

## **SEA of a Road Network Plan: effects on wolf populations**

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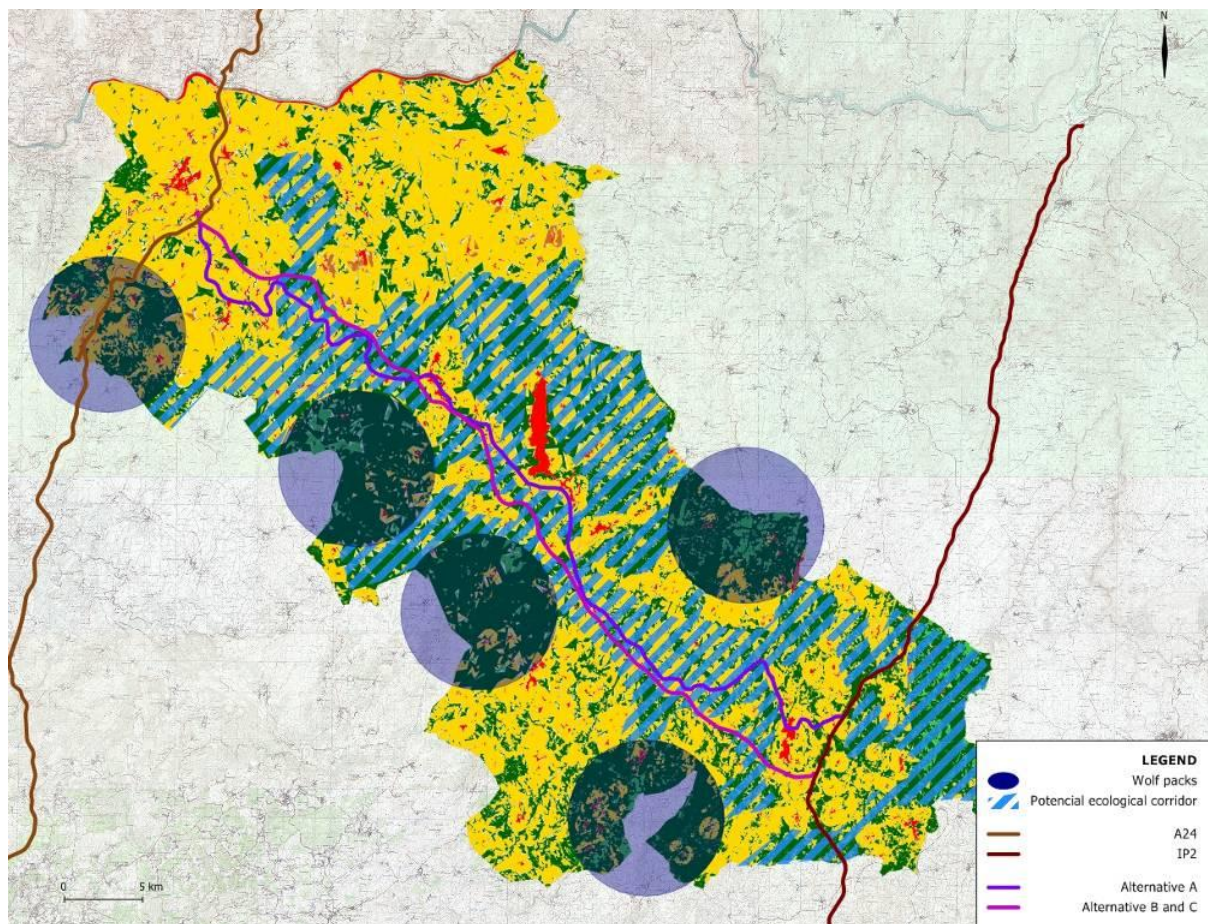
### **Introduction**

During the SEA of Douro Sul Road Network Proposal, it was necessary to assess the effects of this plan on the regional wolf (*Canis lupus signatus*) population, as it is a protected species in Portugal (EN) (Cabral *et al.* 2006), sheltered by a specific law. According to the IUCN, the Iberian population of this canid has a Near Threatened (NT) status (IUCN 2007). In the Habitats Directive (92/43/CEE transposed into national law by Decree-Law 149/99 in the version amended by Decree-Law 49/2005) wolf is a high-priority species for conservation. As this was part of a SEA it was important to adapt the methodological approach to the plan scale and also to guarantee an effective integration of the conclusions in the overall assessment.

### **Method implementation**

The assessment was based on a characterization and diagnosis which was established by bibliographical and GIS data. With the bibliographical information we could get the whole picture about the wolf's situation in the area – distribution of wolf attacks to livestock (Barroso & Pimenta 2008), distribution of the known wolf populations (Pimenta *et al.* 2008) and wolf population conservation reality in south of Douro river region (Alexandre *et al.* 2000). During these first steps of the assessment we have also analysed the recommendations defined for the construction of fauna road passages to mitigate fragmentation (Ministério de Medio Ambiente 2006) and some guidelines to establish ecological corridors to preserve fragmented wolf populations (Grilo *et al.* 2002). With this information we performed a GIS analysis considering, among other things, the known territories, areas of favourable habitat and stressors to determine the effects of the planned alternatives on wolf populations. In order to do so, we used the localization of wolfpacks and sites of irregular presence of this canid, location of wind farms and main roads, map of forest fire risk and the land use map. Each attribute was assigned with a value according to its degree of risk to wolf, being less valued those with higher risks / threats to this canid. For main roads, densely populated areas (cities, towns and villages) and wind turbines we considered a buffer of 100m, 500m and 1000m, respectively, where the inner buffer was considered unsuitable for the wolf. For each element

raster files were created with a pixel of 10x10m based on the value of each attribute. To obtain the risk map to wolf in the study area we executed the sum of all raster created, where each pixel assumed a value resulting from the operation executed. Concerning the range of pixel values, we define 5 risk classes to the wolf in the study area: Very High, High, Moderated, Low and Very Low. The establishment of potential corridors for the species in the study area took into account the continuity of areas identified as having Low or Very Low risk in the final map obtained (Figure 1).



**Figure 1** – Wolf potential ecological corridors in the study area.

After this first assessment, the effects of each road plan alternative were determined by estimating the degree of interference on the potential wolf ecological corridors. So, each alternative was analyzed in terms of wolf habitat fragmentation (considering the potential corridors as areas with favorable habitat), increased disturbance and effect of exclusion in sensible areas for the wolf, and risk of trampling (considering higher risks in the potential ecological corridors). Subsequently, the effects on the conservation objectives established by the Natura 2000 Network to the wolf were also assessed, as required in the Habitat Directive

(92/43/CEE transposed into national law by Decree-Law 232/2007). Having all these elements analyzed we were able to suggest detailed mitigation measures and recommendations for each alternative considering the different phases of the project.

## Conclusion

This process supported the team's decision on determining which was the best alternative for the road network and also gave important contribution to the next phases (EIA, post-EIA, construction and operation). This assessment offers a good baseline to the development of the road impact assessment on the south river Douro wolf population and ensures its conservation objectives.

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