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ORIGINAL ARTICLE

Rapid assessment of bat diversity in Egypt

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ABSTRACT

Despite some recent efforts to survey bat diversity in Egypt, bat fauna remains relatively underexplored and poorly documented. This study reports on bat diversity across Egypt's main ecological zones — the Nile Valley, Delta, Western Desert, Eastern Desert and Sinai Peninsula — surveyed between 2020 and 2023, with a specific focus on roost sites and reproduction. We surveyed 65 natural and artificial roost sites (caves, ancient structures and buildings). Of the 20 bat species previously documented in Egypt, seven were confirmed across the surveyed sites: *Rousettus aegyptiacus, Rhinopoma microphyllum, Rhinopoma cystops, Asellia tridens, Taphozous perforatus, Taphozous nudiventris,* and *Pipistrellus kuhlii*. A further species, the endemic Plecotus christii, was detected ad hoc. We contextualise these findings within the current knowledge of Egyptian bat conservation, including the protections afforded by Law 4/1994 (amended by Law 9/2009), and the ongoing persecution of bat colonies — particularly following unfounded health fears linked to the COVID-19 pandemic. This study adds new distributional data and proposes priorities for future research and conservation action in the region.

INTRODUCTION

Bats (order Chiroptera) comprise approximately 1,500 species across two suborders, Yinpterochiroptera and Yangochiroptera (Simmons & Cirranello, 2025; Teeling et al., 2002), representing approximately 20% of all mammal species globally (Cox et al., 1992). They deliver critical ecosystem services including agricultural pest suppression, pollination, seed dispersal and guano production (Meena, 2020). Nevertheless, nearly 25% of bat species are threatened with extinction (Mickleburgh et al., 2002; IUCN, 2026). Population declines are driven primarily by habitat loss and fragmentation, alongside misguided persecution and exploitation (IUCN, 2026). Ineffective regulation of pesticides, herbicides and fertilisers in intensive agriculture further compounds these threats, both directly — by impairing reproduction — and indirectly, by depleting insect prey (Oliveira et al., 2021).

Egypt harbours 20 bat species from 16 genera and seven families (*Pteropodidae, Rhinopomatidae, Rhinolophidae, Emballonuridae, Nycteridae, Vespertilionidae* and *Molossidae*; Qumsiyeh, 1985; Benda & Ševčík, 2020). The most comprehensive survey remains Qumsiyeh's (1985) MSc thesis, which is still the primary reference for Egyptian bat fauna. Between 1990 and 2020, scattered publications (Basuony et al., 2010; Benda et al., 2009; Dietz, 2005; Osborn, 1988) added morphological, physiological and ecological data, but population-level research and conservation assessments have remained limited (Benda & Ševčík, 2020; see also Reem El-Gamal et al., 2026). This study therefore aims to provide an up-to-date overview of bat species distribution and conservation status in Egypt through roost surveys at 65 sites across the country between 2020 and 2023.

MATERIALS AND METHODS

Study area

Egypt encompasses distinct ecological-climatic zones supporting both African and Asian biotic communities (El-Hawagry & Gilbert, 2014). The country relies heavily on the fertile Nile Valley and Delta for agricultural production (Elhini et al., 2024). The River Nile flows northward forming a narrow valley before fanning into a broad delta at the Mediterranean Sea; millennia of alluvial deposition have made this corridor the agricultural heartland of the country. The Western Desert extends from the Nile Valley to the Libyan border and is characterised by extreme aridity, sand dunes, rocky plateaus and scattered oases. The Eastern Desert, bounded by the Red Sea to the east, features rugged mountains and mineral-rich landscapes. The Sinai Peninsula is a triangular landmass at the junction of Africa and Asia, delimited by the Mediterranean Sea (north), Gulf of Suez (west) and Red Sea (south), with mountainous terrain in the south and low-lying coastal plains adjacent to the Red Sea. The Red Sea coast and associated oases were included as focal areas within the Eastern Desert and Western Desert survey zones, respectively (Figure 1).

