Contribution to the knowledge of the distribution of bats (Chiroptera) in Algeria

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Abstract

Algeria is the largest country in Africa and for the most part has not yet been surveyed for bat species. To contribute to the knowledge of the distribution of Algerian bat fauna, between 2010 and 2025 we surveyed 69 sites from across the country, mostly roost sites but also using mist nets. We found 19 species from six families, out of a total of 27 species from seven families currently recognized for Algeria. The species we found in the most sites were the Maghrebian mouse-eared bat (*Myotis punicus*), the greater horseshoe bat (*Rhinolophus ferrumequinum*), and the common bent-wing bat (*Miniopterus schreibersii*). Our observations represent several new findings regarding the distribution of bat species in the country, including, for example, the southernmost record for the Mediterranean horseshoe bat (*Rhinolophus euryale*), the northernmost record for the Egyptian mouse-tailed bat (*Rhinopoma cystops*), the southernmost and westernmost records for Geoffroy's bat (*Myotis emarginatus*), and the southernmost record for the desert long-eared bat (*Otonycteris hemprichii*). Overall, this work provides 19 new provincial records for 11 species. Thus, this study constitutes a significant contribution to our understanding of the distribution of Algerian bats, essential information to guide actions for their conservation and that of their habitats.

Keywords: Chiropteran fauna, local distribution, inventory, conservation, Maghreb

Introduction

Bats (Order Chiroptera) contain more than 1400 species, about 20% of the current mammal species in the world, being the second largest order of mammals after rodents (Burgin et al. 2018; Simmons and Cirranello 2024). This species richness is associated with a great diversity of ecological niches (Popa-Lisseanu et al. 2007; Ashrafi et al. 2011; Krüger et al. 2013). Bats are ecologically important (Kunz et al. 2011; Ramírez-Fráncel et al. 2021), in the case of insectivores by contributing to the control of insect populations (Kalka et al. 2008), and in the case of nectarivores and frugivores in pollinating flowers and dispersing seeds (Sheherazade et al. 2019; Enríquez-Acevedo et al. 2020). Their importance to humans includes public health and economic benefits, derived from their consumption of insect pests (Maslo et al. 2022), but also potential risks, as they are natural reservoirs of many zoonotic pathogens (Fenton et al. 2006; Caraballo 2022). They are also important bioindicators of habitat quality and environmental change (Fenton et al. 1992; Jones et al. 2009). Although bats are versatile and adaptable, they have suffered a strong anthropogenic impact on their conservation (Frick et al. 2020). Threats to their persistence include habitat destruction, agricultural intensification, pesticides, water pollution, overhunting, persecution, climate change, invasive species, epidemic diseases, wind turbines, and mining activities (Fenton et al. 1992; Wickramasinghe et al. 2003; Kunz et al. 2007; Welbergen et al. 2008; Jones et al. 2009; Mickleburgh et al. 2009; Welch and Leppanen 2017; Frick et al. 2020). In fact, bat populations appear to be declining in many parts of the world, with more than a third of the species assessed by the International Union for Conservation of Nature (IUCN) considered threatened or data deficient, and more than half of the species with decreasing or unknown population trends (Frick et al. 2020).

Since the landmark work 'Mammals of Algeria' (Kowalski and Rzebik-Kowalska 1991), interest in determining precisely which bat species are present in Algeria, and their distribution and status in the country, has increased in recent times (Ahmim 2017, 2019). However, the number of species that have been reported for the country has essentially not changed since Kowalski and Rzebik-Kowalska (1991) (26 species), with the literature review by Ahmim (2017) listing 25 species, and two species having been added since then (Loumassine et al. 2017a; Ahmim 2024). On the

other hand, regarding a detailed knowledge of the distribution of bat species throughout Algeria, there is still a lot of work to be done. There has been an increase in local studies investigating the bat species present at specific sites (Bendjeddou et al. 2014; Ahmim and Oubaziz 2017; Ahmim and Tahri 2017; Ahmim et al. 2020; Farfar et al. 2017; Loumassine et al. 2017b, 2019, 2020; Mokrani et al. 2018a,b; Hamida et al. 2021; Ait-Abdesselam et al. 2025), but Algeria is a very large country and there are still many areas lacking surveys. This is largely due to the fact that much of Algeria is extreme desert, with many remote and difficult-to-access areas. Ahmim (2017) considered it an important priority to carry out bat inventories across Algeria, for a better characterization of their distribution, community diversity patterns, fine mapping of habitat preferences, and establishment of conservation targets. With the aim of contributing to the understanding of the current distribution of bat fauna in Algeria, we conducted a series of bat surveys across the country, the results of which we report here. This study provides baseline information that is essential for both ecological research and conservation plans. Several of the bat species in Algeria are of conservation concern at the regional level (Aulagnier et al. 2010a,b,c), and some have risk status at the global level (Alcaldé et al. 2016; Juste and Alcaldé 2016; Paunovic 2016; Cistrone et al. 2023).

