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The award will be assigned yearly, in the second semester of the year following that of reference (i.e., Best Paper Award for 2013 will be assigned in the second semester of 2014). The Editorial Committee is responsible to assign the award. A written motivation will be made public on the journal website.



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Roberta Chirichella and Damiano G. Preatoni

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Riassunti: Comunicazioni e Poster

Ogni eventuale errore relativo a contenuti, stile e lingua presente nei riassunti va attribuito esclusivamente agli Autori, che se ne assumono ogni responsabilità.

I'm in charge here! Effect of the golden jackal presence on the behaviour of other smaller-sized competitors in a neo-colonization area of north-eastern Italy

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According to the mesopredator suppression theory the biggest carnivore living in the territory behaves as the apex predator through killing small-sized competitors to reduce competition and, occasionally, to feed on them. The interspecific competition among sympatric carnivores is one of the main causes which may lead smaller competitors to modify their activity rhythms to reduce the likelihood of encounters with larger predators. In Friuli Venezia Giulia (hereafter, FVG) the medium-sized carnivore population includes the golden jackal (*Canis aureus*), the red fox (*Vulpes vulpes*) and the wildcat (*Felis silvestris*). The golden jackal is mainly distributed in the karstic areas of Gorizia, Trieste, and the Julian and Carnic Pre-Alps. However, in recent times, the species has started to colonize even the regional lowland areas where it shares its habitat with both foxes and wildcats. Because these species present a similar trophic niche (at least for what concerns the carnivorous component) the competition for resources is very likely, especially during the wintering period when the diet of both jackals and foxes is mostly composed of animal component. Using data obtained from camera-trapping the main purpose of the present research was to assess the activity pattern and temporal overlap among golden jackals, red foxes and wildcats to explore how the presence of jackals may alter the behaviour of the other medium-sized competitors. We would expect to observe that both foxes and wildcats may adjust their activity pattern to reduce the odds of encounters with jackals as the latter, being bigger in size, could behave as the apex predator in the area thus exerting direct negative effects.

Overall, 12 camera traps were placed along trails and in two different areas: six in the Carnic Pre-Alps and six in the riparian lowland area. Before placing the cameras, both study areas were divided into squares of 3.3×3.3 km and in each square one or two cameras were placed, depending on site accessibility. For what concerns the Carnic Pre-Alps, the first camera was placed from 29/09/2021 to 23/03/2022; while in the riparian lowland area the first camera was placed from 22/09/2021 to 12/04/2022. Cameras were activated 24 h per day, set to record both photos and videos and checked every 15 days to download data and change batteries (if needed). The significance in terms of activity pattern among species was assessed through the Hermans-Rasson's test. The degree of activity overlap between species was evaluated considering the coefficients of overlap $\Delta 4$ and/or $\Delta 1$, in the case of a small number of detections (<50). $\Delta < 0.50$ indicates low temporal overlap, $0.50 < \Delta < 0.75$ indicates moderate temporal overlap, while $\Delta > 0.75$ indicates high temporal overlap. Statistical analyses were run using the R Software (v. 4.1) and setting the level of significance at 0.05.

In the Carnic Pre-Alps, during a sampling effort of 1050 trap-days, we recorded 71 positive detections for the red fox and 23 for the wildcat. No positive detections for the golden jackal were obtained. As for the riparian lowland area, during a sampling effort of 1212 trap-days, we recorded 335 positive detections for the red fox, 172 for the wildcat and 52 for the golden jackal. Our findings revealed that in the Carnic Pre-Alps the wildcat was significantly more active during the sunset (around 18:00) ($T=19.87$, $p < 0.001$), while the red fox showed no significant peaks of activity ($T=6.62$, $p=0.06$). In the riparian lowland area, all three species showed significant peaks of activity. Specifically, it turned out that the wildcat was mostly active during the night (around 24:00) ($T=54.73$, $p < 0.001$), the red fox showed a bimodal activity pattern being most active during the night (from 23:00 to 06:00) and late in the morning (around 10:00) ($T=36.45$, $p < 0.001$), while the golden jackal was mostly active late in the morning (around 10:00) ($T=39.22$, $p < 0.001$). In the Carnic Pre-Alps, low temporal overlap ($\Delta 1=0.44$) was observed comparing both wildcat and red fox patterns of activity. Conversely, in the riparian lowland area, high levels of temporal overlap ($\Delta 4=0.82$) were observed between these species. Lastly, in the riparian lowland area, both the wildcat and red fox showed a moderate temporal overlap with the golden jackal, i.e., wildcat vs golden jackal ($\Delta 4=0.54$) and red fox vs golden jackal ($\Delta 4=0.59$).

The low level of temporal overlap between wildcat and red fox observed in the Carnic Pre-Alps suggests temporal avoidance between species, most likely to reduce the degree of resource competition. This result is even more interesting if we consider the high level of temporal overlap between these species observed in the riparian lowland area, where the golden jackal was detected. Here, both the wildcat and the red fox showed moderate temporal overlap with the golden jackal. Therefore, we speculate that wildcats and red foxes modulate their temporal behaviour (hence resulting in overlapping between them) most likely to reduce the odds of direct encounters with golden jackals. These results are consistent with studies realized in FVG and Romania, respectively, in which it was shown that the presence of the golden jackal may lead to increasing allostatic load in wildcats, as well as reducing the body weights of juvenile red foxes. To conclude our research revealed that the presence of the golden jackal may represent a disturbing factor for both wildcats and foxes forcing them to modulate their activity pattern to reduce the risk of direct encounters. Nevertheless, further research also taking into consideration the diet analyses of these species are needed to provide detailed insights.