habitat fragmentation due to transportation infrastructure

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VICEPRESIDENCIA TERCERA DEL GOBIERNO
MINISTERIO PARA LA TRANSICIÓN ECOLÓGICA Y EL RETO DEMOGRÁFICO

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PREVIOUS NEWSLETTERS

EDITORIAL

We are enthusiastic about this new year 2024, when some significant milestones in the framework of habitat defragmentation could be already highlighted.

On the international scene, the job done by the IPBES (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services) deserves attention. This intergovernmental body will develop a worldwide methodological evaluation on biodiversity and ecological connectivity in the framework of territory planning. This desired document will assess different methods, models, and scenarios that aim encouraging the integration of ecological connectivity in territory planning from a multi-spatial and multidisciplinary point of view. In addition, it aims at gathering learnt lessons and good practices to identify, restore and improve connectivity.

Within the UE, it is expected that the nature restoration law be finally approved (see news below). This legislation will impose the development of National Plans for nature restoration in a two-year period since its approval, probably by 2026. These restoration measures must include the improvement of ecological connectivity among European ecosystems.

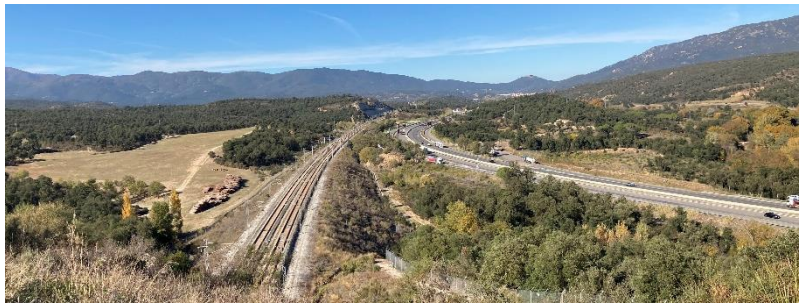
At the national level, and fulfilling compromises set by the National Strategical Framework for Biodiversity (PEEPNB 2030), the National Plan for Habitat Defragmentation should be implemented before the end of the year. This document, developed in collaboration with the Working Group on Habitat Fragmentation due to Transport Infrastructures during 2023, aims at setting the basis to advance in the improvement of the connectivity in the territory and a better integration of biodiversity on the development of transport infrastructures in Spain.

This year 2024 could be crucial for the effective launching of the Spanish Green Infrastructure. The deadline to approve the regional strategies of green infrastructure, as established by the Law 42/2007 of Natural Heritage and Biodiversity is in July. Thereafter, a new scenario of collaboration between the different administrations and stakeholders will be created.

Other notable achievements regarding green infrastructure will include the completion of the first Working Program to build the green infrastructure in Spain by the Spanish Central Administration. Immediately afterwards, the second Working Program should be established together with the publication of an improved version of the proposed methodology to assess and map ecosystem services and ecological connectivity in Spain. This information belongs to the Methodological guidelines to identify elements of the green infrastructure in Spain (in Spanish).

Finally, we highlight the future publication of a revised version of the document of technical prescriptions 6 (Identification of areas to defragment to reduce the impacts of linear transport infrastructure on biodiversity. See "Documents of the working group"), as well as the document of technical prescriptions 9 focused on wildlife roadkill.

In the challenging equilibrium between development and nature conservation, during 2024 we expected to contribute to a future of harmonious coexistence between biodiversity and transport infrastructures.



Picture: Manuel Oñorbe

WORKING GROUP

During these months, the Working Group on Habitat Fragmentation due to Transport Infrastructures has been working on the participative process to write the National Plan of defragmentation regarding Transport Infrastructures. Using the first draft, and the comments provided by the numerous contributors, a new version of the document is being written.

In addition, different administrations shared their experiences with the working group. For instance, the Bizkaia Regional Government shared their experiences regarding virtual fences. A camera trap captured badger behavior when passing cars activated the virtual fence. The Navarra Regional Government also shared their planned actions to reduce wildlife vehicle collisions in one of their roads.

The next meeting of the working group will be held in February 6, in CETA building (CEDEX headquarters, Madrid). Among other topics, we will discuss on the progress of the technical document number 9, related to vertebrate mortality in Spanish roads (SAFE project).

