiums paid by these areas to insurance companies (and in the most extreme cases, some insurance companies have refused to renew hunting areas' insurance policies). Thus, some of the areas that have a high number of wildlife collisions are searching for measures to help reduce this problem.

The Otero de Bodas (Zamora) section of the road N-631 has a high number of accidents caused by game. Consequently, in recent years various measures have been

implemented to reduce accidents, such as the installation of crash barriers on both sides of the road, road widening, and the clearing of vegetation from an 8 m strip on both sides of the road.

However, those responsible for the hunting areas in this location consider that these measures have not completely resolved the problem. Therefore, they asked the Department of the Environment for permission to install a fence along the perimeter of the preserve (7 km), to stop the animals in this areas from accessing the road and causing accidents.

In February 2010, the Autonomous Government of Castilla y León's Director-General for the Environment gave the game preserve permission to construct this fence, which initially (and due to the high cost it represents) will be erected along the boundary with the N-631 road and along the most conflictive stretch. Likewise, those responsible for the hunting areas have explained the situation to the Directorate-General of Traffic so that it can introduce measures to raise the awareness of road users, for example the installation of radars so that drivers reduce their speed.

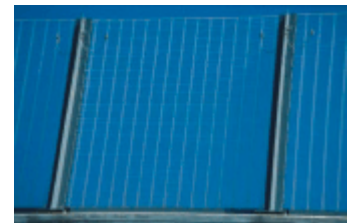
This action is the first of its kind, hence it is important to bear in mind that the perimeter fences around the hunting areas may increase the road's barrier effect.

Source: Adolfo Delibes (Department of the Environment, Autonomous Government of Castilla y León).



A web site presents measures that can be applied to prevent collisions of birds with transparent noise screens

One cause of bird mortality that has emerged in recent decades in relation to the construction of transport infrastructures is collision with transparent noise screens. The web www.windowcollisions.info has been set up to provide detailed information on this problem and on the actions that can be taken to reduce this cause of mortality. The aim is to disseminate knowledge attained in studies and to provide information on effective protection measures.



H. Schmid. COST 341. Wildlife and Traffic Handbook

The mortality of birds due to collisions with structures made from glass or other transparent materials threatens the conservation of some bird populations,

as millions of birds crash into such screens every year. Only a few scientific studies have been undertaken in this area and information on the effective prevention of this problem is scarce. Therefore, the *Swiss Ornithological Institute Sempach and SVS/BirdLife Switzerland* have created this web site (in conjunction with other nature protection organizations and universities in Switzerland, Austria, the United Kingdom and the United States of America) to improve the situation.

The [web](http://www.windowcollisions.info) presents a description of different variants of the problem (collisions of birds with windows and glass in buildings and with other structures such as noise screens along transport infrastructures), and includes innovations in terms of prevention and measures to prevent collisions. In addition, it contains links to companies that distribute products that have been found to be effective and a high number of references of interest.

Some examples are given of recommended measures to prevent collisions with noise screens along infrastructures (with an indication of their main characteristics) as well as examples of bad and ineffective solutions. The evaluation confirms that the use of stickers showing silhouettes of birds of prey in windows is not an effective measure. According to the web site, the best solution is to install non-transparent noise screens or to mark the transparent screens with vertical stripes to make them more visible to birds. The specific characteristics of these stripes should follow the prescriptions included in the Wildlife and Traffic handbook, which was drawn up as part of the COST 341 project (see the section on the [Working Group and Action COST 341 documents](#)).

Source: Ferran Navàs (Minuartia).



Measures are designed to reduce collisions on roads in Extremadura as part of the INTERREG project

In 1999, as part of the INTERREG FAUNATRANS I programme, Portugal and Extremadura began to work together in the field of cross-border nature and biodiversity conservation, as both territories share many natural areas and species of interest. Collaboration in this field has continued to the present. Recently, in the

framework of the Cross-Border Cooperation Programme Spain and Portugal 2007-2013 a study was carried out on habitat fragmentation.

