

habitat fragmentation due to transportation infrastructure



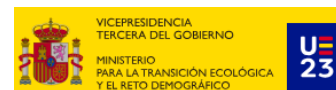
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e-newsletter · **JULY 2024** · number 26



EDITORIAL

Past June 17, the EU Environmental Council formally adopted the regulation on nature restoration, which constitutes a crucial milestone in the protection and ecosystem restoration in the continent. Now, it is time for the country members to build their National Plans for Nature Restoration where they should mirror the law obligations in their respective territories.

At the time this bulletin is published, the Defragmentation Strategy for Habitats Affected by Transport Infrastructures (EDHILT) is prone to be adopted. The process to build this strategy was rigorous and exhaustive, with the committed participation of expert technicians belonging to the Working Group on Habitat Fragmentation due to Transport Infrastructures, scientists, the third sector, and representatives of different companies. Running for 10 years, the EDHILT will constitute the strategical framework and the required guidelines to advance in the improvement of territorial connectivity, therefore achieving a more effective integration of biodiversity in the development of transport infrastructures. The creation and approval of the Strategy constitute an important milestone at the European level, and it will be, therefore, introduced during the IENE conference (Infrastructure & Ecology Network Europe) to be held in Prague from 9 to 13 September.

The Strategy will be implemented through successive working programs, the first of which to be launched immediately after its approval. It is expected to get the engagement of all regional and local administrations to maximize its impact.

The publication of two relevant technical documents can be already announced: a new version of Technical Prescriptions number 6, focused on identifying areas to be defragmented to reduce the impact of transport infrastructures on biodiversity, and number 9, which will show standardized methodologies to study and analyse vertebrate mortality in transport infrastructures. This last document is based on information gathered by hundreds of volunteers participating in the Project SAFE (Stop roadkill of wildlife in Spain, in Spanish). It shows significant information on the impact of transport infrastructures on Spanish fauna. The agreement between this Ministry and the Research Centre "Estación Biológica de Doñana" that constitute the framework to build this document, as well as this newsletter is close to its end. It is a good opportunity to acknowledge the excellent job made by this Institute during these years.

Finally, we highlight the imminent onset of tasks regarding the review of the document number 1: "Technical Prescriptions to design wildlife passes and fences. The recent publication of the Handbook Wildlife Traffic 2024 will be useful in this task.

Picture: Eloy Revilla



WORKING GROUP

During these months, the Working Group on Habitat Fragmentation due to Transport Infrastructures met on February the 6th to be informed on the progress achieved regarding the drafting of the document "Technical Prescriptions number 9" related to vertebrate mortality in transport infrastructures and therefore to project SAFE. Part of the Working Group also belongs to the Technical commission to build the document that met online on March 26 and June 27 to discuss on the progress of the document, and finally gives the approval to the document. With the delivery of both the document and this bulletin, the agreement with the Research Institute "Estación Biológica de Doñana" will be over after three documents of Technical Prescriptions and 12 bulletins (this included). From now on, these tasks will be done by the Ministry in collaboration with Tragsa. This company will be also the responsible of the **consulting service** regarding habitat fragmentation due to transport infrastructures. Questions could be sent to the following e-mail address: habitat_infraestructuras@ebd.csic.es created and devoted to this service.

NEWS

European Council gives final green light to the Nature restoration law:

On June 17th, the Council formally adopted the – first of its kind – regulation on nature restoration. This law constitute a keystone of the European green deal, and it is aligned with the scientific knowledge and recommendations to restore ecosystems in Europe. It is the first law that obligate estate members to restore nature, and not only to protect it. The regulation aims to mitigate climate change and the effects of natural disasters, also enhancing food safety. The law aims to put measures in place to restore at least 20% of the EU's land and sea areas by 2030, prioritizing on the Nature 2000 network. It sets specific, legally binding targets and obligations for nature restoration in each of the listed ecosystems – from terrestrial to marine, freshwater and urban ecosystems. On habitats deemed in poor condition, as listed in the regulation, member states will take measures to restore at least 30% by 2030, at least 60% by 2040, at least 90% by 2050.