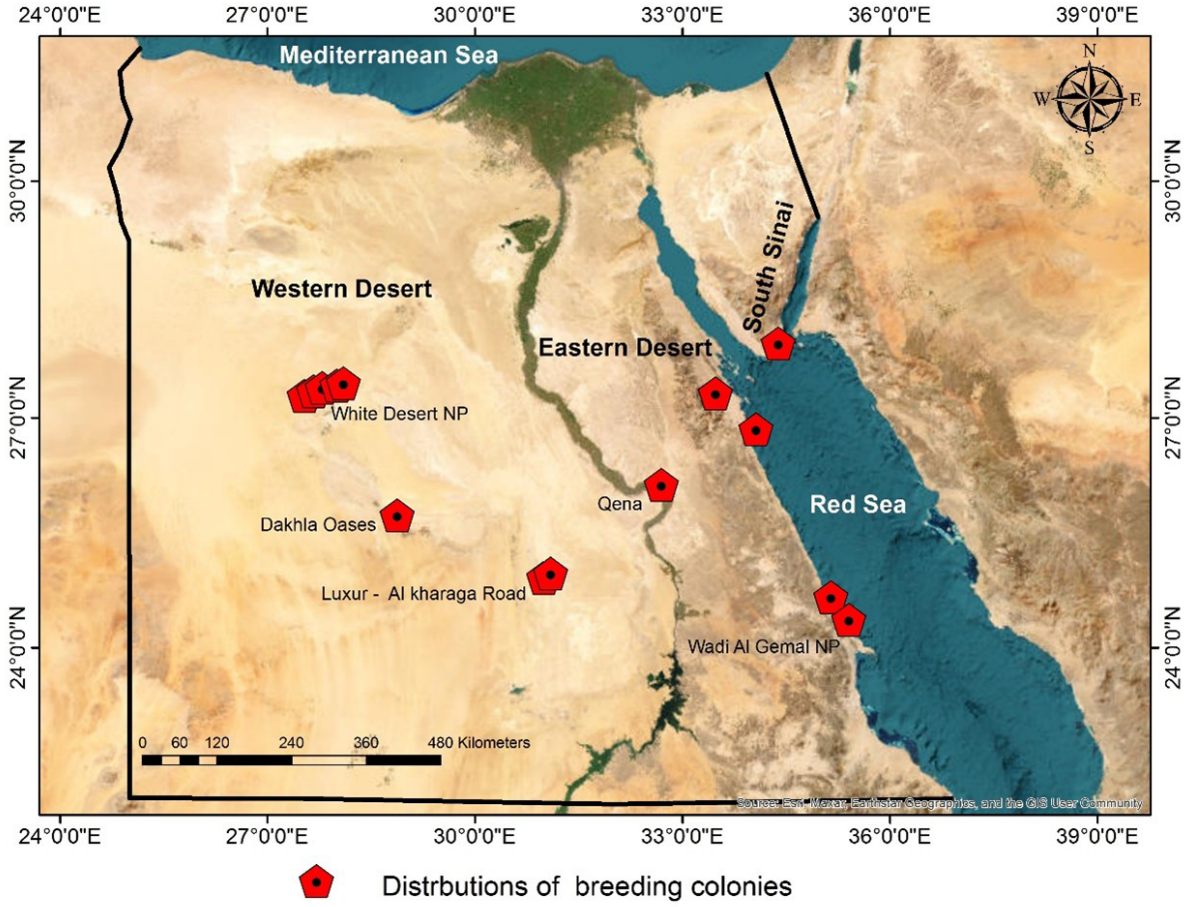


Fig. 1 - Colonies of seven bat species identified during a roost survey of Egypt's bats. Surveys were conducted in the following study regions: the Eastern Desert and Red Sea, the Western Desert and two Oases, the Nile region and Delta, and the Sinai Peninsula.

