Short communication

Summer presence of Greater Noctule bat *Nyctalus lasiopterus* (Schreber 1780) in NW Italy (Chiroptera: Vespertilionidae)

Roberto Toffoli[1], Marco Cucco[2]*, Laura Martinelli[3], Marco Rastelli[4], Denise Trombin[1]

Abstract - The Greater Noctule is a threatened bat species characterized by a fragmented distribution and limited documented observations in Italy. During a census using ultrasound detectors, foraging Greater Noctules were identified in 2024 and 2025. Echolocation calls were recorded in Santena, Valdieri, and the Bosco dell'Alevè woodland in Val Varaita, NW Italy. The first localization in Alevè was made at 1,500 m a.s.l. on 30/07/2024. In the following year, sampling was performed across five sites in the surrounding area. The species was recorded again at the original site at 1,500 m on 11/07/2025, as well as at a new location at 1,900 m a.s.l. on 11/08/2025. The habitat in these areas is dominated by Arolla Pines *Pinus cembra* of uneven ages, featuring many ancient trees with numerous cavities or advanced decay. In Santena, localization occurred on 24/06/2024 at 240 m a.s.l. The habitat was characterized by a private garden in the periurban area, close to an ancient castle park with old trees. The observation of Valdieri occurred in autumn, on 14/10/2025 at 790 m a.s.l., in an area characterized by vertical rocky slopes within open arid grassland and broadleaf woods. The observations of Santena and Alevè represent the first verification of this rare bat's occurrence during the summer reproductive season, and prompt further investigation regarding the regular presence of the species in NW Italy.

Key words: agricultural landscape, arolla pine forest, bioacoustics, rare bat.

Riassunto - Presenza estiva della nottola gigante *Nyctalus lasiopterus* (Schreber 1780) in Italia nordoccidentale (Chiroptera: Vespertilionidae).

La nottola gigante è una specie di pipistrello minacciata, caratterizzata da una distribuzione frammentata e da limitate osservazioni documentate in Italia. Durante un censimento effettuato con rilevatori a ultrasuoni, nel 2024 e nel 2025 sono stati individuati esemplari in attività di foraggiamento. I segnali di ecolocalizzazione sono stati registrati a Santena, Valdieri e nel bosco dell'Alevè in Val Varaita, nell'Italia nord-occidentale. La prima localizzazione nell'Alevè è avvenuta a 1.500 m s.l.m. il 30/07/2024. L'anno successivo, il campionamento è stato effettuato in cinque siti nell'area circostante. La specie è stata registrata nuovamente nel sito originale a 1.500 m il 11.07.2025, oltre che in una nuova località a 1.900 m s.l.m. il 11/08/2025. L'habitat in queste aree è dominato da pini cembri *Pinus cembra* di età disomogenea, con la presenza di molti alberi secolari ricchi di cavità o in stato di avanzata decomposizione. A Santena, la localizzazione è avvenuta il 24/06/2024 a 240 m s.l.m. L'habitat era caratterizzato da un giardino privato in un'area periurbana, vicino al parco di un antico castello con alberi secolari. L'osservazione di Valdieri è avvenuta in autunno, il 14/10/2025 a 790 m s.l.m., in un'area caratterizzata da pareti rocciose verticali tra praterie aride aperte e boschi di latifoglie. Le osservazioni di Santena e dell'Alevè rappresentano la prima verifica della presenza di questo raro pipistrello durante la stagione riproduttiva estiva e sollecitano ulteriori indagini sulla presenza regolare della specie nell'Italia nord-occidentale.

Parole chiave: bioacustica, foresta di pino cembro, paesaggio agricolo, pipistrello raro.