Member states will make efforts to prevent significant deterioration of areas that have reached good condition thanks to restoration or host the terrestrial and marine habitats listed in the regulation

To address the dramatic decline experienced in recent decades in Europe of both abundance and diversity of wild insect pollinators, the regulation introduces specific requirements for measures to reverse the decline of pollinator populations by 2030 at the latest.

In addition, the regulation sets out specific requirements for different types of ecosystems, including agricultural land, forests and urban ecosystems.

Member states will put measures aiming to enhance two out of these three indicators: grassland butterflies' population, stock of organic carbon in cropland mineral soils and share of agricultural land with high-diversity landscape features. Increasing forest birds' population and making sure there is no net loss on urban green spaces and tree canopy cover until end of 2030 are also key measures of this new law.

Under the new rules, member states must plan ahead and submit national restoration plans to the Commission, showing how they will deliver on the targets. They must also monitor and report on their progress, based on EU-wide biodiversity indicators.

The regulation will now be published in the EU's Official Journal and enter into force. It will become directly applicable in all member states. By 2033, the Commission will review the application of the regulation and its impacts on the agricultural, fisheries and forestry sectors, as well as its wider socio-economic effects.

Source of information: Editorial team

The smart signaling system to alert drivers on the risk of collision with wildlife designed by the Castilla y León Regional Government and the University of Salamanca was honored in the XVI awards Ponle Freno Axa to innovation in road safety ex-aequo

The smart signaling system to alert drivers on the risk of collision with wildlife of the Castilla y León Regional Government was promoted by the department "Consejería de Movilidad y Transformación Digital" and the Department of Animal Biology of the University of Salamanca. Initially deployed by December 2022, the system was honored during the XVI edition of Ponle Freno Axa 2024 awards.

The objective of the proposal was to reduce the number of car-wildlife collisions in the regional road network by means of signals that offer drivers real-time information on collision risk.

More precisely, the system, working since December 2022 in eleven sectors of the

regional road network is based on the study made by the Department of Animal Biology of the University of Salamanca. This study found that car-wildlife collisions, that account for the 70% of accidents in the Region during 2022, were not randomly distributed. Instead, they clump both spatially and temporally, being influenced by lunar phase, weather or hunting activity, among others.

Using these patterns, the Regional Government placed around 30 smart signals in different sectors of León, Palencia, Burgos and Soria provinces, covering around 80 km of the regional road network (by the way the longest in the country with 11.500 km). These signals are able of adopting three states depending on the predicted collision risk by the above mentioned factors. The signal is off when the predicted risk is low, therefore appearing as a regular passive signal. When the collision risk is high, an orange light is turned on. If the collision risk is very high, the light turn to red. An advantage of this system is that drivers are not so readily habituated to the signal. In addition, its ability of calling the attention of the driver is higher as collision risk increases.

Despite the system is still under monitoring and evaluation, the information already gathered about its effectiveness shows a decrease of 22% of collisions when equipped sectors are compared with data before the implementation of the system. This new generation of signals, supported by current technology and information seems to contribute to increase road safety.

Ponle freno is a campaign launched by Atresmedia and AXA-España foundation that aims to create public awareness on the importance of road safety, promoting responsible driving habits. Such a campaign started in 2008 notably contributing to the prevention of traffic accidents and the protection of human life in Spanish roads through different initiatives as education programs, events and the collaboration with different governments and associations.



Source of information: Junta de Castilla y León and Universidad de Salamanca

The SAFE project awarded by CSIC as winner of the Citizen Science category

The Spanish Council of Scientific Research recognized SAFE as a *novel project in the framework of citizen science, with very strong scientific objectives, high quality of its working methods and open access*. Beyond this recognition, the award was useful to disseminate the project through mass media like Canal Sur Radio, where Marcello D'Amico (EBD-CSIC) was interviewed in the program "Climate Change", or the TV program "Objective the Earth" (see pictures) where representatives of the Society for the Study and Conservation of Mammals (Francisco García), the platform Observation.org (Julio Rabadán), and EBD-CSIC (Carlos Rodríguez) were asked about the project.



