



Turkish Journal of Bioscience and Collections

Research Article

 Open Access

The Silent City Hunters: Exploring Shrews through Stray Cats (*Felis catus*) in Urban Ecosystems in Jordan



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Abstract

Objective: This study investigates the predatory behaviours of stray cats (*Felis catus*) in Amman City, Jordan, from April 2021 to August 2024. Stray cats are significant contributors to wildlife mortality and serve as inadvertent tools for biodiversity monitoring. By analysing prey brought by these cats, the research highlights the interactions and distributions of small mammals in urban settings. The research aims to provide insights into the abundance and distribution of shrew species in urban landscapes and explore the potential role of stray cats as contributors to biodiversity monitoring.

Materials and Methods: The study was conducted in Dair Ghbar, a residential area with agricultural patches, using opportunistic documentation of prey items presented by stray cats. Over 41 months, a total of 20 specimens were identified, including Pygmy White-toothed Shrews (*Suncus etruscus*, 16 specimens), smaller white-toothed Shrews (*Crocidura suaveolens*, 4 specimens), and house mice (*Mus musculus*). Fisher's Exact Test assessed differences in predation rates, with $p = 0.081$.

Results: Temporal trends revealed peak predation in 2021 and 2022, with seasonal patterns indicating higher captures in warmer months. Predation rates showed no significant difference between the two shrew species, but *S. etruscus* was predominant, highlighting its adaptability to urban habitats. Seasonal variation is likely to correlate with the reproductive and activity cycles of small mammals.

Conclusion: This study underscores the dual role of stray cats as ecological disruptors and biodiversity monitors. The predominance of shrews, which are sensitive to habitat fragmentation, underscores the ecological value of urban green spaces. Despite urbanisation, these areas serve as crucial refuges for biodiversity. Stray cats provide cost-effective insights into elusive species like shrews but also pose threats to urban biodiversity. Future research should incorporate larger datasets and complementary methods to balance conservation strategies with urban ecological dynamics.

Keywords

Crocidura suaveolens · *Felis catus* · *Suncus etruscus* · Predation · Urban areas



“ Citation: Eid, E. (2025). The Silent City Hunters: Exploring Shrews through Stray Cats (*Felis catus*) in Urban Ecosystems in Jordan. *Turkish Journal of Bioscience and Collections*, 9(1), 1-6. <https://doi.org/10.26650/tjbc.1588328>

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Introduction

Stray cats (*Felis catus*) thrive in diverse environments because of their adaptability, supplemental human feeding, and minimal dependence on free water (Baker *et al.*, 2005; Bradshaw *et al.*, 2013). Their predatory behaviour, however, has raised ecological concerns because they are significant contributors to wildlife mortality, particularly in urban and suburban areas where their densities are unnaturally high (Sims *et al.*, 2008; Turner & Bateson, 2000). Estimates suggest that domestic cats kill millions of small vertebrates annually, including mammals, birds, and reptiles, impacting species already vulnerable due to urbanisation and habitat loss (Loss *et al.*, 2013; Mead, 2000). This impact is not limited to urban areas; for instance, a stray cat in the Dibeen Forest Reserve, Jordan, was observed capturing a Persian squirrel (*Sciurus anomalous*) shortly after its release into the wild (Ehab Eid, personal observation). Notably, studies in Great Britain revealed that cats could account for up to 30% of house sparrow (*Passer domesticus*) mortality in certain areas (Churcher & Lawton, 1987), while similar predation patterns have been observed across Europe, North America, and Oceania (Blancher, 2013; Doherty *et al.*, 2016).

Despite their significant ecological impact, domestic cats can also serve as valuable tools for ecological monitoring. Cats often present prey items as "gifts" to their caregivers, providing insight into local biodiversity, especially for elusive or understudied species (Thomas *et al.*, 2012; Woods *et al.*, 2003). This phenomenon has been explored in various contexts, such as understanding the prey composition of free-ranging cats in urban areas (Baker *et al.*, 2005; Thomas *et al.*, 2014) and assessing their impacts on specific taxa like bats and shrews (Oedin *et al.*, 2021; Vergnes *et al.*, 2013). Bats are essential for maintaining ecosystem balance through their roles in pest control, pollination, and seed dispersal, making them indispensable for sustaining agricultural productivity and natural ecosystems (Kunz & Parsons, 2011). Similarly, shrews play a significant role in forest ecosystems by regulating insect populations and enhancing soil health through their burrowing activities (Nisteanu, 2019). Their presence serves as an indicator of a healthy environment due to their sensitivity to habitat changes and pollution (Nisteanu, 2019). While mitigation measures to reduce predation have faced public resistance, studies emphasise the importance of involving cat owners in conservation strategies to balance

ecological concerns with domestic pet welfare (McDonald *et al.*, 2015).