Materials and Methods

The fieldwork for this study was done between 2010 and 2025 in several provinces of the country. Fig. 1 shows the location of the sites visited and Table 1 provides more information about those sites, including the dates they were surveyed; some of the sites were visited more than once, in different years. Fig. S1 shows photographs of some of the type of sites that were prospected for the presence of bat roosts. Since, to our knowledge, none of the sites we visited had been previously surveyed for bats, we relied on site suggestions and collaboration from local people, national parks, and forest conservation authorities. We initially focused our search efforts on natural and artificial caves, old mines, abandoned railway tunnels, water galleries, old bridges, old houses, and ruins. We conducted visits during the warmer season (April-September) and cooler season (October-March) to locate summer and winter colonies, respectively. For roosting places, we recorded the presence and abundance of guano,

as an indicator of the density and continuity of bat occupancy. Roost sites with abundant old guano suggest long-term occupancy by bat colonies, while sites with only abundant fresh guano indicate recent use by bat colonies. To detect bats, we used both indirect and direct methods, the former involving observation of signs of presence and occupation (e.g. guano, insect remains such as moth wings, claw marks on the ceilings and walls of their roosts) and the latter involving direct observation of animals. Direct observation was achieved by manual capture when individuals were easily accessible, but generally required the use of nets. In this case, individuals were captured using sweep nets, when at rest and inaccessible by hand or in flight. To find tree-dwelling species living in woodland, nocturnal outings were conducted between May and October to capture individuals during their foraging activities. Mist nets were used in spring and summer and were placed near water sources, such as streams, ponds and agricultural irrigation basins, which attract insects and consequently foraging insectivorous bats. Mist nets were also placed on paths in forests and gardens, at the exits of inaccessible tunnels and caves, and near public or private outdoor lighting. Mist nets were set, on fine weather days, one hour before sunset and left open until around midnight. The captured individuals were handled with thick gloves to protect against bites, photographed with a digital camera, and released. We also took photographs from a distance in the case of inaccessible individuals on the ceilings of caves and tunnels and in crevices. Bat species were identified with the help of illustrated identification keys to European and Northwest African bats (Dietz and von Helversen 2004; Dietz et al. 2009).

Results and Discussion

To increase our comprehension of the current local distribution of bats in Algeria, we conducted a series of surveys across the country. Table 1 gives the bat species found, and the observed/estimated number of individuals of each species, at each of the 69 visited sites. These sites are from 19 different provinces, which is about a third of the current Algerian provinces. In terms of bat species, we detected 19 species from six families, out of a total of 27 species from seven families currently described for Algeria (Ahmim 2019, 2024). Fig. 2 shows photographs of some of the bat species found in our surveys. The eight species we did not find are apparently very rare in

Algeria, with either zero records (common noctule *Nyctalus noctula*) or one to less than a handful of records (barbastelle *Barbastella barbastellus*; naked-rumped tomb bat *Taphozous nudiventris*; Rüppell's bat *Vansonia rueppellii*; Leisler's bat *Nyctalus leisleri*; Zenati myotis *Myotis zenatius*; Geoffroy's horseshoe bat *Rhinolophus clivosus*; Egyptian free-tailed bat *Tadarida aegyptiaca*) in the last 35–40 years (Kowalski and Rzebik-Kowalska 1991; Ahmim and Oubaziz 2017; Bendjeddou et al. 2017, 2020; Loumassine et al. 2019, 2020; Ahmim 2019, 2024). In Table 2 we summarize the records in terms of the number of sites and provinces in which each of the 19 species was observed, and we list the provinces for which this is apparently the first record of a given species. Overall, our study provides 19 new provincial records for 11 species (Table 2). The species we found in the most sites by far were the Maghrebian mouse-eared bat (*Myotis punicus*), which is listed as 'Data Deficient' on the International Union for Conservation of Nature (IUCN) Red List (Juste and Paunovic 2016), the greater horseshoe bat (*Rhinolophus ferrumequinum*), which is listed as 'Near Threatened' in the Mediterranean region (Aulagnier et al. 2010), and the common bent-wing bat (*Miniopterus schreibersii*) which is listed as 'Vulnerable' (Cistrone et al. 2023). Given that we mainly searched for roosting sites in natural and artificial underground cavities (Table 1), it is natural that this contributed to the troglophilic species being the most frequently found (Ahmim 2017).