Source of information: Editorial team

Monitoring of the barrier effect of the High-speed railway between Palencia and León on the Iberian wolf population

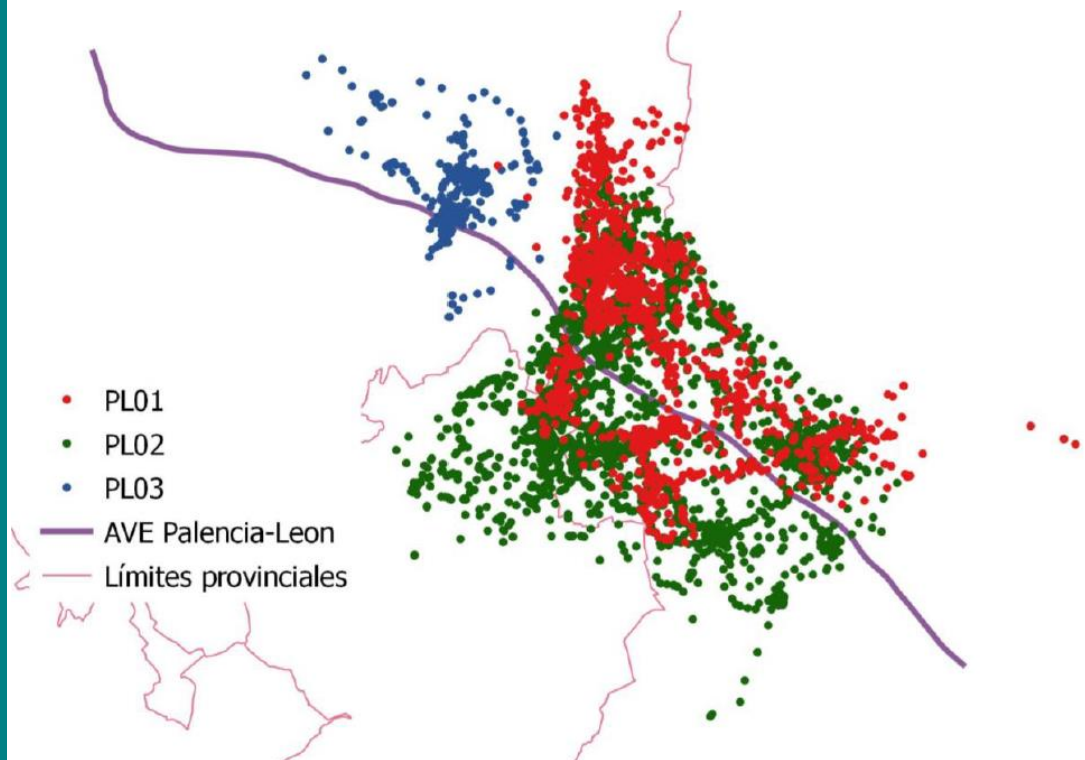
One of the most important impacts of transport infrastructures on biodiversity is the "barrier effect", which means the physical fragmentation of habitats by a fenced linear infrastructure. This may cause genetic isolation of populations, increasing species vulnerability.

Wolf (*Canis lupus*), an iconic species of the Iberian fauna, is sensitive to this impact, as they show large home ranges and are able of long-distance displacements that are frequently limited by transport infrastructures.

To monitor this impact, in the high-speed railway between Palencia and León, three wolves were trapped and equipped with last-generation GPS-collars to check their ability to cope with such an important barrier. This job was made by renowned expert on this kind of monitoring. The study was made in coordination with the regional environmental administration, providing them with weekly reports on the activity.

