

RAPTOR EXPOSURE TO SECOND-GENERATION ANTICOAGULANT RODENTICIDES IN CYPRUS

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INTRODUCTION

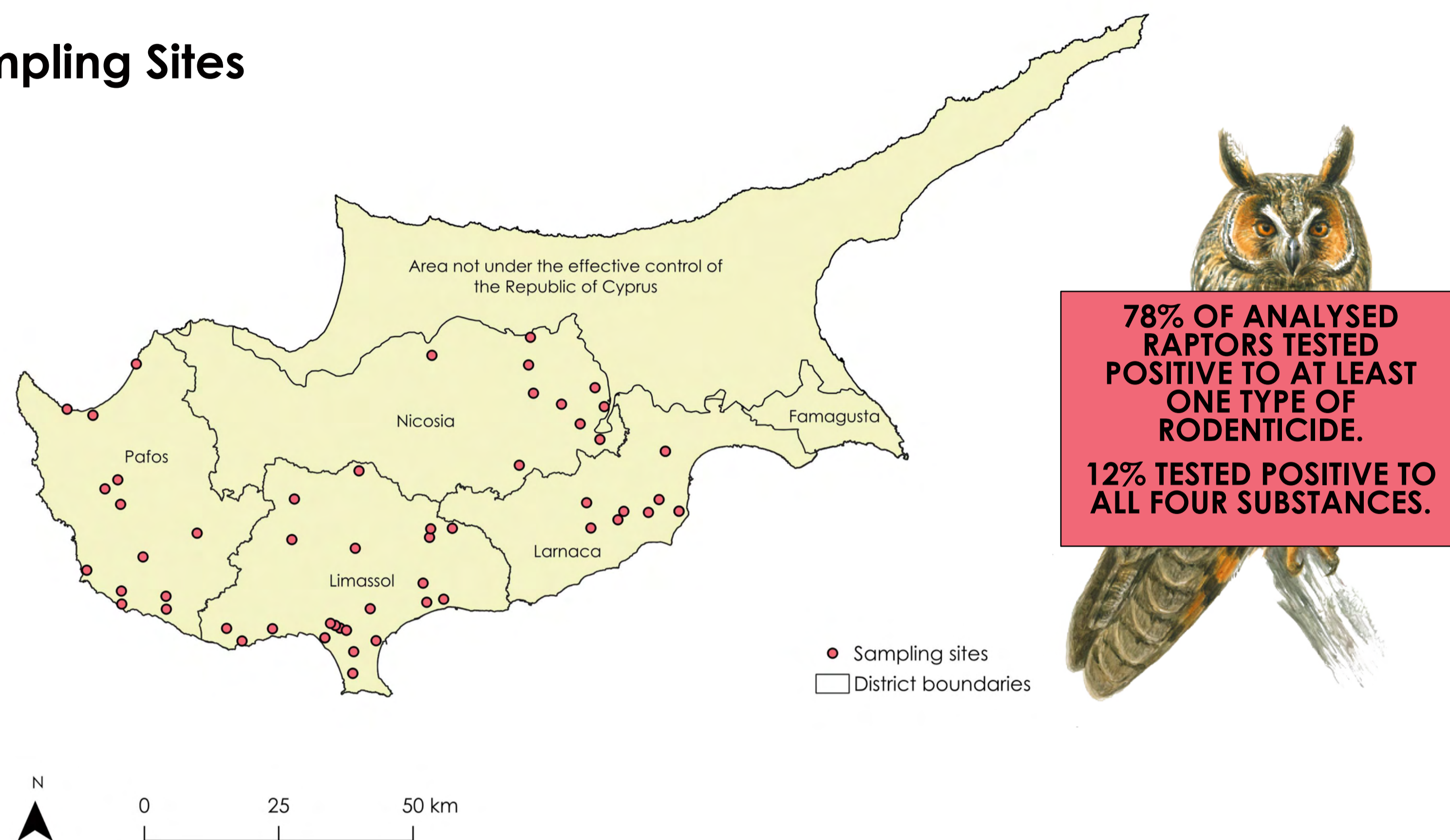
Second-Generation Anticoagulant Rodenticides (SGARs) have been widely applied in Cyprus for rodent control, usually for the protection of crops, agricultural trees, mostly Carob (*Ceratonia siliqua*), but also for public health purposes. SGARs affect various non-target wildlife, including protected raptors, a priority group for conservation. Within the framework of the project "LIFE IP Pandoteira" (LIFE+18 IPE/CY/000006), the Cyprus Game and Fauna Service, the NGO BirdLife Cyprus and the Cyprus State (General) Laboratory have joined forces to understand the extent of this issue in Cyprus.

