

habitat fragmentation due to transportation infrastructure



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EDITORIAL

United Nations and the European Commission continue highlighting the alarming biodiversity loss going on nowadays, worldwide. This includes Spain and the main explaining factors are agricultural activities and habitat fragmentation due to transport infrastructures. Spain is currently involved in several possible infringements of EU law that may lead to important financial penalties, according to the Luxemburgo Court.

The last data available, informing on fragmentation due to grey infrastructure (infrastructure development, in general, including urbanization) were compiled in 2013. According to this information, Spain showed relatively small fragmentation values when compared with other western and central European countries, but with high variability between regions. Galicia, the Cantabrian and Mediterranean coasts, Alcudia Valley, and the western lowlands of Castilla y León, together with the Basque region showed the highest fragmentation levels because of the dense road network, linked with urban development and sometimes agrarian development.

This study showed several maps depicting an index on vehicle-wildlife collisions provided by the National Traffic Authority. It was noticed that information was partial, lacking information on other casualties that were being gathered by regional governments, NGOs, and research institutes in a very heterogeneous manner.

These results serve to highlight several information gaps that need to be addressed: complete information on fragmentation, especially in agrarian landscapes, gather information on a country basis periodically, manage fragmentation, at least in the areas pointed by this study, but also those identified by regional governments and other related institutions. It is also required to promote the construction and adaptation of wildlife crossing structures, according to the prescriptions given in our publication of 2015 (see documents of the working group), but having in mind that bigger structures normally allow better connection between populations at both sides of roads and railways. Last but not least, it is important to get standardized data on road killed wildlife that give us a realistic picture of this cause of mortality.

The technical workshop on wildlife mortality in transport infrastructures held in Barcelona, past October concluded that regional information on vehicle-caused mortality must be based on validated observations, according to stratified sampling protocols, and conducted in a systematic way. A proper documentation of this process may help future samplings to get such kind of reliable information.

It was also concluded that recording casualties and carcass removal involve a high number of entities, including the administration, private companies in charge of road maintenance, and volunteers. Their cooperation may enhance the quality of the information gathered.

Finally, this workshop concluded that this coordination should include research institutes in order to analyze the existing data bases on different topics regarding vehicle-caused mortality, and habitat fragmentation due to transport infrastructures. This may allow us to build an up to date information system that gives access to available data to everyone. Such a huge data base may allow us to evaluate the total cost derived from vehicle-caused mortality, as well as the environmental and heritage responsibilities derived from collisions. This may help understanding the importance of preventing and mitigating measures installed in roads and railways, encouraging their funding.

During the workshop it was announced the beginning of two agreements promoted by the Ministry for the Ecological Transition and the Demographic Challenge. The first agreement, with the Doñana Biological Station (CSIC) aims to lead a National Survey of road mortality, setting the methods and protocols to get information on vehicle-caused mortality, as well as developing some professional samplings. The second agreement involves three scientific societies: the Spanish Society for the Study and Conservation of mammals (SECEM), the Spanish Society of Ornithology (SEO-Birdlife), and the Spanish Herpetological Society (AHE). They will use citizen-science tools to get roadkill data on a country basis. In this newsletter we confirm the approval of both agreements, whose results will be detailed in forthcoming newsletters. A reliable picture of the magnitude, distribution, and clustering of casualties require a joint effort from all institutions involved in this issue.

WORKING GROUP

The exceptional situation of the COVID-19 pandemic caused a delay in the writing process of the document *Prescripciones técnicas para hacer efectivos los seguimientos de las medidas de mitigación del efecto barrera de las infraestructuras de transporte* (technical prescriptions to make effective the monitoring of measures aiming to mitigate the barrier effect of transport infrastructures). The contract with the Doñana Biological Station (CSIC) to write such a document was therefore extended until November 1st. The technical commission in charge of this document has met with the writing team in July and September, contributing to improve previous versions of the document, and help using the writing standards and style used in the document's series. However, contributions from representatives of the working group has decreased significantly. Such contributions are essential to better focus the topic, and optimize understanding of the document contents by professional coming from different disciplines (mainly civil engineers), thus facilitating the use and application of the document.