The taxonomy, distribution and conservation status of bats in Algeria were recently reviewed (Ahmim 2017), in an effort to update the information summarized in the reference book 'Mammals of Algeria' (Kowalski and Rzebik-Kowalska 1991). When compared with the information in that review (Ahmim 2017) and in other recent studies on the chiropteran fauna of Algeria (Ahmim and Oubaziz 2017; Ahmim and Tahri 2017; Ahmim 2019; Ahmim et al. 2020; Bendjeddou et al. 2017; Bendjoudi et al. 2019; Farfar et al. 2017; Khelfaoui et al. 2018; Loumassine et al. 2017a,b, 2019, 2020; Mokrani et al. 2018a,b; Messaoud et al. 2020; Hamida et al. 2021; Ait-Abdesselam et al. 2025), our results represent several novelties in our knowledge of its distribution. Among the new records, we highlight: i) the southernmost Algerian record of the Mediterranean horseshoe bat (*Rhinolophus euryale*), in the province of Béni Abbès. This mainly European species, which has undergone a significant decline in recent decades throughout its range, has few old (Kowalski and Rzebik-Kowalska 1991) and recent (Ahmim 2019) records in Algeria, with the exception of the extreme

northeast of the country that has been much more frequently surveyed (Bendjeddou et al. 2017; Farfar et al. 2017; Khelfaoui et al. 2018; Ahmim et al. 2020); ii) the northernmost Algerian record of the Egyptian mouse-tailed bat (*Rhinopoma cystops*), in the province of M'sila. This is a primarily African species for which there are few old Algerian records (Kowalski and Rzebik-Kowalska 1991) and even fewer recent ones (Ahmim and Tahri 2017; Bendjeddou et al. 2017; Loumassine et al. 2017b, 2019), with the latter being almost all from the province of Béchar. Our observation in July 2013 of a large colony, numbering about 1000 individuals, in a natural cave near Djebel Antar is the oldest record in that province; iii) the southernmost (Batna province) and westernmost (Tlemcen province) Algerian records of Geoffroy's bat (*Myotis emarginatus*). This is another primarily European species with few records from Algeria, both old (Kowalski and Rzebik-Kowalska 1991) and recent (Ahmim 2019), mainly from the northern Mediterranean region of the country (Ahmim and Oubaziz 2017; Bendjeddou et al. 2017; Farfar et al. 2017; Khelfaoui et al. 2018). Our observations extend the confirmed distribution of the species to the south and west; iv) the southernmost Algerian record of the desert long-eared bat (*Otonycteris hemprichii*), in the province of Tamanrasset, which is also only the second record of the species for the country since Gaisler and Kowalski (1986), the first being from the province of Béchar (Loumassine et al. 2019); v) the observation of the greater mouse-tailed bat (*Rhinopoma microphyllum*) in 2013 (in Béchar province), which is the oldest record of the species in Algeria; the first published record of the species in the country is from 2016 (Loumassine et al. 2017a), also in Béchar province but at a different location; vi) the observation of Kuhl's pipistrelle (*Pipistrellus kuhlii*) in the province of Tamanrasset (May 2025) is by far the southernmost record of this circum-Mediterranean species since Qumsiyeh (1985), who also observed it in the same province; vii) the observation of a group of European free-tailed bats (*Tadarida teniotis*) in the province of Tamanrasset. To our knowledge, the only previous record of the species so far south in Algeria is a single individual (Bendjeddou et al. 2014), in the same province. The other records of the species are mainly from the north and north-central regions of the country (Kock and Nader 1984; Gaisler and Kowalski 1986; Kowalski and Rzebik-Kowalska 1991; Ahmim and Oubaziz 2017; Bendjeddou et al. 2017; Farfar et al. 2017; Ahmim et al. 2020; Kaci et al. 2024; Ait-Abdesselam et al. 2025); and viii) three new provincial records of the threatened common bent-wing

bat (*M. schreibersii*) increase our understanding of the species' current range in Algeria.

Over the years of fieldwork for this study, we made a number of interesting observations. We prospected more potential roost sites and attempted mist netting at more locations than the 69 sites reported here, but we did not find or capture bats at those sites. In particular, in some caves and abandoned mines, we found the presence of old guano, but the bats had apparently abandoned the sites, in some cases seemingly due to disturbance from recently established quarries nearby. In other cases, where we set up mist nets near agricultural fields, the absence of bats may be due to low insect availability in result of the use of insecticides on those fields (Frick et al. 2020; Russo 2023). We also observed mixed colonies of *M. schreibersii* and *M. punicus* (Fig. S2), usually in large caves. This association has been noted previously in the Maghreb (Ruedi 2023).