METHODOLOGY

In order to understand the degree to which raptors are exposed to and affected by SGARs, the Game and Fauna Service, in collaboration with the State (General) Laboratory and BirdLife Cyprus, carried out toxicological examinations of raptor carcasses, mostly Common Barn-owls (*Tyto alba*) and Northern Long-eared Owls (*Asio otus*), mostly from road kills through opportunistic sampling. The main targets were the four commonly used SGARs (Bromadiolone, Brodifacoum, Flocoumafen and Difenacoum). Samples were also tested for Carbofuran and Methomyl, which are banned substances in Europe but are still used in Cyprus. These ongoing efforts are taking place both as part of Game and Fauna Service own initiative (2018-2020), as well as within the framework of the "Pandoteira" LIFE Integrated Project (2021-2023).

RESULTS

Sampling Sites

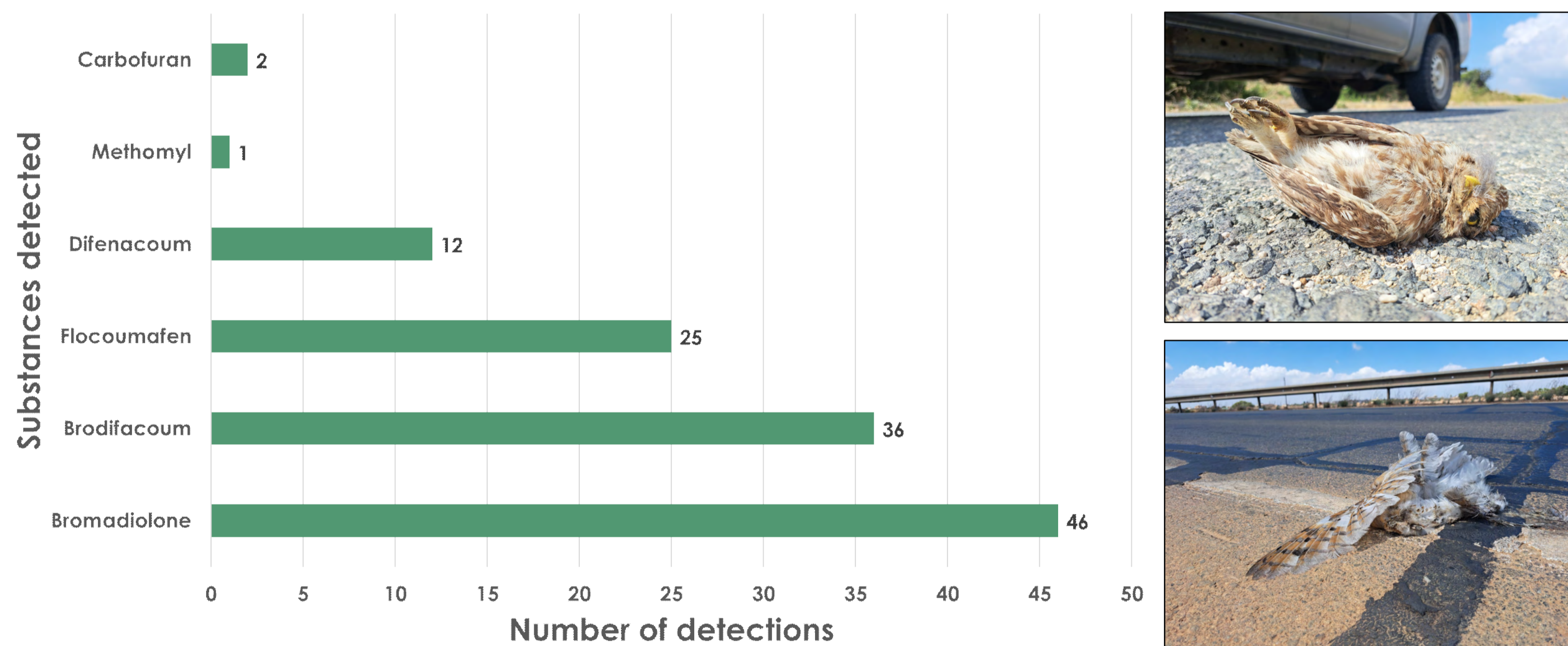


Map 1: Map shows all locations where samples were collected from.

Throughout the period 2018-2023, 72 samples of 11 different species were collected.