Bat surveys

We surveyed a total of 65 sites from April 2020 to November 2023, spanning the Nile Valley, Delta, wetlands, oases, Sinai Peninsula, Eastern Desert and Red Sea coast, and the Western Desert and its oases (Figure 1). Prior to each survey we conducted structured interviews with national park officials and local community members with knowledge of local wildlife, following Benda & Ševčík (2020). Bat species were identified using Benda & Ševčík (2020) and Dietz & Kiefer (2016) as primary identification references; photographs were sent to expert colleagues when identification was uncertain.

Roost surveys consisted of pre-dawn counts of bats visible within each roost, conducted between approximately 05:00 and 07:00 h local time, with care taken to avoid disturbing the bats. Each roost was surveyed up to four times across the study period. Counts were supported by Canon 7D cameras and binoculars. Survey effort was not stratified uniformly across years or sites and therefore does not yield population estimates comparable across regions or time; however, the surveys provide novel distributional data on bat species across Egypt. To safeguard conservation efforts, exact roost coordinates are not disclosed; maps display governorates only.

RESULTS AND DISCUSSION

Egyptian bat diversity — survey overview

Of the 20 bat species known from Egypt, seven were confirmed across our 65 survey sites between 2020 and 2023 (Table 1; Figure 1). The eighth species listed in Table 1, Plecotus christii, was not detected at any surveyed site but was detected by the authors ad hoc (see species account below). Maternity colonies (breeding activity) were confirmed for four species: Rousettus aegyptiacus, Rhinopoma cystops, Taphozous perforatus and T. nudiventris. The thirteen species not detected during our surveys likely include range-restricted or cryptic taxa that would require targeted acoustic monitoring and increased spatial coverage to record. Some, such as the endemic Plecotus christii, may be genuinely scarce and should be prioritised in future surveys.

Species accounts

Rousettus aegyptiacus (Geoffroy, 1810) — Egyptian fruit bat. IUCN Status: Least Concern (IUCN, 2026)

Rousettus aegyptiacus is the most widespread and conspicuous bat species in Egypt, commonly roosting in cultivated areas, orchards, and the Nile Valley as far south as Aswan (Qumsiyeh, 1985). The species roosts in caves, buildings

Table 1 - Summary of the eight bat species targeted across 65 roost sites in Egypt (2020–2023). Seven species were confirmed present; Plecotus christii was detected ad hoc in 2023 in a separate site. Max. n = maximum number of individuals recorded in a single roost count. IUCN status: LC = Least Concern; DD = Data Deficient. "—" = species not recorded that year.

Family	Species	IUCN	2020 Max. n	2021 Max. n	2022 Max. n	2023 Max. n	Roost type	Region(s)
Pteropodidae	*Rousettus aegyptiacus*	LC	7,500	11,000	5,000	10,000	Buildings, caves	Nile Valley & Delta
Rhinopomatidae	*Rhinopoma microphyllum*	LC	—	—	2,201	—	Historic buildings, caves	Nile Valley
	Rhinopoma cystops	LC	—	—	9,462	—	Temples, tombs, caves	Nile Valley, Delta
Hipposideridae	*Asellia tridens*	LC	—	—	2,215	—	Temples, caves	Nile Valley, E. Desert
Emballonuridae	*Taphozous perforatus*	LC	202	—	—	—	Pyramids, temples	Nile Valley, E. Desert
	Taphozous nudiventris	LC	—	—	425	—	Temples	Nile Valley
Vespertilionidae	*Pipistrellus kuhlii*	LC	—	—	88	—	Buildings, gardens	Nile Valley, W. Desert
	Plecotus christii	DD	—	—	—	1	Cave	Endemic – Egypt & Libya

Column colour key — survey year: 2020 2021 2022 2023 not surveyed / absent. IUCN: LC = Least Concern, DD = Data Deficient.

Table 2 - Maximum counts of *Rousettus aegyptiacus* per governorate per survey year (2020–2023). Column shading denotes year. Maternity colony = confirmed breeding (pups present). "—" = not recorded.

