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Assessment of the impact of natural and anthropogenic predators on ungulates in the Iron Gates Natural Park (Romania)

Tihamér FÜLÖP[1,2], Szilárd SUGÁR[1,2], Csaba KISS[4], Gábor BÓNÉ[2,3]

[1]Termeszet Barat Kert S.R.L, str. Principală nr. 74, 447118 Corod, România, e-mail: tihamer.fulop1@gmail.com.
[2]Asociația „Grupul Milvus", str. Crinului nr. 22, 540343 Târgu Mureș, România, e-mails: sugar.szilard@milvus.ro; gabor.bone@milvus.ro.
[3]University of Debrecen, Juhász-Nagy Pál Doctoral School, Egyetem sqr. 1, 4032 Debrecen, Hungary, e-mail: kiss.csaba@uni-eszterhazy.hu
[4]Department of Zoology, Institute of Biology, Eszterházy Károly Catholic University, Eszterházy sqr. 1, 3300 Eger, Hungary

Key words: ungulates, predators, dog, anthropogenic, disturbance, Parcul Natural Porțile de Fier.

The increase in the human population and the proportional decrease in natural habitats lead to the growth of interactions between wild species and humans. Our study took place in the Iron Gates Natural Park (Parcul Natural Porțile de Fier) in the Southern Carpathians, Romania, where the impact of human presence and stray dogs on the wildlife was studied. Between September 2020 and May 2023, we monitored feeding sites set up by hunting associations and nearby game trails using camera traps. Analyzing the data from the camera traps, we calculated the non-parametric activity overlap coefficient (Δ4) to estimate avoidance between natural predators, humans, stray dogs, and ungulate species. Additionally, we used a Two-species occupancy model to calculate occupancy interaction, occupancy interaction and detection, and Species Interaction Factor (SIF) values.

Our results showed that the daily activity patterns of ungulates, (*Cervus elaphus* and *Capreolus capreolus*) can overlap more with natural predators (*Canis lupus* and *Canis aureus*) than with anthropogenic predators (dogs) and humans, indicating that ungulates tend to move with natural predators away from non-natural predators. Based on our analyses, we found that the presence of natural predators has a moderate positive effect on the occurrence of ungulate species, with a higher probability of detection together, especially for red deer and wolf. On the other hand, the presence of humans and stray dogs negatively affects the occurrence of ungulate species and reduces detectability. Our results suggest that disturbance by humans and domestic stray dogs is more significant for ungulate species than disturbance by natural predators. In addition, it was found that disturbance caused by dogs is more important than human disturbance for red deer, while no significant difference in disturbance caused by dogs and humans was found for roe deer.