This study, which is part of the INTERREG IV project "Projecto Estructurante para o Desenvolvimento das Terras do Grande Lago Alqueva", was carried out in the



Carlos Miranzo

cross-border area of Gadiana Internacional, specifically on the Extremaduran side in the towns of Olivenza, Cheles, Alconchel, Táliga and Villanueva del Fresno (Badajoz province).

The aim of the study was to determine the species that are most vulnerable to collisions, identify black spots and find potential corrective measures to reduce or eliminate this problem. The study was carried out by monitoring the mortality of wildlife due to collisions along 200 km of the roads in the study area, divided into 16 stretches, some of which run through areas of the Natura 2000 network: Special Bird Protection Area (SBPA) - Common Interest Area (CIA) "Dehesas del Jerez", CIA "Río Gadiana Internacional", CIA "Río Alcarrache", CIA "Minas las Marías", CIA "Mina los Novilleros", CIA "Sierras de Alor and Monte Longo" and the Ecological and Biodiversity Corridor "Río Alcarrache".

Each stretch was travelled along five times between Autumn 2009 and Spring 2010 in a car at a slow speed (15 km/h). In addition, some stretches that were considered of interest for the passage of fauna (wetlands, river beds, sections with low visibility, etc.) were monitored by foot.

A total of 96 carcasses were detected, most of which were mammals (58%). The main mammals found were the European hedgehog and the fox, followed by the wild cat. Birds (27% of the carcasses) were mainly found in areas with large masses of forests close to the road. Notably, there were 8 nocturnal birds of prey (almost 30% of the total number of bird carcasses) from four species: barn owl, little owl, tawny owl and eagle owl. In addition, 11 amphibians were found (an Iberian ribbed newt, a Bosca's newt, and 9 unidentified frogs) and 3 reptiles (ladder snakes and horseshoe whip snakes).

The studies led to the detection of eight black spots of mortality due to collisions, which were subsequently characterized. Corrective measures have been proposed for these spots to reduce the problem in each one of them.

Source: María Jesús Palacios (Department of Industry, Energy and the Environment, Autonomous Government of Extremadura).



PUBLICATIONS

Prescripciones técnicas para la reducción de la fragmentación de hábitats en las fases de planificación y trazado (Technical prescriptions for the reduction of habitat fragmentation in planning and alignment phases). This is the third volume in the series *Documents for the reduction of habitat fragmentation caused by transport infrastructure*, which on this occasion is focused on the proposal of guidelines and prescriptions to be implemented in the early phases of defining road infrastructures. Due to the characteristics of these phases and particularly when planning processes are involved, it is important to apply precaution and prevention principles at this time. Thus, this is an important point at which to reduce the effects of habitat fragmentation.



As in the previous two documents, most of the information is included in files that aim to provide useful and easy-to-use tools for the agents who are involved in these phases. The files describe aspects of methodology for processing the available information and defining the area of study, techniques for assessing the existing state and for evaluating and selecting alternative alignments, a description of the measures that should be included to reduce habitat fragmentation and aspects related to monitoring their success.

Reference:

Ministry of the Environment and Rural and Marine Affairs (MARM), 2010. *Prescripciones técnicas para la reducción de la fragmentación de hábitats en las fases de planificación y trazado*. Documents for the reduction of habitat fragmentation caused by transport infrastructure, number

3. Autonomous Organization of National Parks. Ministry of the Environment and Rural and Marine Affairs, Madrid. The document can be acquired from the [Publications Service](#) of MARM's Autonomous Organization of National Parks (OAPN).



