

Alien parakeets as a potential threat to the common noctule *Nyctalus noctula*

Silvia Giuntini^{1*}, Leonardo Ancillotto², Mattia Falaschi³, Andrea Viviano², Elisabetta Palagi⁴, Emiliano Mori²

¹Università degli Studi dell'Insubria, Environmental Analysis and Management Unit, Guido Tosi Research Group, Department of Theoretical and Applied Sciences, Varese, Italy

²Consiglio Nazionale delle Ricerche, Istituto di Ricerca sugli Ecosistemi Terrestri, Sesto Fiorentino (FI), Italy

³Università degli Studi di Milano, Department of Environmental Science and Policy, Milan, Italy

⁴Università di Pisa, Unit of Ethology, Department of Biology, Pisa, Italy

*email of corresponding author: silvia.giuntini11@gmail.com

The ring-necked parakeet *Psittacula krameri* (Aves: Psittaciformes) is a widely distributed species of Asian and African origin, which occurs with over 40 alien populations in the rest of the world. Most established populations of this species are showing a clear trend of territorial expansion and numerical growth. Recent reviews highlighted that one of the main impacts by alien ring-necked parakeets is the competition with threatened bat species using trunk cavities as roosts. In Italy, the only known reproductive population of *Nyctalus* bats (Mammalia: Chiroptera) occurs in an urban area in the central part of the country, surrounded by increasing and expanding populations of ring-necked parakeets. In this work, we updated the population status of both ring-necked and Alexandrine parakeets and breeding noctule bats in the region. Then, we ran a species distribution model using Maxent software to analyze the environmental suitability of the region for the ring-necked parakeet and a connectivity model using Circuitscape software to predict the possibility of its expansion in the area occupied by breeding noctule bats. We recorded a high number of individual parakeets and breeding colonies, together with a remarkable noctule population decline, from about 400 to about 120 individuals, in the last 20 years, possibly due to urban green management practices. Although some ring-necked parakeets have already been observed in the study area, there is no evidence of reproduction in the surroundings of the noctule colony. However, our model showed high environmental suitability for the ring-necked parakeet in the area occupied by breeding noctules. As well, the connectivity model showed the potential for a direct flow of individuals from the main urban centers to the area used by noctule bats. The arrival of alien parakeets to the area occupied by the bat breeding colony should be tightly monitored by surveying the suitable areas for this bird, as well as the identified ecological corridors. Early detection of new invasions, together with a sustainable urban green management practice, may prevent the extinction of the southernmost breeding colony of the common noctule.