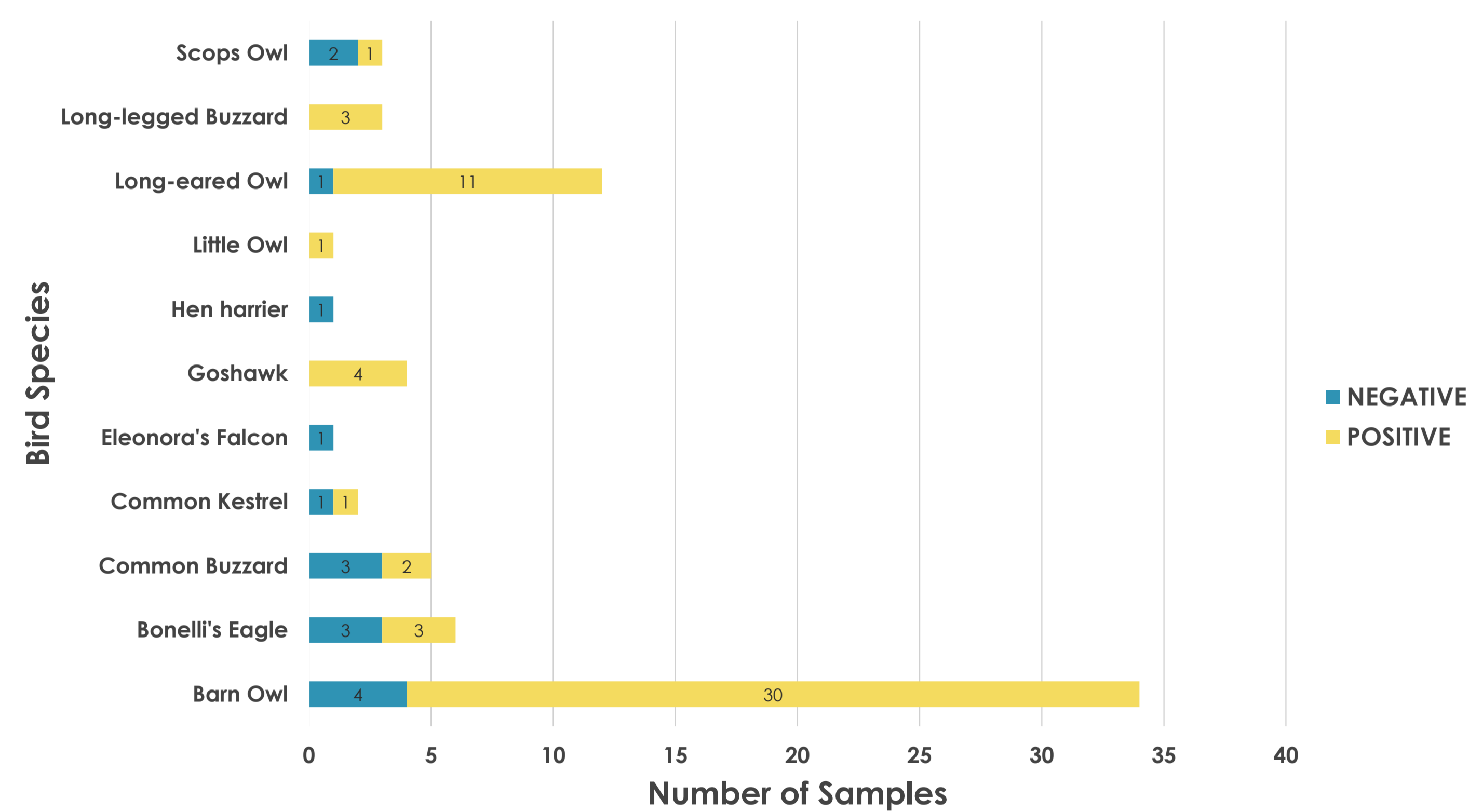
Substances Detected



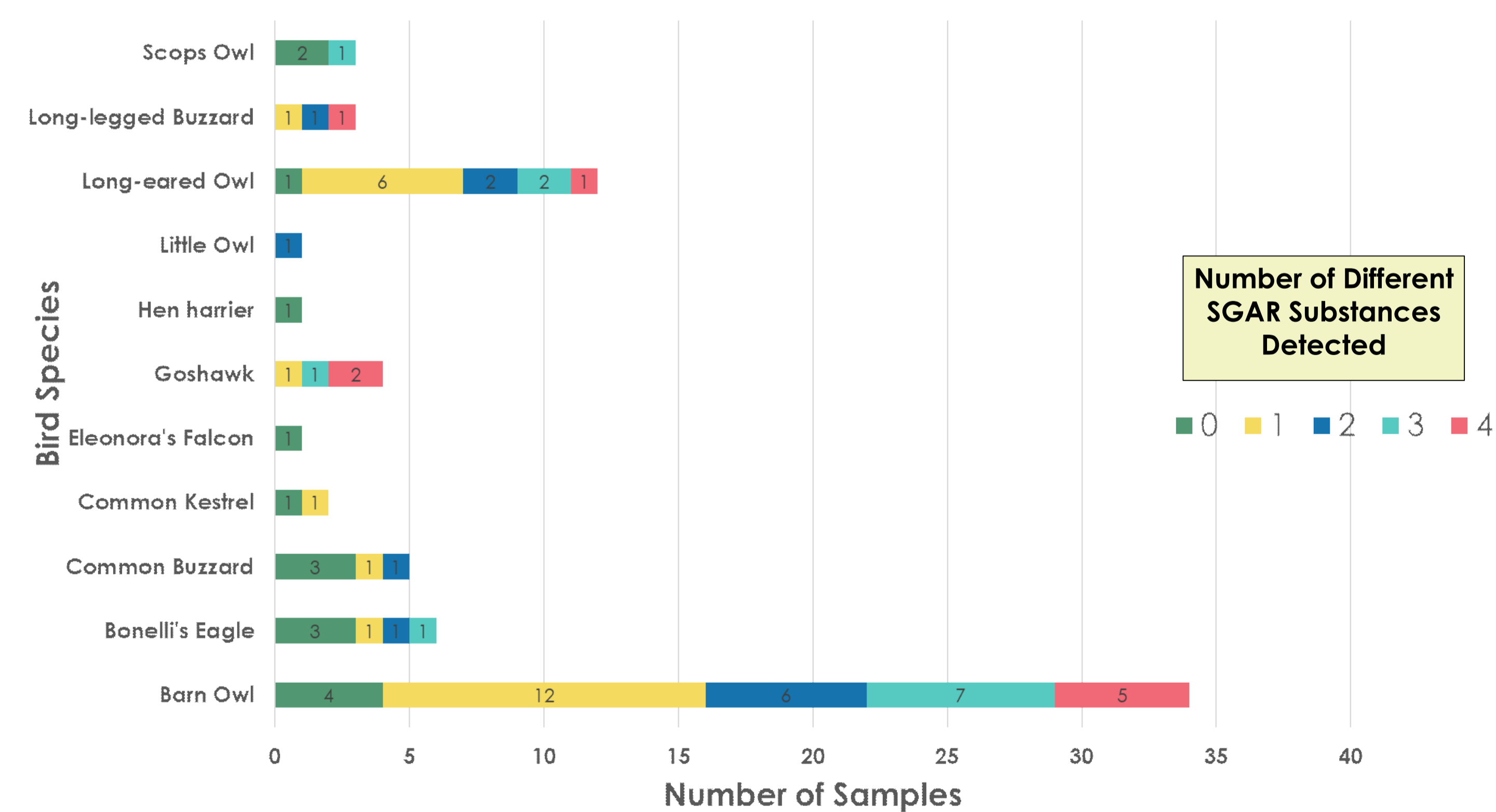
Graph 1: Substances detected within the samples. Note that in some samples, more than one substance was detected. Further analysis is shown in Graph 3.