An interesting finding of the meta-analysis performed on over 40 projects of environmental monitoring provided by National and Regional administrations is the frequent absence of declared sampling effort in the studies. This means that crossing structures not used by wildlife (samplings resulted in zero records) were not included in the data bases, strongly limiting the kind of questions that can be answered using this information.

The document will be published before the end of the year, aiming to substantially improve the design and execution of monitoring samplings focus on the effectiveness of mitigating measures installed in transport infrastructures.

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

NEWS

New IENE Governance Board

The IENE Governance Board elections took place between January 20th and January 26th, 2020. The election results will be approved during the IENE General Assembly, as part of the International Congress to be held in Evora (Portugal) next January (see events). The new Governance board during the next 4 years will be composed by Carme Rosell (Minuartia Wildlife Consultancy), Elke Hahn (Austrian Federal Ministry for Transport, Innovation, and Technology), Lazaros Georgiadis, Tony Sangwine (Adviser at Highways England), Marita Böttcher (German Federal Agency for Nature Conservation) and Jean-François Lesigne (French Foundation for Biodiversity Research).



Source of Information: IENE.

Pilot study on the use of dynamic lighting in the Highway A-66 between Cáceres and Plasencia

The Ministry for Transport, Mobility, and Urban Agenda has installed dynamic lighting on two sections of this road when it crosses the Tajo, and Almonte rivers. These two sections include the whole viaduct plus some additional meters at both sides. These lights, similar to reflex reflectors will turn on when visibility decreases (mainly because of the fog created by the rivers). It constitutes an extra-lighting that improve driving safety under such conditions. This is the first time this system is installed in Extremadura, but it was first tested experimentally in the Cantabrian Highway. This pilot system will be tested to check whether it really improve visibility under foggy conditions.

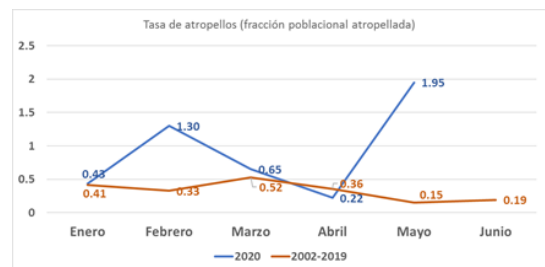
Because the aim of this measure is analyzing whether it is worthy to extend the application of this measure to other road sections, the working group on Habitat Fragmentation due to Transportation Infrastructures encourages the Ministry for Transport to also check whether this supplementary lighting do not contribute to increase light pollution. This already constitutes a threat for biodiversity, especially in dark areas like the one under study, where artificial lighting mainly comes from transport infrastructures. Likewise, we also suggest to apply this technology (dynamic lighting) not only to supplement the existing signaling, but also to reduce lighting time, when traffic goes down and visibility is good enough to allow such a measure

Source of Information: Editorial team.

Road casualties of Iberian Lynx during the lockdown and afterwards

Since the beginning of lynx recovery projects (2002) the Andalusian Government intensively record all sources of lynx mortality, including roadkill data. These are frequent and easy to detect, so these records constituted a good proxy of lynx population status during these years. Because lynx distributional range overlap with a dense transport infrastructure network, vehicle-caused mortality followed a random distribution, collisions being more likely when lynx population increases. From this general point of view, collisions do not constitute a limiting factor for the species, and these events are extremely difficult to predict. However, when high local population densities overlap with risky road and railway sections, this may result in mortality hotspots that may have an impact on the lynx population dynamics. These points require urgent management.