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Received for publication: 9 February 2026
Accepted for publication: 29 May 2026
Early access: 31 August 2026
Online publication: 5 November 2026

INTRODUCTION

The Greater Noctule is a rare bat species classified as Vulnerable on the IUCN Red List (Alcaldé *et al*., 2016), with a fragmented distribution spanning the Palearctic from Spain and Portugal in the west up to Russia and Kazakhstan in east. It reaches the northern latitude in Russia and the southern latitude in north Morocco and Cyrenaica in Libya (Ibanez & Juste, 2023). In Italy, the species is extremely rare with only about thirty confirmed records, including historical records (Lanza, 2012; Agnelli & Lapini, 2025). The presence of the species has been reported from the sea level (pineta di Ravenna in Emilia Romagna) to about 1350 m in Tuscany (Vergari *et al*., 1997) and Calabria (Lanza & Agnelli, 2002). Recently, a summer presence of Greater Noctule have been reported in four other regions of Italy, namely South Tyrol (Paniccia *et al*., 2023), Trentino (Scaravelli & Priori, 2018), Veneto (Vernier & Vedovat, 2011), and Sicily (AA.VV., 2008). In Friuli, the species is present year-round (Lapini *et al*., 2014; 2019) where the

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only breeding colony of the species known in Italy occurs (Agnelli & Lapini, 2025). The colony is located in an isolated forest patch at an altitude of ca. 15 m a.s.l. within an agricultural landscape dominated by corn, wheat, and vineyards in the province of Udine (Russo *et al*., 2023). In Italy, the species has an endangered status according to the national Red List (Rondinini *et al*., 2022).

In Piedmont, the species was not reported either historically (Sindaco *et al*., 1992) or recently (Agnelli & Lapini, 2005; Debernardi *et al*., 2009). However, a male equipped with a GPS tracker in Russia east of Moscow was reported in NW Italy close to the Po River near Casale Monferrato, on 15 and 16 October 2021, during dispersive movements (Vasenkov *et al*., 2023; Vasenkov *in litteris* 11/12/2023). This was the first confirmed report of *Nyctalus lasiopterus* in Piedmont.

The species is highly vulnerable to the logging of mature woodlands, which destroys roosts, and wind turbines that cause high mortality rates (Ibanez & Juste, 2023). While found across a wide area, the populations are patchy and generally decreasing. Densities are particularly low in peripheric regions (North Africa), while the Iberian Peninsula and Hungary are currently the most vital areas for the species. This noctule may be more common than data suggests, but because it forages high in the forest canopy, it is exceptionally difficult for researchers to track and study (Ibanez & Juste, 2023).

In this study, we report the first data on the presence of the Greater Noctule during the summer season in NW Italy. Ascertained presence records could carry significant implications for our understanding of the status of the species in Italy.

MATERIALS AND METHODS

The sampled areas were located in the municipality of Santena, Casteldelfino and Valdieri, in northwestern Italy (Fig. 1). The bat detectors were set to record continuously from 30 min before dusk to 30 min after dawn.

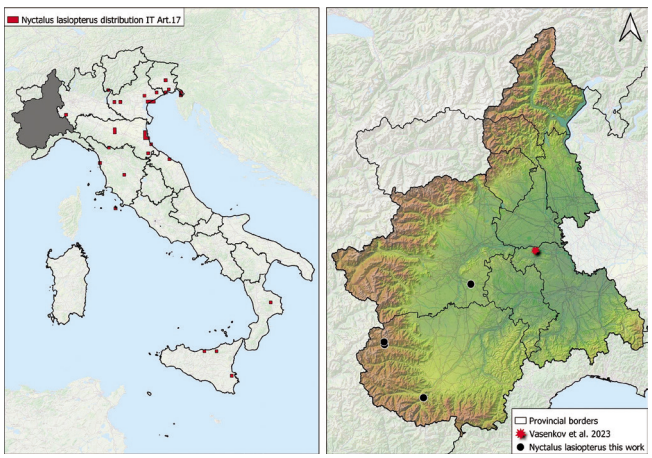


Fig. 1 - Map of the study area showing records of the Greater Noctule (right), and reports of the species in Italy based on Habitats Directive reporting (Article 17) 2019-2024 (left). / Mappa dell'area di studio che mostra i dati di presenza della nottola gigante (a destra) e le segnalazioni della specie in Italia basate sulle relazioni della Direttiva Habitats Articolo 17 (2019-2024) (a sinistra).

In Santena TO, one Ultramic 384 (Dodotronic, Italy) was positioned in a private garden in the suburban area of the town (44°57'17" N, 7°46'60" E; altitude 240 m a.s.l.). Acoustic sampling was carried out during two nights per month between January and December 2024. The site is about 200 m away from the park of the ancient castle, which contains several old trees, and is surrounded by an agricultural matrix dominated by corn.