La carretera en el Paisaje. Criterios para su planificación, trazado y proyecto (*The road in the landscape. Criteria for planning, alignment and design*). In recent decades, the network of roads around Spain has expanded considerably, and there has also been a substantial improvement in a significant number of existing roads. To reduce the impact that the infrastructure could have on the landscape in which it is constructed, the Department of Public Works and Transport of the Autonomous Government of Andalusia has published this book, which establishes criteria and recommendations to be included in the planning, design and execution stages of new roads. The contents are organized in order of increasing complexity (starting from general concepts and moving on to specific aspects of the design of various aspects) and the aim is to promote debate and analysis on how to incorporate roads into the landscape.



Reference:

Department of Public Works and Transport (2008). *La carretera en el Paisaje. Criterios para su planificación, trazado y proyecto*. Seville, 496 pp.



Aplicación de la evaluación de impacto ambiental en España en el periodo 1989-2008: El caso de los proyectos de carreteras (*Application of environmental impact assessment in Spain between 1989 and 2008: the case of road projects*). This article is the result of a final project for a Degree in Environmental Sciences from the University of Alcalá. The project involved a comprehensive assessment of the application of environmental impact assessment (EIA) processes to road projects carried out in the first 20 years of the existence of regulations in this area. The evaluation was carried out by analysing the 1,147 Environmental Impact Statements (EIS) published in the Spanish Official State Bulletin (BOE) in the last two decades in relation to procedures carried out in Spain. Almost half of the EIS were related to transport infrastructure and 327 assessed road projects. Only three of these statements were against the execution of the project.

The conclusions of the article include the fact that since 2006 increasing importance has been given to the use of technical documents, such as the *Prescripciones técnicas para el diseño de pasos de fauna y vallados perimetrales*, which constitutes significant progress in the standardization and quality of the EIS.

Reference:

Barbero, J. y Espigares, T. (2010). Aplicación de la evaluación de impacto ambiental en España en el periodo 1989-2008: El caso de los proyectos de carreteras. *Ingeniería Civil* 157/2010: 57-67.



Towards Green Infrastructure for Europe: Proceedings of EC workshop 25-26 March 2009. An essential condition for conserving ecosystems in a good state is the maintenance of the integrity of the ecological network, which is also known as Green Infrastructure. However, habitat fragmentation has increased throughout Europe. Although there are numerous initiatives to reduce this problem, such as the establishment of the Natura 2000 network, there is a clear need to progress in the assessment of threats and in the application of effective measures to construct a Green Infrastructure that enables us to ensure ecological connectivity and facilitates species' adaptation to climate change.



This publication summarizes the conclusions of a workshop whose main objectives were to: determine an appropriate EC response and decide which actions will be most effective at EU level, in order to define how to plan and establish a Green Infrastructure for Europe.

The publication is available on the web site of the [workshop](#), where other related information can also be found.

Reference:

Ecosystems Ltd. (2010). *Towards Green Infrastructure for Europe: Proceedings of EC workshop 25-26 March 2009*. Directorate-General for Environment of the European Commission. Bruselas, 72 pp.



EVENTS

7th SER European Conference on Ecological Restoration. Avignon (France), 23 to 27 August 2010. Organized by the Society for Ecological Restoration (SER) Europe.

International conference in Landscape ecology. Middle-European IALE Conference 2010. Brno/Prague (Czech Republic), 3 to 7 September 2010. Organized by the Czech Regional Organization of the International Association for Landscape Ecology (CZ-IALE).

III Simposio Internacional sobre Restauración Ecológica (Third International symposium on Ecological Restoration) Ciudad de Santa Clara, Villa Clara (Cuba), 13 to 19 September 2010. Organized by the Society for Ecological Restoration International (SERI), the National Enterprise for the Protection of Flora and Fauna (ENPFF) and the Cuban Group of Ecological Restoration (GCRE).

2010 IENE International Conference on Ecology and Transportation. Improving Connections in a Changing Environment. Velence, Hungary, 27 September to 1 October 2010. Organized by the Infra Eco Network Europe.