Governorate	2020 Max. n	2021 Max. n	2022 Max. n	2023 Max. n	Maternity colony confirmed
Cairo	500	500	6,000	1,000	Yes (2022)
Port Said	2	2	—	—	No
Damietta	—	5,000	5,000	10,000	Yes (2022)
Giza	—	—	6,000	—	No
Luxor	—	—	20	—	No

Column colour key — survey year: 2020 2021 2022 2023 not surveyed / absent.

and ancient structures, and is an important pollinator of date palms and mango trees (Reem El-Gamal et al., 2026). In our surveys (Table 2), the largest colony was recorded in Damietta (max. n = 10,000 individuals in 2023), followed by Giza (6,000 in 2022) and Cairo (6,000 in 2022; 1,000 in 2023). Port Said held the smallest colony recorded (n = 2).

Mating behaviour was first observed in February–March and again in July–August, coinciding with peak fruiting seasons for bananas, mangoes, grapes and figs (personal observation, senior author). *R. aegyptiacus* is the only Palaearctic bat known to exhibit seasonal bimodal polyestry (Lucan et al., 2014), and food availability appears to play a key role in stimulating spermatogenesis and mating activity (Racey, 1982; Speakman & Racey, 1985).

Despite their ecological value, Egyptian fruit bats face strong negative perceptions, attributed to guano deposition on monuments (Madkour, 1977), crop damage (Atallah, 1978; Korine et al., 1999) and perceived links to zoonotic diseases (Kinimi et al., 2025). Between 2018 and 2022, approximately ten colonies were eradicated by Egyptian authorities and the public following media-amplified fears about SARS-CoV-2 (Arab News, 2020), despite no scientific evidence that this species acts as a reservoir or amplifying host for the virus (Sayed Saeed et al., 2021; Weinberg et al., 2022). This ongoing persecution presents the most acute immediate threat to *R. aegyptiacus* in Egypt.

Rhinopoma microphyllum (Brünnich, 1782) — Greater mouse-tailed bat. IUCN Status: Least Concern (IUCN, 2026)

Rhinopoma microphyllum was recorded at three sites in the Nile Valley in 2022, all within El Minya governorate: Farag El-Barquoki Mosque (n = 1), the Roman Waterwheel at Tuna El-Gebel (n = 200) and the Gahooty Crypts at Tuna El-Gebel (n = 2,000). This species is uncommon in the Nile Valley and roosts preferentially in historic structures and subterranean sites. Its ecology and population status in Egypt require further targeted investigation. All site-level records are reported in Table 4.

Rhinopoma cystops (Thomas, 1903) — Egyptian mouse-tailed bat. IUCN Status: Least Concern (IUCN, 2026)

Rhinopoma cystops was the most prevalent species in our surveys by number of sites occupied. It was recorded at 16 sites across the Nile Valley and Delta in 2022, roosting exclusively in archaeological sites including temples, pyramids, tombs, mosques and crypts (Table 3). The largest colony was recorded at the Gahooty Crypts, Tuna El-Gebel, El Minya (n = 8,000); the smallest at the Tal El-Amarna Cave (n = 10). Lactating females were confirmed in Luxor in July–August 2022, indicating active breeding. This species forages over farmland and drinks from the River Nile, making it a potentially important agricultural pest-control agent in the Nile Valley.

Asellia tridens (Geoffroy, 1813) — Trident leaf-nosed bat. IUCN Status: Least Concern (IUCN, 2026)

Asellia tridens was recorded at three sites in 2022: Canyon El-Tarafy on the Red Sea coast (n = 15), Khore-F Tomb, Luxor (n = 2,000) and Philae Temple, Aswan (n = 200). In arid environments, this species captures prey in aerial pursuits, targeting primarily moths and beetles (Dietz & Kiefer, 2016). It does not hibernate; instead, it undertakes seasonal movements to track food availability (personal observation, senior author). No maternity colonies were confirmed during our surveys. Site-level records are included in Table 4.

Table 3 - Counts of *Rhinopoma cystops* at all surveyed sites in Egypt, 2022. All data from the 2022 survey season (green column shading). Maternity = maternity colony confirmed (pups present).