The consulting service regarding habitat fragmentation due to transport infrastructures is still active, also giving support to SAFE. Any question on this topic can be sent to: habitat_infraestructuras@ebd.csic.es

NEWS

Summer of collisions for the Cantabrian Brown Bear population

At least 5 individuals of brown bear experienced collisions with vehicles in the roads of the Cantabrian Mountains past summer. The first happened in the toll highway AP-66 in the night of July 2nd, close to the village of Campomanes (Asturias Province). Despite this road is fenced, it proved to be inefficient to prevent the access of the bear to the road, but also his exit after the collision. Afterwards, on August 17, a brown bear cub was roadkilled in km 169 of road CL-626 in Guardo direction (see picture). Ten days after, two additional collisions were reported. One in this same road, close to the village of Puente Almuhey, without consequences, and the other in the toll highway AP-66 close to Canales-La Magdalena (León Province). In this case, a young male resulted roadkilled. The last collision happened in the night of September 2nd in road As-15 between Zarréu and Degaña (Asturias Province) where an adult brown bear resulted roadkilled. Although collisions are difficult to forecast and therefore to avoid, especially in conventional roads, highways are always fenced (at least in Spain) and these events showed them as inefficient, or not properly maintained. For this reason, the Regional Government of Castilla y León formally informed the company currently in charge of this toll-highway to inspect the fencing and fix the points where it may show any fault. It is timely to remember that the toll for cars and vans in this highway sector is 9€. It is also advisable to inspect existing wildlife crossings to check whether they are still adequate for the target species, as well as to explore the possibility of build new ones or modify current structures (i.e. drainage, multipurpose under or upper passes) to facilitate wildlife connectivity between both sides of the road.

Source of information: Editorial team

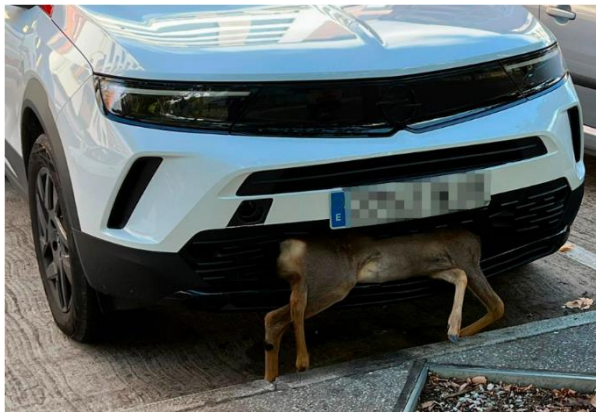
Progress in the Nature Restoration Law of the UE

Obtaining 336 supporting votes, 300 against, and 13 abstentions, past summer started the process of negotiation of this new law that is key for the European green deal. It is also in line with the scientific advice and recommendations for ecosystems restoring in Europe. Such restoration is crucial in fighting climate change and biodiversity loss, also contributing to increase food safety. New legislation neither implies the creation of new protected areas nor block new infrastructures of renewable energy (a new article was previously added to declare them of public interest). This is one of the most sensitive, polemic and politic dossiers of the current mandate. The law aims at rehabilitating at least 20% of Europe's degraded ecosystems (both terrestrial and marine) by 2030. According to information from the European Commission, Europe’s nature is in alarming decline, with more than 80% of habitats in poor condition. Yet, around 60 to 70% of soils in the EU are not healthy. Every year about 1 billion tons of soil are washed away by erosion in the EU, causing an estimated loss of agricultural production of €1.25 billion per year. Half of the species of European fishes have declined in the last decade. Similarly, wetlands have been also reduced by 50% in the last 50 years.

Final voting for this law is expected in February in the plenary. If positive, the law could be finally approved before next European Parliament election (June 9th). The new law will contribute to achieve EU international commitments, particularly those derived from the Kunming-Montreal biodiversity agreement of the UN, promoting restoration measures that rehabilitate at least 20% of Europe's marine and terrestrial degraded ecosystems by 2030