In conclusion, by providing bat records for a large number of sites across Algeria, this study constitutes a valuable addition to our understanding of the local distribution of the country's bat fauna. Our data represent observations of 70% of the bat species currently recognized for Algeria, with over a third of the observed species having global or regional (Mediterranean) threatened status on the IUCN Red List (Table 2). Our observations expand and improve the mapping of the confirmed country's distribution of several species and provide many new provincial records. For some provinces for which we surveyed multiple sites (Table 1), our results contribute to a better fine-scale delineation of species distributions at the provincial level. It is clear that this study provides important distributional information on Algerian bats for biogeographic and ecological research, and for plans and actions aimed at protecting and conserving them and their habitats. Importantly, we prospected 10 sites in the Sahara region, which accounts for about 85% of Algeria's land area and has been very under-surveyed for bats in the last three decades (Ahmim 2017, 2019). The Saharan sites, which yielded very interesting records, were still a minority among the total sites examined, as Saharan sites are much more remote and challenging. It is evident, however, that as the presence and distribution of bat species in Algeria becomes increasingly better known in the Mediterranean region (Ahmim and Oubaziz 2017; Bendjeddou et al. 2017; Bendjoudi et al. 2019; Farfar et al. 2017; Khelfaoui et al.

2018; Mokrani et al. 2018a,b; Ahmim et al. 2020; Ahmim 2024; Kaci et al. 2024; Ait-Abdesselam et al. 2025; this study), a top priority in the future should be distributional research in the Saharan Atlas and the vast Algerian desert to the south.

Figures and Tables

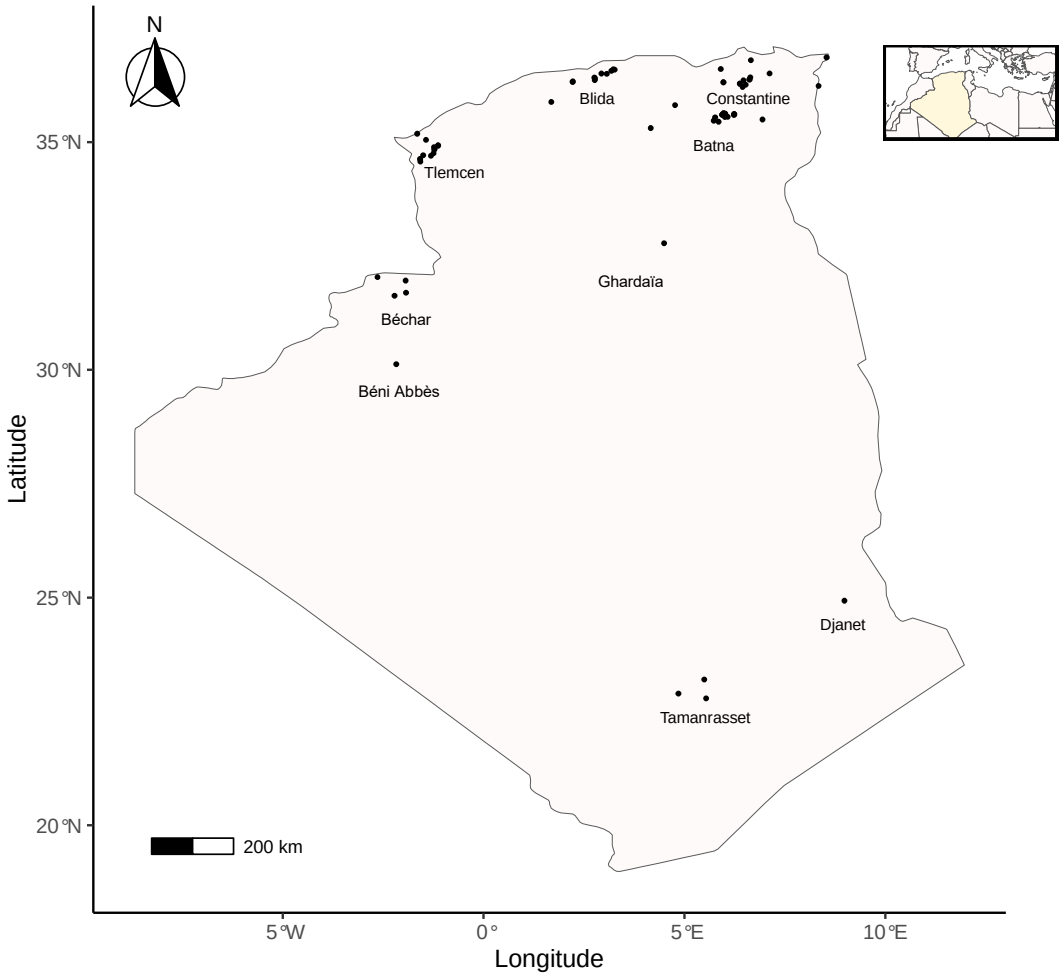

Fig. 1. Map of Algeria showing the location of the 69 sites surveyed for bats (roost sites and mist-netting), represented by black dots. Also indicated for reference are the capital cities of some of the provinces (homonymous) where surveys were conducted. The inset map on the top right shows Algeria's geographic position in North Africa and the Mediterranean region.