Because of the COVID-19 lockdown, we focus on the impact of the resulting reduction of traffic volume on the lynx population. Because collisions depend on population density, we used the current percentage of population size to compare between periods (collision rate). In the period 2002-2019, we registered 216 roadkill events. Monthly records were relatively uniform, with values ranging from 0.15% in May to 0.52 in March. Casualties typically peak in March, August, and September, and drop in May and June. This year (from January to June) we recorded 22 collisions. This number was similar to other years in January, March and April, and higher than other years in February ($Z = 2,44$; $p = 0.015$; see Fig. 1). Therefore, lockdown did not influence vehicle-caused mortality on lynxes. The main difference was that 2 of the casualties did not result in immediate death. Two of the animals got veterinary treatments, and one of them survived. This is very infrequent, and it may be related to lower traffic densities in roads during the lockdown. During May, when lockdown was over, the number of collisions increased up to 9 (increasing the collision rate up to 1.95, higher than the mean; $Z = 3,56$; $p < 0.01$). When comparing between years, collision rate was similar during the lockdown (0.65% vs. 0.44%), but higher after that (2.17% vs. 0.25%; $Z = 3,34$; $p < 0.01$).



In conclusion, the lockdown did not result in lower number of road killed lynxes, but it should be noticed that half of them did not result in immediate death. However, after lockdown, vehicle-lynx collisions were more likely than expected.

Source of information: Junta de Andalucía.

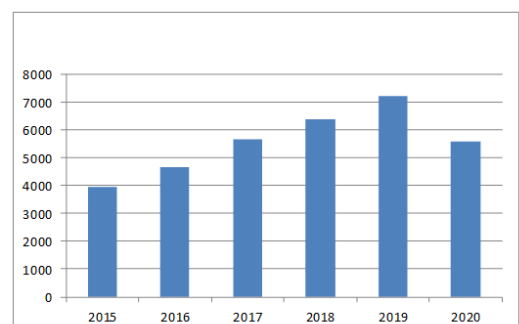
Wildlife-vehicle collisions dropped during the lockdown, but the rate of collisions increases

The Spanish Traffic Authority (DGT) stores and manages the data base "Arena 2" which is a very good tool to study vehicle-wildlife collisions in spite of its biases and limitations. First, it is designed to study roadkill data from the perspective of road safety. Collisions are recorded by traffic agents in the whole National territory but not in Cataluña nor in the Basque country, where they have own recording systems. Out of these areas, Arena 2 is the main tool used by insurance companies to deal with these collisions.

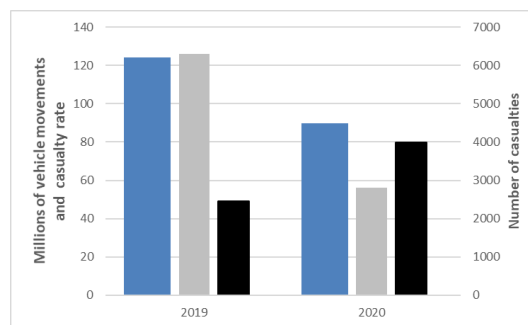
For that reason, it is mainly valid to evaluate collisions involving medium to big animals such as deer and boar which normally results in damages that involve insurance companies. Nonetheless, it also provides with information on many other species.

The historic data series of casualties between March and June show an increasing pattern of casualties that is truncated during 2020 because of the lockdown imposed by the COVID-19 pandemic (see first figure).

No differences were found either in species composition or temporal distribution of collisions within the day. The traffic drop is therefore the most plausible explanation for such a drop in collisions. It is important, however to highlight that movements and casualties did not drop proportionally. Casualties dropped from 6205 in 2019 to 4482 in 2020 (a drop of 28%, blue bars in second figure), while vehicle movements dropped from 126 million to 56 (a drop of 55%, see grey bars). The rate of casualties per million movements across roads during the lockdown increased from 49 in 2019 to 80 in 2020 (60%, see black bars in second figure).



It is therefore important to highlight that despite the number of casualties has dropped, the factors explaining the increasing pattern of casualties found during the last years are still operating. This is: the higher requirements of insurance companies result in a very high proportion of casualties being recorded. On the other hand, the so-called empty Spain is a vast territory where human presence drops every year, facilitating the presence of wildlife in the roads, also increasing the number of collisions.