Worrying Trends

Approximately 78% of analysed raptors tested positive to at least one type of rodenticide, while 12% tested positive to all four substances. High prevalence of rodenticide in Common Barn-owl carcasses reflects the rodent-heavy diet of the species. High levels of SGARs were also detected in Northern Long-eared Owls but also in larger raptors, such as Northern Goshawks (*Accipiter gentilis*), Long-legged Buzzards (*Buteo rufinus*), Bonelli's Eagles (*Aquila fasciata*), and smaller species, such as Cyprus Scops-owl (*Otus cypricus*) and Little Owl (*Athene noctua*), whose diet only partly consists of rodents. Additional necropsies conducted on Bonelli's Eagles and Long-legged Buzzards revealed secondary poisoning from SGARs as the cause of death for two individuals, while SGARs were detected in carcasses of Griffon vultures (*Gyps fulvus*) as well. The results show that rodenticide use in the Cyprus environment is widespread and affects protected species throughout the island.



Graph 2: Bar graph shows the number of positive and negative samples per species.



Graph 3: Bar graph shows the number of different SGAR substances detected in the samples of each species.

Species More Vulnerable to SGAR Poisoning



CYPRUS BASED STUDIES HAVE SHOWN:

63% OF *BUTEO RUFINUS* DIET¹ AND 97% OF *TYTO ALBA* DIET² CONSISTS OF RODENTS.

THIS MAKES THEM PARTICULARLY VULNERABLE TO SECONDARY POISONING.

MANAGEMENT AND CONSERVATION MEASURES

These findings enable identification of which SGARs are most toxic to raptors and provide evidence to support proposals for legal limitations to their use. This action will continue until 2025 with the analysis of new samples. Based on the results, it will be examined which rodenticides are the most toxic to wild birds and suggestions will be made regarding reduction in use, conditions of their application, or even their prohibition.

Project Action Partners:



Co-funded by the European Union:



References / Disclaimers:

Editing: Zoltán Tölgyesi
¹ Kassinis, N.I., Tzirkalli, E., Miltiadou, M., Moysi, M., Charalambidou, I., Roulin, A. and Vogiatzakis, I.N., 2022. Feeding ecology of the long-legged buzzard and diet overlap with sympatric Bonelli's eagle on Cyprus. *Journal of Raptor Research*, 56(3), pp.333-345.
² Moysi, M., Christou, M., Goutner, V., Kassinis, N. and Iezekiel, S., 2018. Spatial and temporal patterns in the diet of barn owl (*Tyto alba*) in Cyprus. *Journal of Biological Research-Thessaloniki*, 25, pp.1-8.
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