Fig. 2. Examples of bat species found in our surveys. a) Maghrebian mouse-eared bat (*Myotis punicus*); b) common pipistrelle (*Pipistrellus pipistrellus*); c) Gaisler's long-eared bat (*Plecotus gaisleri*); d) greater horseshoe bat (*Rhinolophus ferrumequinum*); e) Egyptian mouse-tailed bat (*Rhinopoma cystops*); and f) common bent-wing bat (*Miniopterus schreibersii*).

Table 1. Information on the sampled sites, identified bat species, estimated number of present individuals, and presence of guano at the site. Information about the sex of individuals is given when it was possible to determine it unambiguously. The provinces are listed roughly from north to south and east to west. For provinces and sites that were surveyed on more than one occasion, the results are given according to the date of the prospecting session from the oldest to the most recent.

Province	Geographic coordinates	Nature of the site	Species present	Number of individuals	Presence of guano	Sampling date
El Tarf	36° 51' 35.72" N 8° 32' 16.55" E	Ancient house	*Rhinolophus ferrumequinum*	1 (♂)	No	22/02/2014
Souk Ahras	36° 14' 2.63" N 8° 20' 14.49" E	Ancient house	*Rhinolophus hipposideros*	1 (♂)	No	28/02/2014
Guelma	36° 30' 26.60" N 7° 7' 10.92" E	Natural cave	*Myotis emarginatus* *Rhinolophus ferrumequinum*	5 10	Yes. Old, very abundant	23/03/2016
Skikda	36° 47' 53.24" N 6° 39' 16.68" E	Natural cave	*Rhinolophus blasii*	16	Yes. Old, abundant	19/06/2021
Constantine	36° 21' 23.89" N 6° 28' 9.19" E	Natural cave	*Miniopterus schreibersii* *Myotis punicus* *Rhinolophus ferrumequinum*	200-250 300-400 1	Yes. Fresh and old, very abundant	17/05/2012
			Miniopterus schreibersii *Myotis punicus*	4 2	Yes. Old, very abundant	01/01/2014
			Miniopterus schreibersii *Myotis punicus* *Plecotus gaisleri*	200-250 300-400 1	Yes. Fresh and old, very abundant	29/08/2015
Constantine	36° 22' 32.93" N 6° 36' 51.83" E	Natural cave	*Miniopterus schreibersii* *Myotis punicus*	200-250 300-400	Yes. Fresh, abundant	28/08/2015
Constantine	36° 22' 23.45" N 6° 37' 24.50" E	Outskirts of the city of Constantine	*Hypsugo savii*	1 (♂)		05/10/2017
Constantine	36° 15' 38.15" N 6° 31' 27.44" E	Abandoned mine	*Myotis punicus*	5	Yes. Fresh, little abundant	10/08/2020

Province	Geographic coordinates	Nature of the site	Species present	Number of individuals	Presence of guano	Sampling date
Constantine	36° 25' 21.55" N 6° 38' 23.85" E	Natural cave	*Miniopterus schreibersii*	1	No	08/12/2023
Jijel	36° 36' 17.95" N 5° 54' 14.66" E	Natural cave	*Pipistrellus pipistrellus* *Rhinolophus ferrumequinum*	16 100-120	Yes. Fresh, abundant	26/02/2016
Mila	36° 16' 57.58" N 6° 22' 33.66" E	Abandoned mine	*Rhinolophus ferrumequinum* *Plecotus gaisleri*	1 1	Yes. Fresh, abundant	26/09/2014
Mila	36° 17' 1.84" N 6° 22' 47.23" E	Abandoned mine	*Myotis punicus*	1	Yes. Fresh, abundant	26/09/2014
			Miniopterus schreibersii	>1000	Yes. Fresh, very abundant	20/10/2018
Mila	36° 18' 49.28" N 5° 58' 8.76" E	Natural cave	*Miniopterus schreibersii* *Myotis punicus*	150-200 200-250	Yes. Old, abundant	21/02/2017
			Myotis punicus	>1000	Yes. Fresh and old, very abundant	28/07/2018
Mila	36° 18' 47.87" N 5° 58' 11.14" E	Natural cave	*Rhinolophus ferrumequinum* *Rhinolophus hipposideros*	3 1	Yes. Old, abundant	21/02/2017
			Rhinolophus ferrumequinum	1	Yes. Old, abundant	28/07/2018
Mila	36° 12' 44.87" N 6° 26' 53.07" E	Abandoned mine	*Miniopterus schreibersii* *Myotis punicus*	3 2	Yes. Old, abundant	23/10/2020
Khenchela	35° 29' 47.11" N 6° 56' 33.44" E	Abandoned mine	*Myotis punicus*	3	Yes. Fresh, very little	28/11/2011
Batna	35° 37' 47.84" N 5° 58' 18.83" E	Abandoned mine	*Miniopterus schreibersii* *Myotis punicus*	1 (♂) 2 (♂♂)	Yes. Fresh and old, very abundant	20/03/2012