Site	Governorate	n (2022)	Roost type	Maternity colony
Khenso Temple	Luxor	12	Tomb	No
Dandara Temple (Jun)	Qena	15	Temple	No
Farag El-Barquoki Mosque	Cairo	20+200	Mosque	Yes (20–25 pups)
Sun Temple	Giza	20	Temple	Yes (4 pups)
Onas Pyramids	Giza	130	Pyramid	No
Medom Temple	Fayoum	25	Temple	No
Mastaba Medom	Fayoum	55	Mastaba	No
Dandara Temple (Aug)	Qena	20	Temple	No
Pashadow Tomb	Luxor	40	Tomb	No
Edfu Temple	Aswan	200	Temple	No
Kom Umbo Temple	Aswan	500	Temple	No
Nobil Tombs No. 35	Aswan	400	Tomb	No
Abu Simbel Temple	Aswan	200	Temple	No
Tal El-Amarna Cave	El Minya	10	Cave	No
Roman Waterwheel, Tuna El-Gebel	El Minya	400	Historic site	No
Gahooty Crypts, Tuna El-Gebel	El Minya	8,000	Crypts	No

Column colour key — 2022 data ( ). Maternity colony confirmed = pups present.

Table 4 - All roost-count records for *Rhinopoma microphyllum, Asellia tridens, Taphozous perforatus, T. nudiventris* and *Pipistrellus kuhlii* from surveys in Egypt, 2020–2023. Column shading of the "n" and "Year" cells corresponds to survey year. Mat. = maternity colony confirmed (✓ = yes; — = no).

Species	Site	Governorate	n	Year	Roost type	Mat.
Rhinopoma microphyllum	Farag El-Barquoki Mosque	Cairo	1	2022	Mosque	—
Rhinopoma microphyllum	Roman Waterwheel, Tuna El-Gebel	El Minya	200	2022	Historic site	—
Rhinopoma microphyllum	Gahooty Crypts, Tuna El-Gebel	El Minya	2,000	2022	Crypts	—
Asellia tridens	Canyon El-Tarafy	Red Sea	15	2022	Canyon	—
Asellia tridens	Khore-F Tomb	Luxor	2,000	2022	Tomb	—
Asellia tridens	Philae Temple	Aswan	200	2022	Temple	—
Taphozous perforatus	Zabara Hotel	Red Sea	2	2020	Building	—
Taphozous perforatus	Onas Pyramids	Giza	200	2020	Pyramid	✓
Taphozous nudiventris	Ramses III Temple, Karnak	Luxor	20–25	2022	Temple	—
Taphozous nudiventris	Abidos Temple	Sohag	400	2022	Temple	✓
Pipistrellus kuhlii	Byrka Akiad Abbassa	Qalyubia	50	2022	Garden	—
Pipistrellus kuhlii	Zamalik Aquarium	Cairo	20	2022	Building	—
Pipistrellus kuhlii	Baharya Oasis (White Desert)	Giza	12	2022	Oasis site	—
Pipistrellus kuhlii	Hendi Hotel, Farafra Oasis	Fayoum	6	2022	Building	—

Column colour key — survey year: 2020 2021 2022 2023 not surveyed / absent. IUCN: LC = Least Concern, DD = Data Deficient. Mat. = maternity colony confirmed.

Taphozous perforatus (Geoffroy, 1818) — Egyptian tomb bat. IUCN Status: Least Concern (IUCN, 2026)

Taphozous perforatus was recorded at two sites in 2020: Zabara Hotel on the Red Sea coast (n = 2) and Onas Pyramids, Giza (n = 200). A maternity colony was confirmed at Giza, with approximately 30 pups of 3–4 weeks of age recorded in August 2020. The species forages at altitude using aerial hawking, often at heights exceeding 50 m (personal observation, senior author). Site-level records are included in Table 4.

Taphozous nudiventris (Cretzschmar, 1830) — Naked-rumped tomb bat. IUCN Status: Least Concern (IUCN, 2026)

Taphozous nudiventris was recorded at two temple sites in 2022: Ramses III Temple at Karnak, Luxor (n = 20–25) and Abidos Temple, Sohag (n = 400). A maternity colony with approximately 100 pups of 4–6 weeks of age was confirmed at Sohag in August 2022. The species forages at heights up to 50 m above open terrain along the Red Sea coast and in agricultural areas (personal observation, senior author). Site-level records are included in Table 4.

