Habitat preferences of Caucasian rock agama *Paralaudakia caucasia* (Sauria: Agamidae) in urban and natural habitats in northeastern Iran

Seyyed Saeed HOSSEINIAN YOUSEFKHANI1*, Mansour ALIABADIAN2,3 and Marco A. L. ZUFFI4

1 Young Researchers and Elite Club, Islamic Azad University, Shirvan branch, Shirvan, Iran
2 Department of Biology, Faculty of Science, Ferdowsi University of Mashhad, Mashhad, Iran
3 Research Department of Zoological Innovations (RDZI), Institute of Applied Zoology, Faculty of Sciences, Ferdowsi University of Mashhad, Mashhad, Iran
4 Museum Natural History, University of Pisa, via Roma 79-I-56011 Calci (Pisa), Italy
* e-mail: mesalina.watsonana@gmail.com (corresponding author)

**ABSTRACT**

In this study, we chose 61 plots along three randomly placed transects in urban and natural areas to examine *Paralaudakia caucasia* habitat preferences. Ten habitat characteristics found to affect the lizard occurrence were recorded in both habitat types. Based on ANOVA, distance to farmland, height of vegetation cover, percentage of cover of human structures, and slope orientation are significantly different between presence and absence plots. Using Principal Component Analysis, we found that the distance to farmland was the main factor predicted species presence in natural habitats. In urban habitats, the percentage of human structures was more important than other factors in predicting *P. caucasia* presence. The species is more abundant in regions with a low percentage of human-made structures. Other informative factors for species presence were distance from farmland and distance between refuges for urban and natural populations, respectively. Urban populations of *P. caucasia* appear to prefer areas outside of the city center, far from human structures, whereas natural populations appear to prefer areas away from villages where they may find higher densities of safe refuges. Isolated rocks in both urban and natural areas have an important role in predicting species presence acting because they act as refuges.

**INTRODUCTION**

The distribution of animals is affected by biotic and abiotic factors (Rosenzweig 1991) and habitat selection is one factor that affects species distribution (Loos et al. 2011, Ljubisavljević et al. 2017). The influence of human modified habitats on urban commensals has rarely been measured, but can have important influences on species on their survivorship, feeding ecology and on fitness. Many lizard species living associated to human settlements and activities have rapidly changed behaviour and ecology (Huey and Pianka 1981, Jones 2001, Kearney 2002) to the new ecological frame (e.g. dry walls, roads, houses and buildings). Human effects produce two different patterns of species presence. Firstly, habitat destruction as results of agriculture increase can diminish the probability of lizard species presence. Secondly, in urban areas human structures such as buildings and gardens can have positive effects on species presence, increasing shelters availability and offering alternative ecological niches to resident lizards. It is likely they have selected all the features of human modified habitats that correspond to those characteristics found in a natural