In this study, we document the predatory behaviours of stray cats in Amman City, Jordan, focusing on shrews brought home as gifts. Shrews, known for their sensitivity to habitat fragmentation and their role in controlling invertebrate populations, are integral to many ecosystems but are often overlooked in urban ecological research (Churchfield, 1990; Vergnes *et al.*, 2013). By analysing the prey brought by stray cats, this research aims to provide insights into the distribution and abundance of shrew species in an urban landscape, highlighting the potential of stray cats as inadvertent contributors to biodiversity studies.

Materials and Methods

Study Area

Dair Ghbar, a well-known residential area in southwestern Amman City, Jordan, includes patches of vacant agricultural lands in the southern sections of its residential zones (Figure 1). Fertile red and yellow Mediterranean soils characterise this area, supporting forest formations and diverse shrubland as part of Jordan's Mediterranean biogeographical zone. The climate features hot, dry summers and mild, wet winters, with annual temperatures ranging from 5°C to 30°C and irregular rainfall varying between 300 and 600 mm (Taifour *et al.*, 2022).

The identification of the Lesser White-toothed Shrew (*Crocidura suaveolens*) and the Pygmy White-toothed Shrew (*Suncus etruscus*) relied on distinct morphological and anatomical traits. *Crocidura suaveolens* was identified by its comparatively larger body size and tail length, comprising 70%–80% of its body length (Amr, 2012; Harrison & Bates, 1991). Additionally, differences in fur colouration provided further differentiation, with *C. suaveolens* displaying a greyish-brown dorsal side and a lighter ventral side, in contrast to the more uniform greyish colouration of *S. etruscus* (Amr, 2012; Harrison & Bates, 1991).

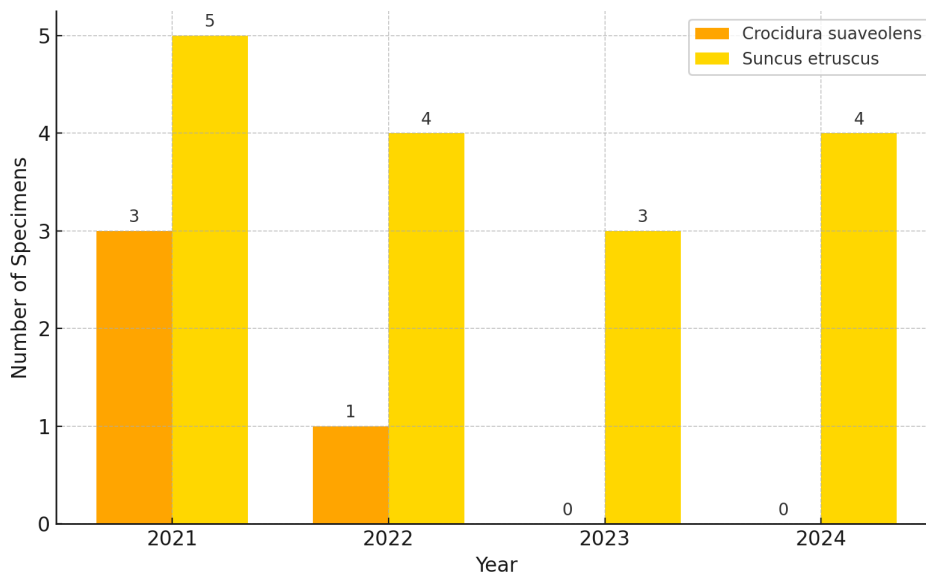
Opportunistic Documentation

This study, conducted over 41 months from April 2021 to August 2024, used an opportunistic method to record wild species brought as prey by stray cats in an urban environment. Each specimen presented by a cat was documented, including the date and species identification. This systematic approach offers a cost-effective and non-invasive way

Figure 1
Study area at Dair Ghbar.



Figure 2
Yearly trends in documented shrew specimens.



to monitor urban wildlife and examine ecological interactions in densely human-populated areas.

Results

Over the study period, 20 specimens were documented as prey brought by stray cats in an urban setting, showing temporal variation in occurrences. Most specimens were recorded during 2021 (8 specimens) and 2022 (5 specimens), with fewer observed in 2023 (3 specimens) and 2024 (4 specimens). In 2021, eight specimens were documented, with peaks in July (2 specimens), while the remaining records were distributed across April, May, June, and August. In 2022, five specimens were recorded, occurring in February, April, June, August, and September. In 2023, three specimens were documented, one each in March, April, and May. In 2024, four specimens were recorded, with occurrences in May, June, and August (Figure 2).