Source of information: Editorial team

Drivers are not aware of roadkill



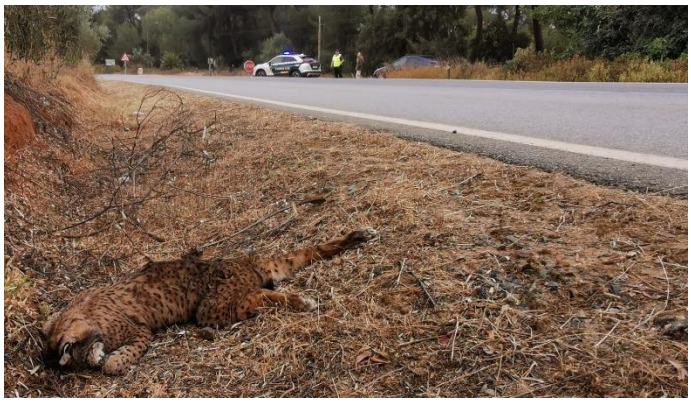
A sociodemographic study carried on by the Krakow Jaguelonic University (Poland) showed that drivers are only aware of the animals they roadkill if they are above a certain size (roe deer, wild boar, etc.). Sometimes even animals of this size are non-consciously road killed, as happened to this driver (see picture) that carry this roe deer attached to her/his car to the parking place in León city. The study showed that the highest frequency of collisions occurred during the sunrise and sunset hours. Respondents indicated that the most effective mitigation measures are driving slower on the road, and sensitizing or educating the public to increase their awareness of the problem. See more details in Toyeeb 2023 (Publications).

Source of information: Editorial team

Which animals are removed from roads for maintenance?

The Ministry for the Ecological Transition and the Demographic Challenge (MITECO) started in September 2023 a new project aiming at identifying the carcasses that are removed from the road by maintenance companies. This project involved the Doñana Biological Station (CSIC) as responsible of identifying the carcasses. This source of information on species involved in roadkill has been rarely employed in Spain, but it has been quite common in other countries.

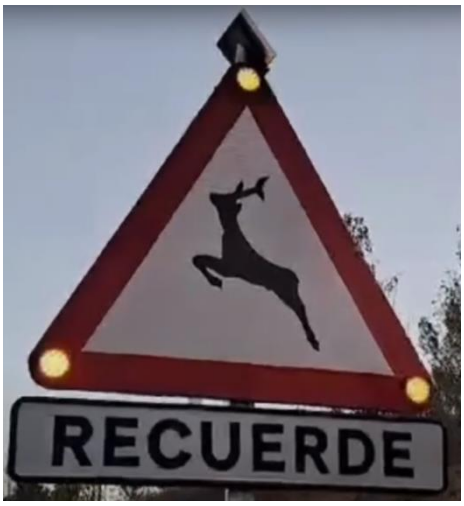
The project also aims at disentangling the difficulties associated to such identification, which is a recent requirement (service note 01/2023) for companies in charge of maintenance of those roads belonging to the National Road Network, and managed by the Ministry of Transport and Sustainable Mobility. From the gathered information on the species involved, the surveying protocol, the record and management of the information, it is expected to improve and optimize these processes, also facilitating that information on involved biodiversity was available for the MITECO, therefore increasing their knowledge on the species involved, especially those of especial conservation concern (included in the National red list – LESRPE-).



As part of the project, some road maintenance buildings will be visited to offer additional information and tips to workers that help them identifying carcasses, also training them on the use of a mobile app designed to easily record all carcasses removed from the road. These carcasses will be identified afterwards. The project will be active until November 2024.-

Source of information: Editorial team. Picture: Jorge Monje

MITMA identifies and increase signaling of TEFIVA road sections



The General Directorate of Roads belonging to the Ministry of Transport and Sustainable Mobility (MITMA) has the main objective of improving safety conditions in the roads they manage. In this line, several measures have been adopted to avoid or reduce vehicle wildlife collisions. Applying a systematic and homogenous process to the whole National Road Network, they have identified those road sectors where these collisions are significantly more frequent. Such sectors are called TEFIVA.

To set these TEFIVA sectors, all information regarding either potential or effective vehicle animal collisions was considered. This included reports from road police, maintenance companies and own data.

TEFIVA is the acronym for "road sectors with especially frequent accidents with animals –in Spanish-". They are sectors of a minimum length of 1km where at least 10 accidents related to medium-big animals have been recorded in the last 5 years, and at least 1 resulting in personal damage.

A total of 150 TEFIVA sectors were identified, resulting in 205.1 km. To increase road safety and to inform drivers on the presence of these road sectors where collisions with animals is more likely, the General Directorate of Roads from MITMA installed the appropriate road signal (danger due to presence of wildlife -reference P-24-), adding a panel informing on the length of the sector. If longer than 2 km, a second signal was also installed as a remainder in the middle of the sector. As exemplified in the figure, the first signal was equipped with warning lights in the vertexes of the signal to increase its visibility. Such lights were powered with solar panels and batteries and programmed to work during dawn, dusk, and nighttime. Regarding signaling, consecutive sectors were treated as a single long one. This resulted in a total of 136 sectors provided with this signaling, covering a total distance of 216.6 km.

