

Landscape-Scale Impacts of Isfahan's West Freeway on Ghamishloo Wildlife Refuge, Iran

Toktam MAKKY, Sima FAKHERAN, Hossein MORADI, Majid IRAVANI
Department of Natural Resources, Isfahan University of Technology, Isfahan, 84156-83111,
Iran
E-mail: fakheran@cc.iut.ac.ir

The fragmentation of habitat and the creation of barriers caused by transportation infrastructure reduces landscape connectivity and is suspected of being one of the most important factors causing wildlife population declines (Forman et al. 2002). Road networks affect wildlife habitats in two different ways. Firstly, road construction leads to direct habitat loss. Secondly, maintenance and use of road have various effects on and alter habitat quality, such as increasing access to hunters, poachers and tourists. Roads are thought to affect the persistence of many species by restricting movement between habitat patches. Long-term protection of many natural habitats is threatened due to isolation and segregation, even in protected areas. This study focuses on the impacts of Isfahan's west freeway on Ghamishloo wildlife refuge, I.U.C.N category IV: Habitat/ Species Management Area, through which it passes, in Isfahan Province, Iran. The main goal of this research is to predict the effect of the freeway on the population persistence of *Gazella subgutturosa* and *Ovis orientalis isphahanica* in Ghamishloo wildlife refuge. To quantify landscape patterns, various metrics such as NumP, ED, LPI, AWMPFD and Pland were calculated to examine how landscape patterns (including Number of Patches, Edge Density, Largest Patch Index, Fractal Dimension) influence wild sheep and gazelle populations. In addition, the model of road avoidance behaviour (Road Impact Model) presented by Jaeger et.al. 2005 was used. Model parameters include: road characteristics, road avoidance behaviour of species and sensitivity of the populations to the road's four impacts (habitat loss, road kill, creating barriers to animal movement and population subdivision). The results indicate a significantly negative impact of the freeway on wild sheep and gazelle populations in Ghamishloo wildlife refuge, in particular due to the absence of wildlife crossing structures such as underpasses and overpasses. The results of this presents a concern for the conservation of these vulnerable species.

References

- Eigenbrod F, Hecnar SJ, Fahrig L, 2008. Accessible habitat: an improved measure of the effects of habitat loss and roads on wildlife populations. *Landscape Ecology* 23:159–168.
- Forman RTT, Sperling D, Bissonette JA, Clevenger AP, Cutshall CD, Dale VH, Fahrig L, France R, Goldman CR, Heanue K, Jones JA, Swanson FJ, Turrentine T, Winter TC, 2002b. *Road Ecology, Science and Solutions*. (Island Press: Washington)
- Jaeger JAG, Bowman J, Brennan J, Fahrig L, et.al. 2005. Predicting when animal populations are at risk from roads: an interactive model of road avoidance behaviour. *Ecological Modelling* 185: 329–348.