The Valdieri CN plot is located near vertical rocky slopes in front of the valley floor of the Gesso River (44°17'03" N 7°24'40" E; altitude 790 m a.s.l.). The area lays within the Special Protection Area SAC/SPA IT1160056 "Alpi Marittime" characterized by beech and chestnut forests on the north-facing slope, and by conifers and sub-Mediterranean vegetation on the south-facing slope. An Ultramic 384 bat detector was deployed at the campsite on the nights of 31/07/2024, 17/09/2024, 14/05/2025, 7/07/2025, 21/07/2025 e 14/10/2025.

The Bosco dell'Alevè (Casteldelfino, Cuneo: 44°36'47" N, 7°04'38" E) is a Special Area of Conservation SAC IT1160058 "Gruppo del Monviso e Bosco dell'Alevè" featuring the largest forest of Arolla Pine *Pinus cembra* in Italy. Larch *Larix decidua* is also found there, albeit in smaller numbers. Bat detectors Audiomoth (Hill *et al*., 2019) were positioned at five sampling points:

A) clearing in arolla pine wood at 1500 m a.s.l. (44°35'29"N 7°05'02"E). Acoustic sampling occurred during four nights: 28/07/2024, 9/09/2024, 10/07/2025, 12/08/2025.

B) rocky area at 1711 m a.s.l. (44°35'50"N 7°04'58"E). Sampling occurred during the night 11/08/2025.

C) arolla pine wood at 1746 m a.s.l. (44°35'57"N 7°04'40"E). Sampling occurred during the night 11/08/2025.

D) lake Secco at 1900 m a.s.l. (44°36'24"N 7°04'48"E). Sampling occurred during the night 11/08/2025.

E) lake Bagnour at 2000 m a.s.l. (44°36'47" N, 7°04'38" E). Sampling occurred during the night 11/08/2025.

The acquired acoustic sequences were analysed in advance using the Sonochiro 4.0 automatic identification software (Biotope Society, France). In a second step, we manually controlled with Batsound 4.4 all sequences with a score less than 5, as indicated by Toffoli & Rughetti (2017) and all sequences identified by the software as *Nyctalus lasiopeterus* regardless of the score assigned. Acoustic determination of the *Nyctalus lasiopterus* was made according to Haquart & Disca (2007), Estók & Siemers (2009), Haquart *et al.* (2010), and Barataud (2015), giving particular attention to acoustic sequences characterised by alternating QCF and FM-QCF signals (Estók *et al*., 2021), with QCF with maximum energy frequency of the final part of the signal between 14 and 17 kHz and duration between 19 and 27 ms. Some of the recorded sequences have been uploaded to the Xeno-Canto website https://xeno-canto.org under the codes XC1103051 and XC1103052.

We used bat passes as the primary sampling unit for activity levels. In accordance with Appel *et al*. (2017), we divided all audio data into 5-second intervals, identifying a pass whenever two or more characteristic search-phase

pulses were detected within a single block. Acoustic signals were attributed to species or acoustic groups according to the characters reported in Barataud (2015). The *Myotis* HF acoustic group is designed for small- and medium-sized bats of the genus *Myotis*, i.e. all European *Myotis* with the exception of *M. blythii* and *M. myotis* (Cantori & Haquart, 2017).

RESULTS

In Santena, the Greater Noctule was detected on 24/06/2024. Other species detected in the area are reported in Table 1. The most abundant species found were Savi's pipistrelle *Hypsugo savii* and the bats of the acoustic group *Pipistrellus kuhlii/nathusii*.

In Bosco dell'Alevè, the species was detected in point A on the nights of 30/07/2024 and 11/07/2025. In point D, the species was detected on the night of 11/08/2025 (Fig. 2). Other species detected in the area are reported in Table 1. The most abundant species found were the Common pipistrelle *Pipistrellus pipistrellus* and the bats of the acoustic group *Epstesicus/Nyctalus/Vespertilio* for point A at 1500 m, and the bats of the acoustic group *Myotis HF* for point D at 1900 m.