The TEFIVA procedure for identification and signaling of danger sectors will be repeated periodically to account for temporal and spatial variability in animal-vehicle collisions.

Source of information: General Directorate of Roads (MITMA)

Pilot project installing road beacon with deterrents to avoid animal-vehicle collisions in road EX-206

The Regional Government of Extremadura have installed road beacon with deterrents between km 8+800 and 9 in EX-206 as pilot devices to be tested. This road between Caceres and Torreorgaz crosses the regionally protected area of "Llanos de Cáceres y Sierra de Fuentes". Beacons were installed close to El Risco.

These devices were installed there as a prototype to check its performance. If an animal enters its detection range when vehicles are also present, the device is activated, emitting both lights and sounds, which make animals to run away. Lights are also visible to drivers that are also alerted. Beacons has a detection angle of 160º, and a detection distance of 13-17m. Distance between beacons is 20 m, therefore covering the whole sector.

This device has been designed by company Visever in collaboration with Castilla La Mancha University and the Institute for Game and Wildlife Research (IREC-CSIC). It is free of cost for the Regional Government, as it belongs to the improvement of the contract with the temporal holding Visever-Aglomerados Olleta Torres to develop several works in the Extremadura Regional Road Network (batch number 2, areas 3 and 4, Cáceres and Trujillo).

Source of information: Dirección General de Infraestructuras Viarias. Junta de Extremadura

Navarra Regional Government completed the ecological corridor in Etxarri Aranatz connecting biodiversity rich areas of Urbasa-Andia and Aralar

As previously reported, (bulletin 24), the Department of Rural Development and the Environment completed the construction of the ecoduct over Highway A-10 in km 22. The infrastructure, of 45m long and 45m wide is an upper pass of 7.13m over the road connecting two patches of the Aritzalko oak forest. This helps reducing the barrier effect caused by this road to the Natura 200 Network. This action is in line with the UE Biodiversity Strategy for 2030, and considered as a key point in the management plans of the two natural spaces placed at both sides of the road: the Natural Parks of Urbasa-Andía and Aralar. Until March 2024, revegetation of the ecological corridor will be conducted under supervision of the General Directorate of Environment. This will consist in providing the pass with vegetation cover that fulfill requirements of the target fauna, using the same species of both trees and bushes present at both sides of the road. During the winter, plantations will include about 3000 trees, tall and short bushes. They will be provided with protection from herbivores, therefore improving plant survival and a quicker development during the first years. Along with oaks (which is the main tree species in the area), other species such as lime, ash, maple, hawthorn, yew, rowan, heather, and laurustinus will be also planted. This vegetation will provide animals with the required protection that facilitate the ready use of the ecoduct. The budget of this action is 48000 euros.

In addition to the important value this kind of measures have to reduce fragmentation and enhance biodiversity, it is also expected that this ecoduct helps reducing the number of both roadkill and accidents derived from wildlife-vehicle collisions. In the past 20 years, mortality of 150 individuals belonging to at least 11 species of vertebrates were reported in this road between Irurtzun and Altsasu/Alsasua. Some of this species are threatened. Considering that roadkill animals are often not detected, this numbers illustrate the potential benefit of this infrastructure.

This action had a cost of 6.1 million euro funded by the Next Generation funding through the Recovery, Transformation and Resilience Plan of the Spanish Government. More specifically, the action was funded by REACT funds for the green infrastructure and connectivity of Natura 2000 Network: Urbasa-Andía-Aralar PO FEDER 14-20.

Source of Information: Dep. of Rural Development and the Environment. Navarra Government.

PUBLICATIONS

In addition to the literature listed below, two books merit special attention. The first, developed by IUCN, is an overview of practical, feasible science-based strategies for protected and conserved areas (PCA) managers, transport practitioners, industry, conservationists and other stakeholders interested in biodiversity and ecological connectivity conservation in, and adjacent to, PCAs. It promotes best practices for the various phases of infrastructure development.

The second one, focusing on wildlife crossings is also an overview of different structures developed to improve connectivity across roads for different organisms, from mountain lions in California to toads in the United Kingdom.

Ament, R., Clevenger, A. y van der Ree, Editors. Addressing ecological connectivity in the development of roads, railways and canals. IUCN, Gland, Switzerland. 146 pp.