Wolves were trapped by using Belisle® 8 traps. They consist on foot snares designed in accordance with guidelines of the International Human Trapping standards. The snare trap the animal by the paw and a spring acts as anti-shock system to avoid any injure to the animal when it tries to get rid of the snare. Traps remain inactive during the day to avoid bycatching of other species but also to avoid potential interference with people. In fact, traps were equipped with trap alarms (MinkPolice MP10) that gives an immediate heads-up when the trap is activated, therefore minimizing the time elapsed until the technical team reach the trap, provide the wolf with a GPS-collar, and release it.

Two different collar models were used: Vertex Plus (Vectronic, N=2) and Tellus T5H (Televilt-Followit, N=1). Both inform on the animal position with the frequency established by researchers. To set such a frequency, the tradeoff between accuracy and battery life should be taken into account because a higher frequency means more precise tracking but short battery life. To fulfil the basic requirements of this study, a double programming was used, combining an intensive tracking (1 position every 20 min) during the first week of the month, and a regular tracking (three positions a day at 12:00 h, 20:00 h and 3:00 h), during the rest of the month. The intensive tracking gives information on position clustering, which means the continuous presence of the individual in a particular location. This may respond to resting or feeding places.

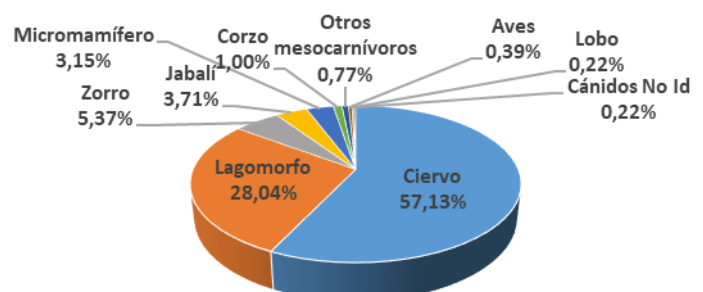


The monitoring of the three individuals showed their ability to cross the high-speed railway. A peripheral female (PL01) crossed the railway every 5.6 days. A sub adult female belonging to a pack (PL02) crossed the railway every 2.4 days, and an adult male not belonging to any pack (PL03) crossed the railway every 3.7 days. Positions are shown in the picture.

Source of information: ADIF high speed trains

First results of video-monitoring of wildlife using the ecoduct of Otero de Bodas in the high-speed railway Zamora-Pedralba-Orense

The video-monitoring system installed in the ecoduct of the high speed railway Zamora-Pedralba (see bulletin 24), already active, is providing us with the first data on wildlife using such a crossing. The ecoduct is 135 m wide and 78 m long, close to the village of Otero de Bodas (Zamora province). Two opposed infrared cameras were installed to detect nocturnal movements in the crossing, as well as a dynamic DOMO camera able to track moving objects. The system is automatically recording any activity in the crossing. When infrared cameras detect a movement, they activate the DOMO camera to track and record the crossing.



The system is working since December 2022, and videos

were analyzed monthly. Based on 67 days when 24h recording was done, the number of crossing events were about 2000, made by different species or group of species (see plot). The most important is the red deer ("ciervo" in the plot), and "lagomorfos" (rabbits and hares).

Regarding the number of individuals, it should be highlighted that more than 3600 deer were counted, which account for 77% of the individuals of any species registered in the 67 days period. They constitute a mean of 55 deer a day, 94% of them already crossing the infrastructure. This indicates the high permeability of the ecoduct, especially for deer, but also for other species, and suggest a high collision risk in the area due to the high deer density. These results also validated the novel monitoring system installed in this ecoduct as a good method for wildlife monitoring in this kind of crossings, and more generally, as an interesting continuous surveillance system.



Source of information: ADIF high speed trains

Which animals are removed from the road by maintaining companies?