National survey on road casualties in Spain

During the Technical meeting “Wildlife mortality in transport infrastructures. Current knowledge and methodological advances” held in Barcelona in October 24-25 (see previous e-newsletter) two forthcoming agreements promoted by the Ministry for the Ecological Transition were announced. Both agreements aim to evaluate animal mortality in Spanish roads.

The approval of both agreements were published in August 7th in the Spanish Official Bulletin number 213 (Section III pages 66726, and 66828, respectively). The first agreement involves the Ministry for Ecological Transition and the Demographic Challenge and the Doñana Biological Station, belonging to the Spanish Council for Scientific Research (CSIC). It is focused on establishing the methodological basis of the National survey, gathering and analyzing the resulting information, and carrying on some scientific monitoring. The second agreement involves the Ministry for Ecological Transition and the Demographic Challenge, and three conservation societies: the Spanish Society of Ornithology (SEO-Birdlife), the Spanish Association of Herpetology (AHE), and the Spanish Society for the Study and Conservation of the Mammals (SECEM). The aim of this second agreement is carrying on the National survey on the basis of citizen-science, but following the sampling design and protocol established in the first agreement.

Source of information: Editorial team.

PUBLICATIONS

Duffett et al. 2020. Species’ traits as predictors of avoidance towards roads and traffic. *Ecological Indicators* 115: 106402

Farfan, M.A. et al. 2020. Lack of maintenance of motorway fences works against their intended purpose with potential negative impacts on protected species. *Scientific Reports* 10: 791

Grilo, C. et al. 2020. Roadkill and population vulnerability in European birds and mammals. *Frontiers in Ecology and the Environment* doi:10.1002/fee.2216. This study estimates an average of road-killed birds of 9 million and 1.5 million mammals in Spain.

Hilty, J. et al. 2020. Guidelines for conserving connectivity through ecological networks and corridors. IUCN. 122pp.

Hlavac, V. et al. 2019. Wildlife and traffic in the Carpathians. Guidelines how to minimize the impact of transport infrastructure development on nature in the Carpathians countries. The State Nature Conservancy of the Slovak Republic, Banská Bystrica.

Lundin, U. 2019. The ecological and cultural heritage standards. Trafikverket, Sweden. In this document the Swedish Administration of Transport publish the guidelines of functional requirements to improve the sustainability of its transport network. It is a reference at the European level, and it is available in English [here](#).

Manenti et al. 2020. The good, the bad and the ugly of COVID-19 lockdown effects on wildlife conservation: insights from the first European locked down country. *Biological Conservation* 249: 108728

Sillero, N. et al. 2019. Influence of landscape factors on amphibian roadkills at the National level. *Diversity* 11: 13.

PAST EVENTS

Because of the COVID-19 pandemic, the majority of scheduled meetings were cancelled or postponed (see coming events)

Winter Road Congress 2020

Organized by the Finish Road Association in Tampere (Finland) in february 2-3, 2020. More [info](#)



COMING EVENTS

IUCN Webinar series on Infrastructure and Nature

The Infrastructure and Nature coalition, representing more than 20 organizations formed to organize the Infrastructure and Nature Pavilion at the 2021 World Conservation Congress (see below), is holding a series of virtual discussions from October to December. To attend them, you should first register [here](#)

IENE 2020 International Conference

Organized by the project LIFELINES. Linear Infrastructure Networks With Ecological Solutions. Évora (Portugal). January 12-14. Fully online. More [info](#).



Euroasphalt & Eurobitume Congress

The European Association of Asphalt and Pavements organize this event in Madrid (Spain). June 16-18, 2021. More [info](#).

IUCN World Conservation Congress

Will be organized by the IUCN in Marsella (France). Dates will be announced in due course. More [info](#).



IRU World Congress. Intelligence on the move

Organized by the International Road Transportation Unión, it will be held in Berlin (Germany). Dates will be announced soon. 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 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** (Identification of areas to defragmentate 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). Publicado en 2019

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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