Goldfarb, B. 2023. Crossings: How Road Ecology is Shaping the Future of our Planet. W.W. Northon and Co. ISBN: 978-1-324-00589-6. 384 pp.

Arca-Rubio, J., Moreno-Rueda, G. and Ortega, Z. 2023. The distribution of vertebrate roadkill varies by season, surrounding environment, and animal class. European Journal of Wildlife Research 69: 42.

Botting I., Ascensão F., Navarro L.M., Paniw M., Tablado Z., Román J., Revilla E., D'Amico M. 2024. The road to success and the fences to be crossed: considering multiple infrastructure in landscape connectivity modelling. Wildlife Biology. DOI: 10.1002/wlb3.01187.

Gomez-Peña, G. 2023. Estimating roadkill impact by accounting for survey bias. MSc thesis. University of Pablo de Olavide.

Guinard et al. 2023. Comparing the effectiveness of two roadkill survey methods on roads. Transportation Research Part D: Transport and Environment, Volume 121: 103829.

Keevil, M.G. et al. 2023. Lost reproductive value reveals a high burden of juvenile road mortality in a long-lived species. Ecological Applications, 33: e2789.

Lee, T.S. et al. 2023. Where to invest in road mitigation? A comparison of multiscale wildlife data to inform roadway prioritization. Journal for Nature Conservation, 71, p.126327.

Medrano-Vizcaíno, P., Grilo, C., González-Suárez, M. 2023. Research and conservation priorities to protect wildlife from collisions with vehicles. Biological Conservation 280: 109952.

Menger et al. 2023. Estimating roadkill rates while accounting for carcass detection and persistence using open-population capture–recapture models. Wildlife Research.

Otero, B. F., Herranz, J. and Malo, J. E. 2023. Bird flight behavior, collision risk and mitigation options at high-speed railway viaducts." Science of the Total Environment 902: 166253.

Poulin, M-P., Cherry, S.G., Merkle, J.A. 2023. Dynamic balancing of risks and rewards in a large herbivore: Further-extending predatory-prey concepts to road ecology. Journal of Animal Ecology 92: 1954-1965

Rodríguez, C., Román, J., García-Rodriguez-A., Rivilla, J.C., D'Amico, M., Oñorbe, M. 2023. Fauna atropellada. El proyecto SAFE evalúa los muestreos. Quercus 448: 49-49

Ruiz-Villar, H. et al. 2023. Humans and traffic influence European wildcat behaviour in pastoral landscapes. Animal Behaviour 207: 131-146

Toyeeb, A. 2023. The analysis of drivers' opinion on widlife-vehicle collisions in Krakow. MSc Thesis. Jagiellonian University of Krakow.

PAST EVENTS

VI International Congress of Biodiversity and Nature Conservation (CONSERBIO)

Held by the University of Huelva in 14-17 September 2023 in the Faculty of Experimental Sciences. Among other interesting talks, it included some preliminary results about the impact of roadkill on bee-eater productivity, as well as the Bayesian modelling that will be used in the SAFE project to account for the searching efficiency bias when recording roadkill. More info

ACLIE + GCLIE 2023.

Initially planned as a joint event to the IENE Congress (see bulletin 22), the Global Congress on Linear Infrastructures (GCLIE) was finally organized in coordination with the African Conference for Linear Infrastructure and Ecology (ACLIE). This joint event was held in Kenya between 18 and 21 September 2023. More info.

27th World Road Congress

Organized by the World Road Association (PIARC) and the Czech Road Society, it took place in Prague, Czech Republic at the Convention Centre from 2–6 October 2023.
More info

ANET 2023

With the motto: Resilience, recovery and restoration: transport ecology in a changing world, the Environment Institute of Australia and New Zealand organized this meeting in the Te Pae Christchurch Convention Centre from 27 to 29 November 2023. More info

XVI Internacional Congress of SECEM

The Spanish Society of Mammalogist, organized its traditional biennial meeting in Granollers (Barcelona), from 6 to 9 December 2023. Some interesting talks were there presented such as results from project LIFE SAFE CROSSINGS by Carme Rosell, and project SAFE by Marcello D'Amico. More info

COMING 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 organize 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 will take place 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 will take place in Bologna (Italy) from 17 to 21 June 2024, and Marcello D'Amico will present some results of the SAFE project. 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

DOCUMENTS OF THE WORKING GROUP

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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