The project of the Ministry for the Ecological Transition and the Demographic Challenge (MITECO) and the Doñana Biological Station (EBD-CSIC) to identify the road killed animals that are moved from the road by maintaining companies started gathering information at the beginning of the year (bulletin 25). Information is provided by maintaining centers HU-01 (Huelva), BA-05 (Fuente de Cantos), VA-01 (Boecillo) and M-03 (Arganda del Rey). At the time this bulletin is published, they already provided with 215 records of removed carcasses: 91 of them correspond to pets (66 cats, 17 dogs, and 8 unidentified). Lagomorphs were also frequent (44 hares and 13 rabbits). 20 Carnivores were also recorded, half of them being foxes, but also badgers, mongooses, stone martens, and genets. Hedgehogs were also important (16). Species included in the Spanish List of Species of Conservation Concern were also recorded, including 2 black kites, 2 long-eared owls, a ladder snake, a horseshoe whip snake, and the vulnerable Montagu's harrier (see picture). The project will continue gathering this information until September.



Source of information: Editorial team

Positive synergies between environmental monitoring plans and road maintaining services. The M-501 road.

During the last 6 years, the General Sub directorate of road safety and road maintenance from the Madrid Regional Government is conducting an environmental monitoring plan on the road sector Quijorna - Navas del Marqués belonging to road M-501. Such a plan was required to verify the effectiveness of mitigation measures applied to the road to improve its permeability for the wildlife. Fencing improvement and building drainages on ditches to limit the size of animals having access to the road by these places (see picture), were among these measures.



The exhaustive verification of the fencing was part of the job since this is crucial to prevent the access of big animals to the road, and therefore minimize the number of car-wildlife collisions and improve road safety. During this time, it has been realized that many faults in the fencing were difficult to find by maintaining companies due to the combination of their small size, the frequent presence of hiding vegetation and car-based monitoring. These faults facilitate the access of animals to the road, increasing the number of collisions.

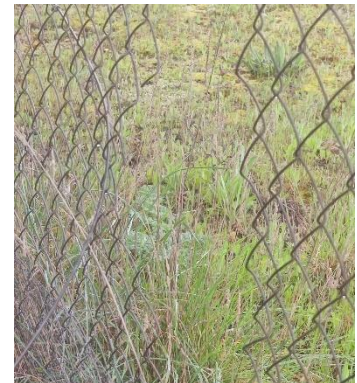
The environmental monitoring plan has contributed to find and fix many of the fencing faults, by conducting monitoring on adjacent service paths, some of them by foot when the fence was less accessible. The efficiency of these measures was high, resulting in a drop of 50% of roadkill, being this percentage even higher when medium to big animals are considered.

This exhaustive monitoring of the fencing is an important tool to increase road safety, but also to reduce the impact of the road on the wildlife. Such a monitoring should be frequent because human-made cuts were also found to cross the road (probably made by poachers). This small-size faults are very difficult to detect, but they can still be used by wildlife to access the road. For this reason, it is important to detect and fix them as soon as possible. Nonetheless, animals are able of creating accesses to the road that should be also fixed.



Another interesting result of the monitoring plan was the high frequency of accidents in the proximity of road joints where there is no fencing. This suggest the necessity of implementing systems such as cattle grids to avoid the entrance of wildlife by these joints, as it has been already implemented in other regions (see bulletin 22).

Source of Information: Subdirección General de Seguridad Vial y Conservación de la Comunidad de Madrid



PUBLICATIONS

Among listed publications, it should be highlighted the updated version of the document for the reduction of the fragmentation caused by transport infrastructures number 6 (MITECO 2024) that will be soon available in the [web page](#) of the working group. In addition, the journal *Frontiers in Ecology and Evolution* has launched a special issue entitled *Amphibian and Reptile Road Ecology*, including several articles on the impact of transport infrastructures on these groups.

Benard, A. et al. 2024. Traffic and weather influence on small wildlife carcass persistence time on roads. *Transportation Research Part D: Transport and Environment* 126: 104012

Carmona, G., Virgós, E., Burgos, T. et al. 2024. Factors determining roadkills in a mammal carnivore are road-type specific. *Mamm Biol* 104, 175–183.

