

# Available vs used prey - Combined methods reveal breeding diet of the European roller (*Coracias garrulus*) in Serbia

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## Introduction

Farmland bird, European roller (*Coracias garrulus*) has suffered a steep global decline at the end of the 20<sup>th</sup> century, caused by changes in agricultural practice. Population recovery of the threatened species was achieved in some countries, including Serbia during the last few decades by installation of nest-boxes as a substitute for lost natural nesting places. Lack of available food acts as the second limiting factor for the roller. Therefore, diet study was essential to understand roller needs in order to achieve conservation measures which would provide returns to breeding sites in the future. This study aimed to perform a diet composition analysis and determine whether available prey within the breeding territory actually refers to used prey found in nest-boxes.



## Methods

Field work was carried out within the roller breeding territories in the Central Banat region (Serbia). Prey availability and preference were determined by sampling available (pitfall traps and sweep net catches) and used prey (food remains from nest-boxes) during five breeding seasons. Research was conducted at the beginning of July during the high brood feeding rates.

One-way PERMANOVA was applied to distinguish whether there were differences in the composition of the available prey between the applied methods, while non-metric multidimensional scaling (NMDS) analysis was used to ordinate samples acquired using pitfall traps and sweep catches. Ivlev index ( $E$ ) was used to assess compatibility of used vs available prey.

## Results and discussion

Fully separated ellipses within the ordination plot (Fig) and results of PERMANOVA confirmed significant difference ( $p = 0.001$ ) in the proportions of available prey between the two applied methods. Pitfall trapping resulted in low proportion of orthopteran specimens but sweep net catches have complemented that lack.

- Ivlev's index values indicated that available prey matched the used prey in the case of Coleoptera ( $E = 0.41$ ) and vertebrates ( $E = 0.22$ )
- Orthopterans and the rest invertebrates showed avoidance ( $E = -0.23$  and  $-0.49$ , respectively), probably due to the methods used.

Orthopterans are consumable to a higher degree, so over-estimation of coleopterans due to higher amounts of chitinous remains found in nest-boxes doesn't surprise. Apiaries were found near the research plots, causing higher proportions of hymenopterans within available invertebrate prey. Contrary to this, we only found one bee specimen in the nest-box.

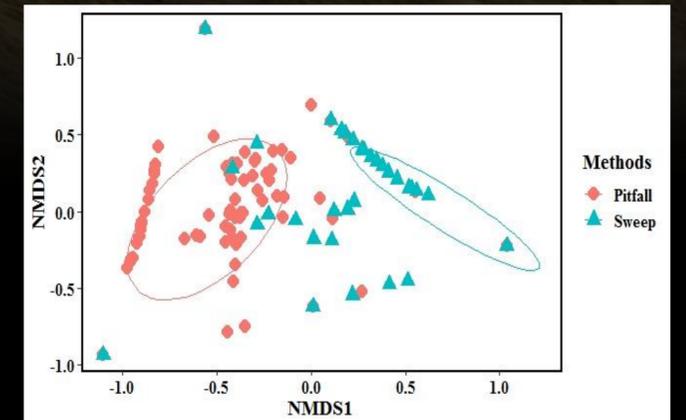


Fig NMDS graph showing differences in sampling methodologies for the available prey

Variety of prey groups have taken part in the diet composition. Most of them were arthropods, while 5% of vertebrates were detected (amphibians, reptiles and small mammals).

## Conclusion

Wide range of prey comprising its diet is the proof that roller is an opportunistic predator. That characteristic is enabling the successful breeding within poor, overgrazed, and dry pastures of Central Banat.