In Valdieri, the Greater Noctule was detected on the night of 14/10/2025. Other species detected in the area are reported in Table 1. The most abundant species found was the European free-tailed bat *Tadarida teniotis*.

DISCUSSION

In this study we report the first records of summer presence of the Greater Noctule in NW Italy. The species was detected in a range of altitudes spanning from 240 to 1,900 m a.s.l. and in different landscapes, including agricultural areas in the lowlands and conifer forests in the Alps.

The presence of the species could be related to the availability of habitats with old trees that have hollows for day roosting, a typical requirement for different rare bat species requiring mature woodland (Toffoli & Cucco, 2020; Kelm *et al*., 2025). The *Nyctalus lasiopterus* is in fact considered a forest species associated with various forest formations (Ibanez & Juste, 2023) for example beech forests in Hungary (Estók, 2011) or pine forests in France, Iberia and Russia (Ibanez *et al*., 2004; Bec *et al*., 2010; Vlaschenko *et al*., 2016). The species also lives in forest patches of broad-leaf trees such as chestnuts,

Tab. 1 - Abundance of bat species or bat acoustic groups (number of bat passes/night) at Santena, Valdieri, and Sites A and D in Alevè, Casteldelfino (Cuneo). / Abbondanza delle specie di pipistrelli o dei gruppi acustici (numero di passaggi di pipistrelli per notte) a Santena, Valdieri e nei siti A e D dell'Alevè, Casteldelfino (Cuneo).

SITES	SANTENA		CASTELDELFINO A			CASTELDELFINO D		VALDIERI	
	2024		2024	2025		2025		2025	
	N	%	N	N	%	N	%	N	%
Barbastella barbastellus			3	12	*1.9%*	6	*0.2%*	33	*13.8%*
Eptesicus nilssonii				11	*1.4%*	12	*0.4%*		
Eptesicus serotinus	24	*1.8%*		5	*0.6%*			2	*0.8%*
Eptesicus/Nyctalus/Vespertilio	2	*0.1%*	92	45	*17.4%*	84	*2.6%*	3	*1.3%*
Hypsugo savii	761	*55.8%*	94	10	*13.2%*	363	*11.4%*	3	*1.3%*
Myotis crypticus				60	*7.6%*	254	*8.0%*	8	*3.3%*
Myotis HF			11	40	*6.5%*	1412	*44.4%*	10	*4.2%*
Myotis myotis/blythii				9	*1.1%*	123	*3.9%*		
Nyctalus lasiopterus	10	*0.7%*	5	8	*1.7%*	4	*0.1%*	5	*2.1%*
Nyctalus leisleri	5	*0.4%*		37	*4.7%*	31	*1.0%*	22	*9.2%*
Nyctalus noctula	10	*0.7%*						4	*1.7%*
Pipistrellus kuhlii	83	*6.1%*	4		*0.5%*	62	*2.0%*	1	*0.4%*
Pipistrellus kuhlii/nathusii	395	*28.9%*	1		*0.1%*	37	*1.2%*	13	*5.4%*
Pipistrellus nathusii								1	*0.4%*
Pipistrellus pipistrellus	3	*0.2%*	82	223	*38.8%*	763	*24.0%*	14	*5.9%*
Pipistrellus pygmaeus			2		*0.3%*				
Plecotus sp.	3	*0.2%*	7	13	*2.5%*	27	*0.8%*	16	*6.7%*
Rhinolophus hipposideros								1	*0.4%*
Tadarida teniotis	69	*5.1%*	12		*1.5%*			103	*43.1%*
Total	1365	*100%*	313	473	*100%*	3178	*100%*	239	*100%*

oaks, *Platanus* sp. in Iberia, Greece, and Eastern Europe (Ibanez *et al*., 2004; Vlaschenko *et al*., 2016).

The record from Santena, at low altitude, is in line with the observations of NE Italy. There, in South-Tyrol, all summer recordings of *Nyctalus lasiopterus* were registered at low altitudes (213-706 m: Paniccia *et al*., 2023). In Friuli, the species lives roughly at sea level, in an area characterized by agricultural landscape with wheat and corn cultivation (Lapini *et al*., 2014; 2019), an habitat that matches that of our observation in low Piedmont. The presence of a historic park with century-old trees creates situations similar to those reported for the Venice province, the third site of NE Italy where the Greater Noctule was recorded (Vernier & Vedovat, 2011).