Dvořáková, P. et al. 2024. Inclusion of road ecology criteria within environmental Impact assessment. *Transportation Research Part D: Transport and Environment* 133: 10430.

Hoffmann, M.T. et al. 2024. Mapping roadless areas in regions with contrasting human footprint. *Sci Rep* 14, 4722. <https://doi.org/10.1038/s41598-024-55283-3>

Lamb, C. T. et al. 2023. Unsecured attractants, collisions, and high mortality strain coexistence between grizzly bears and people in the Elk Valley, southeast British Columbia. *Conservation Science and Practice*, 5(10), e13012.

Luca Bastianelli, M. et al. 2024. Risk response towards roads is consistent across multiple species in a temperate forest ecosystem. *Oikos* e10433.

MITECO 2024. Identificación de Áreas a Desfragmentar para Reducir los Impactos de las Infraestructuras Lineales de Transporte en la Biodiversidad (Segunda edición, ampliada y revisada).

Quiles, P. and Barrientos, R. 2024. Interspecific interactions disrupted by roads. *Biol Rev*, 99: 1121-1139. <https://doi.org/10.1111/brv.13061>

Rocabert, C. et al. 2024. Accounting for the topology of road networks to better explain human-mediated dispersal in terrestrial landscapes. *Ecography*, 2024: e07068.

Rodríguez, C. Oñorbe, M. Caballero-Díaz, C., Cabezas-Díaz, S., García, F.J., D'Amico, M. 2024. Proyecto SAFE: más de 8.500 atropellos de fauna detectados. *Quercus* 456:40-41.

Román, J., Rodríguez, C., García-Rodríguez, A., Díez-Virto, I., Gutiérrez-Expósito, C., Jubete, F., Paniw, M., Clavero, M., Revilla, E., & D'Amico, M. 2024. Beyond crippling bias: Carcass-location bias in roadkill studies. *Conservation Science and Practice*, 6(4), e13103. <https://doi.org/10.1111/csp2.13103>

Tarjuelo, R., Luque-Larena, J.J. & Mougeot, F. Moving towards an ecological management of overabundant ungulates: insights from wildlife-vehicle collisions and hunting bag data. 2024. *Eur J Wildl Res* 70, 51 (2024). <https://doi.org/10.1007/s10344-024-01801-7>

PAST EVENTS

XII National Congress on Impact Assessment

With the motto: the impact assessment as warranty of social, environmental, and economic sustainability, the Spanish Association of Impact Assessment organized this meeting in Vitoria/Gasteiz from 10 to 12 April 2024. Más [info](#)



Transport Research Arena 2024

The foremost European transport event that covers all transport modes and all aspects of mobility was held in Dublin from 15 to 18 April 2024. More [info](#)



7th European Congress of Conservation Biology

This event will focus on biodiversity positive by 2030. This theme presents a positive message and a call to action towards the conservation of our planet's biodiversity. It was held in Bologna (Italy) from 17 to 21 June 2024, and Marcello D'Amico presented some results of the SAFE project. More [info](#)



COMING EVENTS

Northeastern Transportation & Wildlife Conference 2024

With the theme: Small Scale, Large Victories: Collaborating with Partners for Transportation Improvements Yields Cumulative Wildlife Benefits, the 2024 Northeastern Transportation and Wildlife Conference (NETWC) will be held September 8 – 11 at the Mystic Marriott Hotel & Spa in Mystic, CT. More [info](#)



IENE 2024

With the motto: "Biodiversity in the headlight of future transport", the IENE (Infrastructure and Ecology Network Europe) will organize its traditional biennial meeting in Prague (Czech Republic) from 9 to 13 September 2024. More [info](#)



As part of the European project COST 341 on Habitat fragmentation due to transportation infrastructure and its continuity by the Working Group actions, various resources have been created to contribute to the knowledge and mitigation of impacts of habitat fragmentation caused by transport infrastructures.