Pipistrellus kuhlii (Kuhl, 1817) — Kuhl's pipistrelle. IUCN Status: Least Concern (IUCN, 2026)

Pipistrellus kuhlii was the most widely distributed species in terms of habitat type: it was recorded at buildings, garden sites and oases in Qalyubia (n = 50), Cairo (n = 20), Baharya Oasis (n = 12) and Farafra Oasis (n = 6), all in 2022. The species is highly manoeuvrable, frequently foraging around artificial light sources and along linear flight paths (Dietz & Kiefer, 2016). Additional observations near the Karnak temple in Luxor have been reported in previous years (personal observation, senior author). Site-level records are included in Table 4.

Plecotus christii (Gray, 1838) — Christie's long-eared bat. IUCN Status: Data Deficient (IUCN, 2026)

Plecotus christii was recorded at only once at a single cave roost site during this study. Notably, this species is endemic, known only from Egypt and Libya, and is classified as Data Deficient on the IUCN Red List (IUCN, 2026), reflecting the paucity of information on its distribution and population status. Its absence from our surveys may reflect methodological limitations — passive roost counts without acoustic detectors are unlikely to detect this cryptic, low-abundance species effectively — rather than genuine local extinction. Future surveys incorporating bat detectors should specifically target *P. christii* using habitat features associated with its known ecology.

DISCUSSION

This study provides an updated account of the distribution and conservation status of seven bat species confirmed across 65 roost sites in Egypt, with the addition of a single record for *Plecotus christii*. Breeding colonies were confirmed for four of the detected species, and roost sites were identified at a number of historically significant structures. The thirteen species not detected may have been missed owing to inadequate geographic coverage, unsurveyed microhabitats, or the absence of acoustic detection equipment, which is required to reliably detect cryptic or low-density species such as *Plecotus christii.*

Globally, bats are primarily threatened by land-use change, pesticide use and direct persecution (Mickleburgh et al., 2002; IUCN, 2026). These same pressures operate in Egypt. Law 4/1994, updated by Law 9/2009, legally protects all bat species in Egypt. However, many roost sites in historic buildings, mosques and tombs are renovated without notification to environmental authorities, resulting in loss of roost sites and potential local population declines. Persecution by both authorities and the public has intensified following unfounded media-driven fears linking bats to SARS-CoV-2, despite the absence of evidence implicating R. aegyptiacus as a reservoir host (Sayed Saeed et al., 2021; Arab News, 2020; Weinberg et al., 2022).

Addressing these threats requires a combination of research and outreach. Systematic surveys incorporating acoustic monitoring across all major habitat types are urgently needed to determine the status of undetected species and establish population baselines. In agricultural landscapes, promotion of bat populations as biological pest-control agents could help reduce pesticide dependency (Schäckermann et al., 2022; Marsh, 2026). Conservation planning must also ensure the protection of key roost sites near agricultural fields and at archaeological monuments. Critically, community engagement programmes that challenge misconceptions about bats as disease vectors or pests are essential to reduce persecution and build a constituency for bat conservation.

CONCLUSIONS

This study confirms the presence of seven bat species at 65 roost sites across Egypt (2020–2023) and identifies active maternity colonies for four species. *Plecotus christii* was detected at one site targeted, consistent with its Data Deficient status and the methodological limitations of passive roost surveys. Thirteen species known from Egypt were not detected in this study, highlighting the need for expanded surveys using acoustic detection methods. Rousettus aegyptiacus faces an acute threat from persecution driven by unfounded disease fears, requiring targeted conservation intervention under Law 4/1994. Permanent and temporary roost sites — particularly at archaeological monuments — must be legally and physically protected. The Data Deficient status of the endemic *Plecotus christii* warrants urgent survey effort. More broadly, public education and the promotion of bats as beneficial pest controllers are essential to secure long-term bat conservation in Egypt.

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