Province	Geographic coordinates	Nature of the site	Species present	Number of individuals	Presence of guano	Sampling date
Batna	35° 38' 1.82" N 5° 58' 20.55" E	Abandoned mine	*Plecotus gaisleri*	1 (♂)	Yes. Fresh and old, very abundant	20/03/2012
Batna	35° 36' 38.17" N 6° 14' 37.98" E	Water tunnel	*Rhinolophus ferrumequinum*	3	No	22/03/2012
Batna	35° 35' 45.58" N 6° 14' 0.40" E	Abandoned mine	*Rhinolophus ferrumequinum*	1	Yes. Fresh, abundant	22/03/2012
Batna	35° 36' 47.05" N 6° 14' 4.74" E	Water tunnel	*Plecotus gaisleri*	100	Yes. Fresh and old, abundant	18/06/2012
Batna	35° 36' 47.82" N 6° 14' 18.15" E	Ancient house	*Plecotus gaisleri*	20	Yes. Fresh, little abundant	18/06/2012
Batna	35° 37' 31.42" N 5° 58' 35.13" E	Abandoned mine	*Myotis punicus* *Plecotus gaisleri*	2 4	Yes. Fresh and old, very abundant	20/06/2012
Batna	35° 33' 19.28" N 6° 4' 42.27" E	Ancient house	*Rhinolophus ferrumequinum*	2	No	20/06/2012
Batna	35° 32' 39.36" N 5° 45' 48.86" E	Natural cave	*Myotis emarginatus* *Rhinolophus ferrumequinum*	350-400 100-150	Yes. Fresh and old, very abundant	21/06/2012
Batna	35° 37' 35.38" N 6° 0' 54.56" E	Irrigation basin	*Eptesicus isabellinus* *Myotis punicus*	1 (♂) 1		26/06/2012
Batna	35° 26' 50.91" N 5° 51' 0.52" E	Natural cave	*Rhinolophus ferrumequinum*	3	Yes. Old, abundant	26/03/2017
Batna	35° 36' 4.35" N 5° 56' 27.21" E	Abandoned mine	*Miniopterus schreibersii* *Plecotus gaisleri* *Rhinolophus ferrumequinum*	1 (♂) 1 2	No	26/03/2017

Province	Geographic coordinates	Nature of the site	Species present	Number of individuals	Presence of guano	Sampling date
Batna	35° 36' 2.05" N 5° 56' 31.79" E	Abandoned mine	*Myotis punicus*	1	Yes. Fresh and old, very abundant	26/03/2017
Batna	35° 36' 0.89" N 5° 56' 33.97" E	Abandoned mine	*Myotis punicus*	1	Yes. Fresh and old, very abundant	26/03/2017
Batna	35° 33' 6.17" N 6° 0' 20.32" E	Ancient house	*Rhinolophus mehelyi*	1	No	26/03/2017
Batna	35° 28' 13.57" N 5° 43' 45.52" E	Natural cave	*Rhinolophus ferrumequinum*	4	Yes. Fresh and old, abundant	27/03/2017
M'sila	35° 18' 30.88" N 4° 9' 37.11" E	Natural cave	*Miniopterus schreibersii* *Rhinopoma cystops*	350-400 >1000	Yes. Fresh and old, very abundant	02/03/2019
M'sila	35° 48' 45.25" N 4° 46' 0.78" E	Natural cave	*Myotis punicus*	250-300	Yes. Fresh and old, abundant	02/03/2019
Blida	36° 29' 56.91" N 3° 3' 59.13" E	Forest	*Eptesicus isabellinus*	3 (♂♂♂)		20/06/2011
Blida	36° 35' 55.92" N 3° 13' 49.03" E	Abandoned mine	*Rhinolophus ferrumequinum*	3	Yes. Fresh, very little	26/06/2011
Blida	36° 25' 05.6" N 2° 45' 25.7" E	Ancient house	*Rhinolophus hipposideros*	2 (♂♂)	Yes. Fresh, very little	31/06/2011
Blida	36° 35' 25.97" N 3° 15' 45.91" E	Abandoned mine	*Rhinolophus hipposideros*	10	Yes. Old, abundant	01/08/2011
Blida	36° 24' 33.35" N 2° 46' 4.16" E	Forest	*Rhinolophus euryale*	1		01/08/2011

