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CONTENTS

The system itself will be managed by the supplier (Prowild / Traffic2000).In order to evaluate this solution and respond to the expectations of the politicians, monitoring is organised in relation to the objectives of the project:

Goal 1: Improving traffic safety (reduce number of collisions): evaluated based on number of fauna collisions and the reaction of the drivers to the dynamic speed signs;

Goal 2: Ensure passage for local fauna: monitored by camera traps. The images and data will be processed by the Agouti-system. Parallel scientific research will evaluate the population and migration of wild boar in the area.

Goals 3: Evaluation of the whole system: additional cameras will observe animal behaviour in combination with traffic. The Research Institute for Nature and Forest will also analyse the datalogs of the warning system.

During the first year the monitoring method will be tested and evaluated. The actual monitoring starts in the second year.

KEYWORDS: Animal Detection System, ADS, Evaluation, Car accidents, Alternative solution, Wild Boar

#3 Hit the road Jane! Roads decrease the relatedness for females lesser horseshoe bats

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The understanding of how human-induced habitat disturbance shapes the contemporary population structure and gene flow at fine-spatial scale is key for adequate management of species with small and fragmented populations and with limited dispersal abilities. To date there are few studies focusing on how barriers (e.g. roads, habitat fragmentation) might influence gene flow at fine-scales. Roads are known for causing millions of roadkill severy year and for causing movement disruptions mainly for species with low dispersal abilities, thus changing the genetic structure of these populations. Some bat species, despite the high potential for dispersal, may show low dispersal movements due to high flight costs, which combined with a high vulnerability to roadkills, can have a strong effect on population structure. Moreover, differential sex-specific dispersal, often biased towards males is commonly observed on bat populations. Thus, we expect that females will possess strong local affinities, whereas males may act as genetic mediators among colonies. In this study, we investigated how landscape features drive the gene flow and sex-specific relatedness structure on a lesser horseshoe bat (*Rhinolophus hipposideros*) population. We combined multiple regressions on genetic distance matrices and spatially explicit analysis to fit models of genetic individuals-relatedness to landscape resistance surfaces. Genotyping involved 2,837 SNPs and 327 bat samples collected across a Mediterranean agroforestry system of southern Portugal. Our analysis based on relatedness structure supported the male-biased dispersal hypothesis. Females are thought to be philopatric, whereas males display uniform levels of relatedness throughout the landscape. Furthermore, we demonstrated that the effect of the landscape features could also be sex-specific. The relatedness analyses showed that the female´ colonies bisected by roads were less related between them-

selves than to those where no roads were present. In fact, relatedness among female' colonies was negatively correlated with proximity of roads, unlike males. However, the long-generation time for lesser of horseshoe bat, jointly with time lag since the road construction may not be sufficient to detect a clear genetic signal of isolation. Thus, main finding of presented study is that the roads reduced but did not halt the gene flow, although they may be major drivers of contemporary genetic population structure with medium to long-term consequences on the local bat populations. Furthermore, our results yield evidence that unsuitable habitat, such as presence of agricultural areas, is important factor mediating population connectivity between colonies. This study underscores the potential of conducting sex-specific analysis by identifying landscape elements that differentially promote or impede functional connectivity between sexes, particularly when studying species with different sex-dispersal abilities, as may uncover processes that may otherwise remain cryptic. Our findings are important for lesser horseshoe bat conservation, road planning schemes and habitat management, due to the threatened conservation status and species-specific traits (e.g. low flying, high-road mortality), that increases the risk of road barrier effect. The strong effect of roads at fine-scale on the contemporary genetic structure shows that effective management measures are required to increase across-roads connectivity allowing to preserve high survival rates of breeding females and maintaining continuous exchange individuals between colonies.

KEYWORDS: Lesser horseshoe bat, Landscape relatedness, Road barrier, Relatedness structure, Sex-biased

#4 Mapping and monitoring large mammal underpasses on motorway A29

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In Greece, the brown bear (*Ursus arctos*) is a priority species listed in Annex II and IV of the EU Habitats Directive (92/43/EEC) and thus, it is implied that Member States should avoid the deterioration and disturbance of bear habitats. However, motorway A29 cuts through brown bear habitat in northwestern Greece and acts as a barrier which restricts gene flow, isolates populations and ultimately, reduces overall landscape connectivity.

Within 5 years of operation, more than 20 bear-vehicle collisions occured on A29, until a bear-proof fence was installed in 2014 to prevent animals from reaching the roadway. This resulted in the drastic reduction in bear-vehicle collisions with only one incident ever since. Nonetheless, this bear-proof fence also increased the barrier effect and thus, the need for evaluation of the motorway's permeability is undeniable.

In the framework of the LIFE SAFECROSSING project (LIFE17NAT/IT/464), we performed field inspections along the motorway and identified potential passages for brown bears and other large mammals. We recorded all crossing structures, inspected and registered their condition and relevant features (i.e. size, surrounding landscape, evidence of use by smaller or larger mammals). We also identified barriers to animal movement, and places where there is access to the road surface due to problematic fence-ends or human tampering with the fence. Following, we selected 45 structures to be monitored (spring/summer 2019-spring 2020) via solar-panel/battery powered cellular (4G) cameras. The monitoring system is supported by a back-end infrastructure capable of passages visualization on map, along with associated info, automated camera snapshots/videos storage, snapshots depiction per passage, statistics per passage, etc. via a user-friendly graphical environment. The monitoring system was installed on underpasses along the 55km segment and underpass selection criteria were primarily evidence of use by large mammals and even distribution throughout the motorway, and secondarily, theft/vandalism risk and network reception

We found that along this motorway there are ca. 140 underpasses of variant size and the calculated Openness Index ranges from values close to 0 (culverts with a 2x2m entrance and length >100m) to 175, which is the maximum value calculated at a viaduct (height: 35m, width: 125m, length: 25m).

The first pilot camera was installed in March and the rest 44 in July (2019). Five cameras have been installed at underpasses with no reception and are manually checked