

## **Mitigation measures to increase the permeability and decrease the mortality of bears on highways in Croatia**

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The construction of wildlife crossings over highways is already well-established in the Croatian road planning processes and relevant legislation. Only in the mountainous part of Croatia a total of 367 km of new highways was constructed in the period 1999 – 2008. One green bridge was constructed on the Zagreb – Rijeka highway (Dedin, 100 m) and 10 other green bridges on the Zagreb – Dubrovnik highway (120-200 m each). In addition, one big tunnel (Plasina) and 5 viaducts were constructed to mitigate the highway permeability. In total, 25.2% of the Zagreb – Rijeka highway, 13.1% Zagreb – Dubrovnik highway do have structures that allow animal crossings (tunnels, viaducts, bridges and green bridges). We studied the impact of the Rijeka – Zagreb highway through Gorski kotar on large and medium sized mammal movements, and estimated the highway permeability for those animals. The conclusions were that large mammals of Gorski kotar preferred to use wide overpasses (100 m and wider) instead of narrow (10 to 50 m) underpasses. We documented that all large mammals used green bridges on regular basis, but the frequency and patterns of crossings vary during day, as well as between large mammal species and groups. There was strong negative correlation between human passage and passage of large carnivores as well as between passage of large carnivores and ungulate passage, and positive correlation between human and ungulates passage. Therefore, in order to increase usage of green bridges by large carnivores, human influence at green bridges should be eliminated or at least minimized by the enforcement of existing legislation.

In the current LIFE DINALP BEAR project the 30km of the most critical section of highway in bear range through Gorski kotar was, in addition to the present wire mesh, protected by electric fence, in order to prevent the bears and other wildlife to roam on the highway corridor and cause accidents with vehicles. In the first year of the electric fence use there were no bear incidents on the respective section.