The following documents have been published:

- **COST 341. La fragmentación del hábitat en relación con las infraestructuras de transporte en España.** (Habitat fragmentation due to transportation infrastructure in Spain). Review of the state of the art, published in 2003.
- **COST 341. Wildlife and traffic. A European Handbook for Identifying Conflicts and Designing Solutions** (40 MB). Published in 2003 as a coda to Action 341, drawn up by experts from various European countries.
- **COST 341. Fauna y Tráfico. Manual europeo para la identificación de conflictos y el diseño de soluciones** (33 MB). Published in 2005; a translation of *Wildlife and Traffic*.
- Series **Documentos para la reducción de la fragmentación de hábitats causada por infraestructuras de transporte** (Documents for the reduction of habitat fragmentation caused by transport infrastructure).
 - **Nº 1. Prescripciones técnicas para el diseño de pasos de fauna y vallados perimetrales** (1.8 MB) (Technical prescriptions for the design of wildlife passages and perimeter fences). In 2008 the Catalan version of this document was published **Prescripcions tècniques per al disseny de passos de fauna i tancaments perimetrals** by the Department of the Environment and Housing, Regional Government of Catalonia.
 - **N 1. Technical prescriptions for wildlife crossing and fence design. (Second edition, revised and expanded)** (5.5 MB). English version of the previous document. Published in 2016.
 - **Nº 2. Prescripciones técnicas para el seguimiento y evaluación de la efectividad de las medidas correctoras del efecto barrera de las infraestructuras de transporte** (2 MB) (Technical prescriptions for monitoring and evaluating the effectiveness of measures to correct the barrier effect of transport infrastructure). Published in 2008.
 - **Nº 3. Prescripciones técnicas para la reducción de la fragmentación de hábitats en las fases de planificación y trazado** (45 MB) (Technical prescriptions for the reduction of habitat fragmentation in planning and alignment phases). Published in 2010.
 - **Nº 4. Indicadores de fragmentación de hábitats causada por infraestructuras lineales de transporte** (31 MB) (Indicators of habitat fragmentation due to linear transport infrastructures). Published in 2010.
 - **Nº5. Desfragmentación de hábitats. Orientaciones para reducir los efectos de las carreteras y ferrocarriles en funcionamiento** (53 MB) (Habitat defragmentation. Guidelines to reduce the effects of operating road and railway networks). Published in 2013.
 - **Nº 6. Identificación de áreas a desfragmentar para reducir los impactos de las infraestructuras lineales de transporte en la biodiversidad** (12.4 MB) (Identification of areas to defragment to reduce the impacts of linear transport infrastructure on biodiversity). Published in 2014.
 - **Nº 7. Efectos de borde y efectos en el margen de las infraestructuras de transporte y atenuación de su impacto sobre la biodiversidad** (3.23MB) (Edge and barrier effects in transport infrastructures. Minimizing their impact on Biodiversity). Published in 2019
 - **Nº 7. Edge and verge effects of transport infrastructure. Mitigating their impact on biodiversity** (2,8 MB) Published in 2021.
 - **Nº 8. Prescripciones técnicas para hacer efectivos los seguimientos de las medidas de mitigación del efecto barrera de las infraestructuras de transporte (diseño, documentación y archivo del seguimiento ambiental)** (7.19 MB) (Technical prescriptions to make effective the mitigating measures of the barrier effect of transport infrastructures. Design of environmental monitoring, documentation, and archive). Published in 2020.

For further information, see the [MITECO](#) and [IENE](#) sites.

■ This publication is part of the project 'Habitat fragmentation due to Transportation Infrastructure', which is promoted by the Sub-Directorate General for the Terrestrial and Marine Biodiversity, Directorate General of Biodiversity, Forests, and Desertification, and carried on in collaboration with EBD-CSIC.

Any information for publication can be sent [here](#).

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■ Edited by: Ministry for the Ecological Transition and the Demographic Challenge. NIPO: 665-20-056-2
Catálogo de Publicaciones de la Administración General del Estado: <https://cpage.mpr.gob.es/>.