Province	Geographic coordinates	Nature of the site	Species present	Number of individuals	Presence of guano	Sampling date
Blida	36° 30' 22.67" N 2° 55' 57.96" E	Abandoned mine	*Rhinolophus blasii*	1	No	09/01/2012
Blida	36° 21' 39.9" N 2° 45' 57.1" E	Abandoned tunnel	*Rhinolophus ferrumequinum*	4	Yes. Fresh, abundant	15/06/2015
Blida	36° 22' 46.9" N 2° 46' 13.5" E	Abandoned tunnel	*Rhinolophus ferrumequinum*	10	Yes. Fresh, abundant	15/06/2015
			Miniopterus schreibersii *Rhinolophus ferrumequinum*	40 30	Yes. Fresh and old, abundant	16/09/2017
Blida	36° 33' 55.42" N 3° 10' 54.20" E	Forest	*Pipistrellus kuhlii*	1		25/08/2021
Aïn Defla	36° 19' 59.60" N 2° 13' 12.69" E	Abandoned mine	*Miniopterus schreibersii* *Myotis punicus* *Rhinolophus euryale*	>1000 100-150 1	Yes. Fresh and old, very abundant	05/04/2012
Aïn Defla	36° 19' 11.87" N 2° 13' 1.93" E	Abandoned mine	*Myotis punicus*	2	Yes. Old, very abundant	05/04/2012
Tissemsilt	35° 52' 55.26" N 1° 41' 6.70" E	Abandoned mine	*Rhinolophus ferrumequinum*	1	No	20/04/2012
Tlemcen	34° 42' 0.0" N 1° 18' 40.22" W	Natural cave	*Myotis punicus*	1	No	28/04/2012
			Myotis punicus	3	No	15/09/2012
Tlemcen	35° 2' 59.65" N 1° 26' 1.25" W	Forest	*Pipistrellus pipistrellus*	1 (♂)		15/09/2012
Tlemcen	34° 53' 18.87" N 1° 14' 0.44" W	Irrigation basin	*Myotis emarginatus*	1		17/09/2012
Tlemcen	34° 37' 46.03" N 1° 34' 47.38" W	Ancient house	*Rhinolophus hipposideros*	50 (nursery roost)	Yes. Fresh, abundant	26/06/2013

Province	Geographic coordinates	Nature of the site	Species present	Number of individuals	Presence of guano	Sampling date
Tlemcen	34° 37' 41.56" N 1° 34' 45.16" W	Natural cave	*Rhinolophus ferrumequinum*	1	Yes. Fresh and old, abundant	26/06/2013
Tlemcen	34° 34' 27.34" N 1° 34' 25.25" W	Natural cave	*Myotis punicus* *Rhinolophus mehelyi*	100-150 300-350	Yes. Fresh and old, very abundant	27/06/2013
Tlemcen	35° 11' 0.9" N 1° 39' 14.7" W	Natural cave	*Myotis punicus* *Rhinolophus hipposideros*	10 5	Yes. Fresh and old, very abundant	27/06/2013
Tlemcen	34° 50' 6.90" N 1° 13' 37.46" W	Natural cave	*Miniopterus schreibersii* *Myotis punicus* *Rhinolophus ferrumequinum*	70-80 150-200 20-30	Yes. Fresh and old, very abundant	28/03/2016
Tlemcen	34° 55' 26.72" N 1° 7' 55.43" W	Natural cave	*Miniopterus schreibersii* *Myotis punicus* *Rhinolophus ferrumequinum*	100-150 360-400 40-50	Yes. Fresh and old, very abundant	29/03/2016
Tlemcen	34° 55' 39.52" N 1° 7' 56.46" W	Natural cave	*Myotis punicus* *Rhinolophus ferrumequinum*	30 20	Yes. Old, very abundant	29/03/2016
Tlemcen	34° 42' 44.08" N 1° 30' 14.09" W	Dam	*Rhinolophus hipposideros*	30-40	Yes. Fresh and old, very abundant	30/03/2016
Tlemcen	34° 51' 22.22" N 1° 13' 12.03" W	Chasm	*Myotis capaccinii*	200-250		18/06/2016
Tlemcen	34° 45' 20.27" N 1° 14' 48.65" W	Natural cave	*Myotis punicus* *Rhinolophus blasii*	50-70 150-200	Yes. Fresh and old, very abundant	16/07/2016
Ghardaïa	32° 46' 46.62" N 4° 29' 34.85" E	Forest	*Pipistrellus kuhlii*	1	No	18/04/2023
Béchar	31° 57' 37.26" N 1° 56' 24.28" W	Natural cave	*Rhinopoma cystops*	800-1000	Yes. Fresh and old, very abundant	02/07/2013