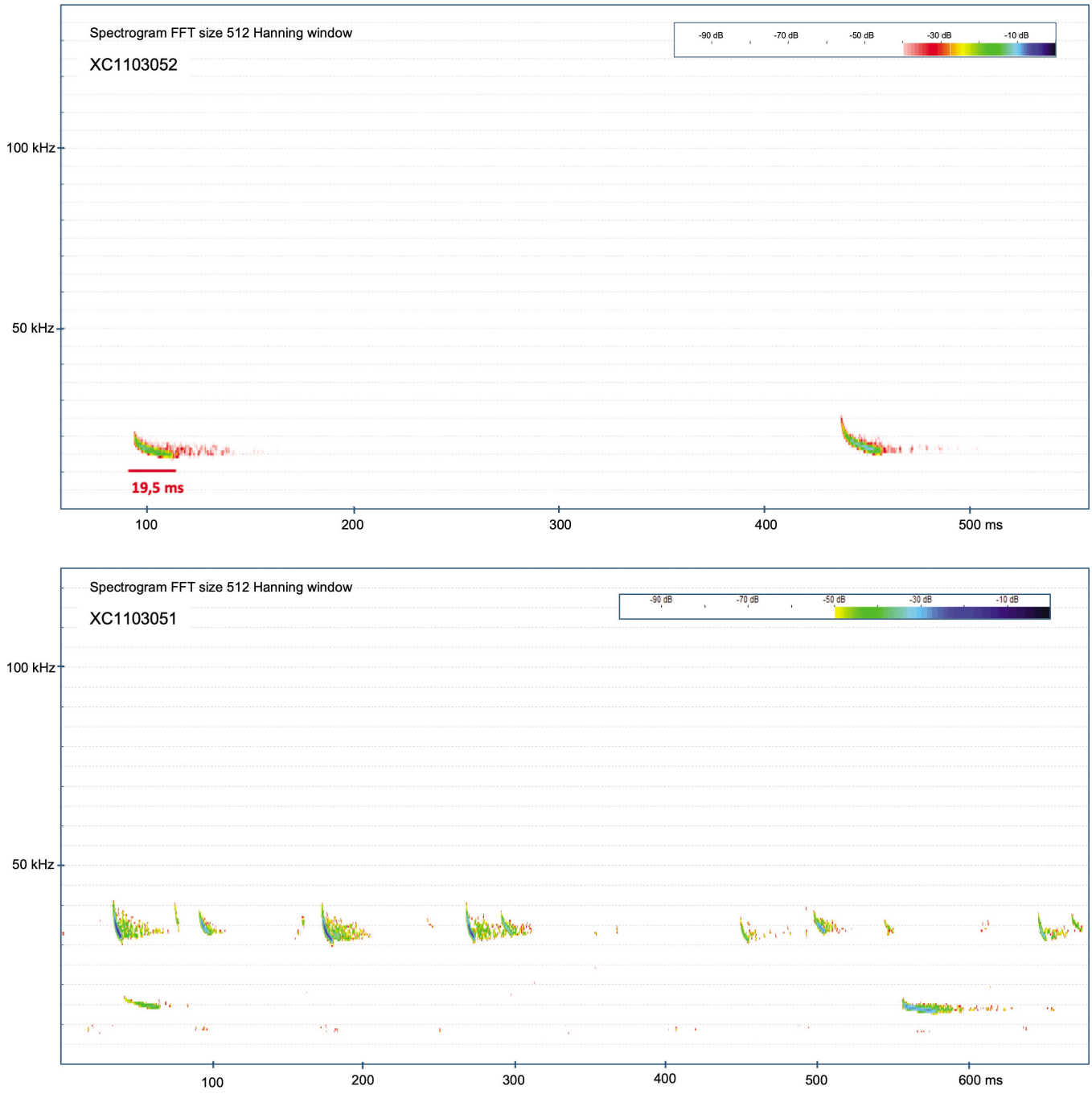


Fig. 2 - Representative spectrograms of Greater Noctule vocalizations recorded in Bosco dell'Alevè (Casteldelfino, Cuneo) in 2025. Above: echolocation call *Nyctalus lasiopterus* 11/07/2025 Alboin Casteldelfino CN (xeno-canto id XC1103052). Below: echolocation call *Nyctalus lasiopterus* 11/08/2025 Lago Secco Casteldelfino CN with *Hypsugo savii* (xeno-canto id XC1103051). / Spettrogrammi rappresentativi delle vocalizzazioni della nottola gigante registrate nel Bosco d'Alevè (Casteldelfino, Cuneo) nel 2025. Sopra: segnale di ecolocalizzazione di *Nyctalus lasiopterus*, 11 luglio 2025, Alboin, Casteldelfino, CN (ID XenoCanto XC1103052). Sotto: segnale di ecolocalizzazione del *Nyctalus lasiopterus*, 11 agosto 2025, Lago Secco, Casteldelfino, CN, insieme all'*Hypsugo savii* (ID XenoCanto XC1103051).

Indeed, these wooded areas can be compared to forest islands in a farmland habitat that provide vital roost trees for bats (Russo *et al*., 2023).

The three records in the arolla pine wood of Alevè confirmed the presence of this bat species in summer along different years. These observations could suggest both the utilization of the area by a resident summer male population (Ibáñez *et al*., 2009) or a breeding colony with females (Ibáñez & Juste, 2023).

The October record from Valdieri could be attributable to migrating or dispersing individuals. The species is considered migratory (Popa-Lisseanu & Voigt, 2009) including over long distances (Vasenkov *et al*., 2023), and migrating individuals were captured at Alpine passes (Vallotton, 2007; Mazenauer, 2015). Our record is in line with the records of the species in the French Maritime Alps, where reports are known from larch forests in the Mercantour National Park (Barataud *et al*., 2013; https://www.observatoire-mammiferes.fr/espece/60457).

Throughout much of its breeding range, the Greater Noctule is a tree-dwelling bat preferring broadleaved woodlands, especially beech or oak trees with hollows used as daytime roosts (Estok *et al*., 2021). Coniferous trees are only occasionally used (Ibáñez & Juste, 2023; Kelm *et al*., 2025). Our observations in the old arolla pine forest widens the known list of habitats frequented by the species, and could be utilized to refine the current species distribution models, which predict a low probability of occurrence in this part of Europe (Iannella *et al*., 2022).

