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The presence of wolves in the Terra delle Gravine Regional Natural Park

Gaudio L.¹, Pinto R.¹, Cascella A.¹, Pucciarelli L.¹, L'Erario P.¹, Chiatante G.²

¹ Systema Naturae Via G. Salvemini 19, 70056 Molfetta (BA), Italy

² Department of Ecological and Biological Sciences, University of Tuscia Largo dell'Università s/n, 01100 Viterbo (VT), Italy

This work fits into the context of the wolves' expansion in southern Italy, contributing to the understanding of ecology and management of this new phase of colonization. The data were obtained from two different project activities. The first, from 2016 to 2018, falls within the scope of the project 'UPPark! Network strategies for the Terra delle Gravine Park'. The second, conducted from 2019 to 2020, as part of project "Action 8 - Actions for the conservation of the Apennine wolf *Canis lupus*", as part of a broader project axis "Actions for the conservation of flora and fauna of conservation interest in the SAC/SPA Area delle Gravine - IT9130007". For both projects, the objectives we set focused on obtaining informations about the presence and the spatial arrangement of breeding packs of wolves in the Terra delle Gravine Regional Natural Park (about 25.000 ha, included within the SAC/SPA Area delle Gravine and SAC Murgia di Sud-Est IT9130005). Such information would be of particular conservation and management relevance due to a series of peculiarities of the territory under investigation. In the first instance, the protected area extends over a series of canyons characterized by steep rocky walls, rich biodiversity and of significant ecological relevance, surrounded by an agricultural agroecosystem. Furthermore, this territory boasts an ancient pastoral tradition with the breeding of indigenous breeds of conservation significance. In order to achieve the objectives, the applied methods were camera trapping (from 2016 to 2021) and wolf howling (2019-2020). Camera trapping was conducted using an opportunistic method, uniformly investigating the areas of greatest relevance within the park territory. The average number of sites investigated was 14.6 (min2019=5; max2016=20). The sampling period coincided with the reproductive season and the territorial phase of the species (March-September). From the analysis of camera trapping data, a relative abundance index (trap rate) and the presence of reproductive nuclei were obtained. Wolf howling was conducted during the summer period, from July to September. The survey stations were set based on a study of suitability related to the possibility of the presence of rendezvous sites. The number of stations investigated in the two years of the study was 55 (272019 and 282020). The results from the camera trapping activity show a widespread and ubiquitous presence within the territory of the Park; the trap rate values seem to vary over the years of the investigation (K-W H-test $p < 0.05$), with a prevalence in the central (Sant'Antuono Wood and Mount Sant'Elia) and western (Laterza Canyon and Ginosa Canyon) sectors. In these two areas, through the study period, and in accordance with the data obtained from wolf howling, we have always contacted at least two reproductive packs.

In order to understanding the ecological preferences and spatial dynamics of wolf populations, we recorded land use data for each rendezvous location, categorizing them into various land use classes based on the Corine Land Cover categorization and the official Land Use data of the Environmental Department of Regione Puglia. We organized the database to be readable in R, assigning numeric codes to different land use classes, and the statistical analyses were performed using the R 'stats' package. We performed t-test analyses to assess whether there were differences in land use between positive and negative rendezvous sites. Finding no significant disparities (p values > 0.05), we subsequently conducted PCA to delve deeper into the various land use classes characterizing the rendezvous, with the aim of identifying the most relevant ones. The first three PCA dimensions described 38.73% of the variation, revealing distinct ecological patterns influencing wolf rendezvous site, highlighting natural habitats being negative correlated to human settlements. Moreover, the results showed positive correlation among grasslands, coniferous forests, and agricultural areas, underscoring the importance of natural habitats for wolf ecology and the coexistence with human environmental features, even though further studies are needed to explore social and behavioral factors influencing rendezvous site selection. Our study provides valuable insights into the ecological drivers shaping wolf habitat utilization, offering a guide to conservation efforts and management strategies for this peculiar territory, promoting coexistence between wolves and human communities.