Province	Geographic coordinates	Nature of the site	Species present	Number of individuals	Presence of guano	Sampling date
Béchar	32° 2' 9.98" N 2° 38' 25.24" W	Natural cave	*Rhinopoma microphyllum*	200-300	Yes. Fresh and old, very abundant	13/09/2013
Béchar	31° 41' 38.43" N 1° 55' 50.33" W	Natural cave	*Rhinopoma cystops*	5-20	No	10/07/2015
Béchar	31° 37' 37.0" N 2° 13' 02.4" W	Ancient house	*Pipistrellus kuhlii*	10-30	No	02/06/2016
Béni Abbès	30° 7' 29.46" N 2° 10' 25.37" W	Natural cave	*Rhinolophus euryale*	4	No	17/01/2015
Djanet	24° 55' 50.6" N 8° 58' 59.7" E	Natural cave	*Asellia tridens*	15	Yes. Old, very abundant	10/04/2019
Tamanrasset	23° 12' 06.2" N 5° 29' 36.7" E	Natural cave	*Tadarida teniotis*	20	No	08/05/2025
Tamanrasset	22° 47' 14.9" N 5° 32' 20.1" E	Ancient house	*Pipistrellus kuhlii*	1	No	13/05/2025
Tamanrasset	22° 53' 31.39" N 4° 51' 0.46" E	Ancient house	*Otonycteris hemprichii*	1	No	13/05/2025

Table 2. Summary of the number of records of the 19 bat species identified in the 69 surveyed sites in 19 provinces from across Algeria. The number of sites and provinces in which each species was observed are indicated, as well as the name of the provinces for which these are apparently the first records of the species. Following the species names, in parentheses, are their global conservation statuses according to the International Union for the Conservation of Nature (IUCN) Red List categories. For species for which there is an IUCN regional assessment (Mediterranean) and the assigned category differs from the global category, that category is also given after the global one. NE: 'Not Evaluated', DD: 'Data Deficient', LC: 'Least Concern', NT: 'Near Threatened', VU: 'Vulnerable'. Species are presented in alphabetical order of the families to which they belong, and also alphabetically within each family.

	Number of sites	Number of provinces	New provinces
Hipposideridae			
Asellia tridens (LC)	1	1	
Miniopteridae			
Miniopterus schreibersii (VU)	13	7	Aïn Defla, Mila, M'sila
Molossidae			
Tadarida teniotis (LC)	1	1	
Rhinolophidae			
Rhinolophus blasii (LC; NT)	3	3	
Rhinolophus euryale (NT; VU)	3	3	Béni Abbès, Blida
Rhinolophus ferrumequinum (LC; NT)	21	9	Batna
Rhinolophus hipposideros (LC; NT)	7	4	Blida, Mila, Souk Ahras
Rhinolophus mehelyi (VU)	2	2	Batna
Rhinopomatidae			
Rhinopoma cystops (LC)	3	2	M'sila
Rhinopoma microphyllum (LC)	1	1	

Vespertilionidae			
Eptesicus isabellinus (LC)	2	2	
Hypsugo savii (LC)	1	1	
Myotis capaccinii (VU)	1	1	
Myotis emarginatus (LC)	3	3	Batna, Tlemcen
Myotis punicus (DD)	22	7	Aïn Defla, M'sila, Khenchela
Otonycteris hemprichii (LC)	1	1	Tamanrasset
Pipistrellus kuhlii (LC)	4	4	
Pipistrellus pipistrellus (LC)	2	2	Jijel
Plecotus gaisleri (NE)	7	3	Mila

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Conflict of interest

The authors have no conflicts of interest to declare.

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Supplementary Information

Fig. S1. Examples of sites prospected for the presence of bat roosts. a) natural cave; b) abandoned mine; c) interior of a natural cave; d) water tunnel; e) stone ruin; and f) old house.

Fig. S2. Examples of observed syntopy between *M. punicus* and *M. schreibersii*. a) cave ceiling with a mixed colony containing mostly *M. punicus*. A *M. schreibersii* individual is indicated by a white ellipse around it; b) two individuals of *M. schreibersii* on the left and one individual of *M. punicus* on the right.