The abundance of the Greater Noctule in our monitored sites of NW Italy was very low. The other species recorded within the same locations indicate a typical bat fauna of Alpine woods in Alevè and Valdieri (Toffoli *et al*., 2016; Scherrer *et al*., 2019; Godio *et al*., 2022; Rigo *et al*., 2024), and of agricultural landscape in Santena (Toffoli & Rughetti, 2017). The three sites of NW Italy are separated by considerable distances, with about 70 km between the Santena plain site and the two mountain sites; the latter are also located in different Alpine valleys. This situation suggests the presence of largely isolated small populations, despite European connectivity models predicting a non-negligible probability of movement between these areas (Iannella *et al*., 2022).

Before the report of a presence in autumn in the Po Plain (Vasenkov *et al*., 2023), the species was never reported in NW Italy (Gulino & Dal Piaz, 1939; Sindaco *et al*., 1992). It is unknown whether the Greater Noctule colonized Piedmont only recently or if its presence went undetected in the past. Historical records are lacking due to the methodological challenges associated with detecting this species. Thanks to the increasing adoption of bat detectors (Paniccia *et al*., 2023), and to a lesser extent, GPS tracking, the probability of detecting this species has increased significantly. Our observations represent the first verification of this rare bat's occurrence during its summer reproductive season, and together with the observations carried out in autumn and winter, they prompt further investigation about its regular presence in NW Italy. Future studies could also address whether or not reproduction of this rare and vulnerable bat (Alcadé *et al*., 2016) does occur in Piedmont.

Acknowledgements

We thank Davide Barberis, Luca Reggiani (Ente di Gestione delle Aree Protette Alpi Marittime), Paola Culasso (Chirosphera), Omar Giordano, and Anna Maria Gaggino (Ente di Gestione delle Aree protette del Monviso) for their assistance during field operations.

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