III Congreso Nacional de Medio Ambiente en Carreteras (Third National Congress on the Environment and Roads). Gijón, 28 to 30 September 2010. Organized by the Spanish Roads Association (AEC).

Medidas compensatorias de proyectos de infraestructuras viarias que afectan la red Natura 2000 (Compensatory measures for road infrastructure plans that affect the Natura 2000 network). Gijón, New dates 18 and 19 November 2010. Organized by the Ministry of the Environment and Rural and Marine Affairs and the Government of the Principality of Asturias.

10 Congreso Nacional del Medio Ambiente (CONAMA) (Tenth National Environment Conference). Madrid, 22 to 26 November 2010. Organized by the Fundación CONAMA.

Congreso de Infraestructuras y Transportes (Infrastructure and Transport Congress). Valencia, 23 to 27 February 2011. Organized by the Spanish Government.

4th SER International World Conference on Ecological Restoration. Mérida (México), 21 to 25 August 2011. Organized by the Society for Ecological Restoration International (SERI).

Events that have already taken place:

IV Congreso de ingeniería civil, territorio y medio ambiente: Litoral, ordenación y modelos de futuro. (Fourth conference of civil engineering, the region and the environment: the coast, planning and models for the future). Málaga, 17 to 19 February 2010. Organized by the Spanish Association of Civil Engineers (CICCP). To obtain the conference proceedings, contact the [conference secretary](#).

Seminar on the conflicts between transport infrastructure and wildlife corridors/ecological networks. Berlin, 13 April 2010. ADAC. Further information [here](#) (in German).




Third International Congress on Landscape and Infrastructures and the Ninth Meeting of the Council of Europe Workshops on the European Landscape Convention. Córdoba, 15 to 17 April 2010. Organized by the European Council, the Government of Spain and the Ministry of Public Works and Transport of the Regional Government of Andalusia. Further information [here](#).



DOCUMENTS OF WORKING GROUP AND RODUCTS ACTION COST 341

Within the framework of the European project and the Working Group, which has given continuity to the project, various materials have been generated which contribute to the knowledge and reduction of the effects of habitat fragmentation caused by transport infrastructures. Specifically, the following documents have been published:

- **COST 341. La fragmentación del hábitat en relación con las infraestructuras de transporte en España.** Revision of the State of the Art published in 2003.

- ***COST 341. Fauna y Tráfico. Manual europeo para la identificación de conflictos y el diseño de soluciones***  (8,4 MB). Published in 2005; translation of the document *Wildlife and Traffic* editay el 2003 as colophon of the project.
- ***Prescripciones técnicas para el diseño de pasos de fauna y vallados perimetrales***  (1,8 MB) Published in 2006 and constitutes the first in the series *Documents of the reduction of habitat fragmentation*.
- ***Prescripcions tècniques per al disseny de passos de fauna i tancaments perimetrals*** Published in 2008 by Departament de Medi Ambient i Habitatge (Generalitat de Catalunya); translation of the document in spanish edited in 2006.
- ***Prescripciones técnicas para el seguimiento y evaluación de la efectividad de las medidas correctoras del efecto barrera de las infraestructuras de transporte***  (2 MB) Published in 2008; second issue of the series *Documents for reduction of the habitats fragmentation*.
- ***Prescripciones técnicas para la reducción de la fragmentación de hábitats en las fases de planificación y trazado***. Published in 2010; third issue of the series *Documents for reduction of the habitats fragmentation*.

Further information on the products drawn up in the Framework of the COST 341 project and the Working Group on Habitat Fragmentation caused by Transport Infrastructures can be found at [MARM](#) website and the [IENE](#) website.



- This publications comes within the framework of the Fragmentation Habitat Due to Transportation Infrastructure Project. It is promoted by the Dirección General de Medio Natural y Política Forestal of the Ministerio de Medio Ambiente y Medio Rural y Marino. The technical secretary's office of the project runs in charge of MINUARTIA.
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