Of the specimens identified, four were Lesser White-toothed Shrews (*C. suaveolens*), recorded as follows: two in July 2021, one in June 2021, and one in February 2022. The remaining 16 specimens were identified as Pygmy White-toothed Shrews (*S. etruscus*) distributed across all study years (Figure 3). Additionally, four specimens of the house mouse (*M. musculus*) were documented.

Fisher's Exact Test was used due to the small sample size and sparse data, providing accurate probability estimates. The test resulted in a p -value of 0.081, indicating no statistically significant difference in the number of specimens recorded for the two species (*C. suaveolens*: 4 specimens; *S. etruscus*: 16 specimens) ($p > 0.05$). The observed variation is likely due to chance rather than a significant ecological or behavioural difference. However, the small sample size limits the statistical power of the analysis, requiring cautious interpretation. Further research with larger datasets is essential to validate these findings.

Figure 3
Photos of the species were collected (right: *Suncus etruscus*, left: *Crocidura suaveolens*).



Discussion

This study emphasises the dual role of stray cats as biodiversity monitors and ecological disruptors, providing insights into species interactions in urban areas like Dair Ghbar in Amman City. The predominance of *S. etruscus* (16 specimens) underscores its abundance and accessibility in urban environments. Although classified as the Least Concern in Jordan (Eid *et al.*, 2020), shrews are sensitive to habitat fragmentation and environmental changes, making their urban presence significant. Differences in predation rates between *S. etruscus* and *C. suaveolens* (4 specimens) may reflect variations in behaviour, habitat use, or population size. Studies in Europe similarly highlight shrews as the common prey of domestic cats in fragmented urban habitats (Krauze-Gryz *et al.*, 2016; Vergnes *et al.*, 2013), suggesting cats utilise these microhabitats as refugia for small mammals.

The temporal patterns observed in this study, with higher predation in 2021 and 2022 and fewer records in 2023 and 2024, may reflect fluctuations in shrew populations or changes in cat hunting behaviours. Seasonal variation in prey captures, with higher numbers recorded during warmer months, is consistent with studies from Poland and the UK, where seasonal changes influence prey availability and activity in temperature and food resources (Baker *et al.*, 2005; Krauze-Gryz *et al.*, 2016). This seasonal trend likely corresponds to the reproductive cycles and activity peaks of small mammals during these periods.

Statistical analysis revealed no significant difference in the predation rates between the two shrew species ($p = 0.081$), indicating that the observed differences are likely incidental rather than indicative of ecological or behavioural distinctions. However, the small sample size limits the robustness of this finding, emphasising the need for larger datasets to validate these patterns and draw more definitive conclusions.

The role of domestic cats in global wildlife mortality is well-documented (Doherty *et al.*, 2016; Loss *et al.*, 2013). Nonetheless, this study highlights their utility in biodiversity monitoring, particularly for elusive species such as shrews that are otherwise challenging to survey. Opportunistic documentation of prey items offers insights into the presence and distribution of these species, aligning with the findings of Thomas *et al.* (2012), who emphasised the value of domestic cats in biodiversity studies, especially in urban environments.

Seasonal variation in prey composition may also reflect fluctuations in shrew availability linked to their reproductive cycles and environmental factors. Urban green spaces play a critical role in supporting such species by serving as ecological corridors that mitigate the effects of habitat fragmentation (Vergnes *et al.*, 2013). Despite extensive urbanisation in Dair Ghbar, the continued presence of shrews underscores their resilience and highlights the importance of conserving and enhancing urban green spaces.

This study highlights the dual role of urban green spaces as vital habitats for small mammals and refuges for biodiversity while underscoring the mounting ecological pressures they face. Stray cats in urban areas, although offering valuable insights into local biodiversity, significantly contribute to their decline, which is already under severe threat from urbanisation. Their growing populations place additional strain on fragile ecosystems. To address this, immediate and practical actions are needed, such as public awareness campaigns to discourage feeding stray cats near sensitive areas, improved waste management to limit their food sources, and expanded research to better understand their ecological impacts. Such efforts can help mitigate the effects of stray cats and promote the preservation of urban biodiversity in Amman.



Peer Review Externally peer-reviewed.

Ethics Approval No specific ethical approval was necessary, and no ethical contraventions occurred in this report.



Conflict of Interest The author has no conflict of interest to declare.

Grant Support The author declared that this study has received no financial support.

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