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# THE GREATER NOCTULE (*NYCTALUS LASIOPTERUS*) IN FRANCE: DISTRIBUTION, ECOLOGY AND CONSERVATION

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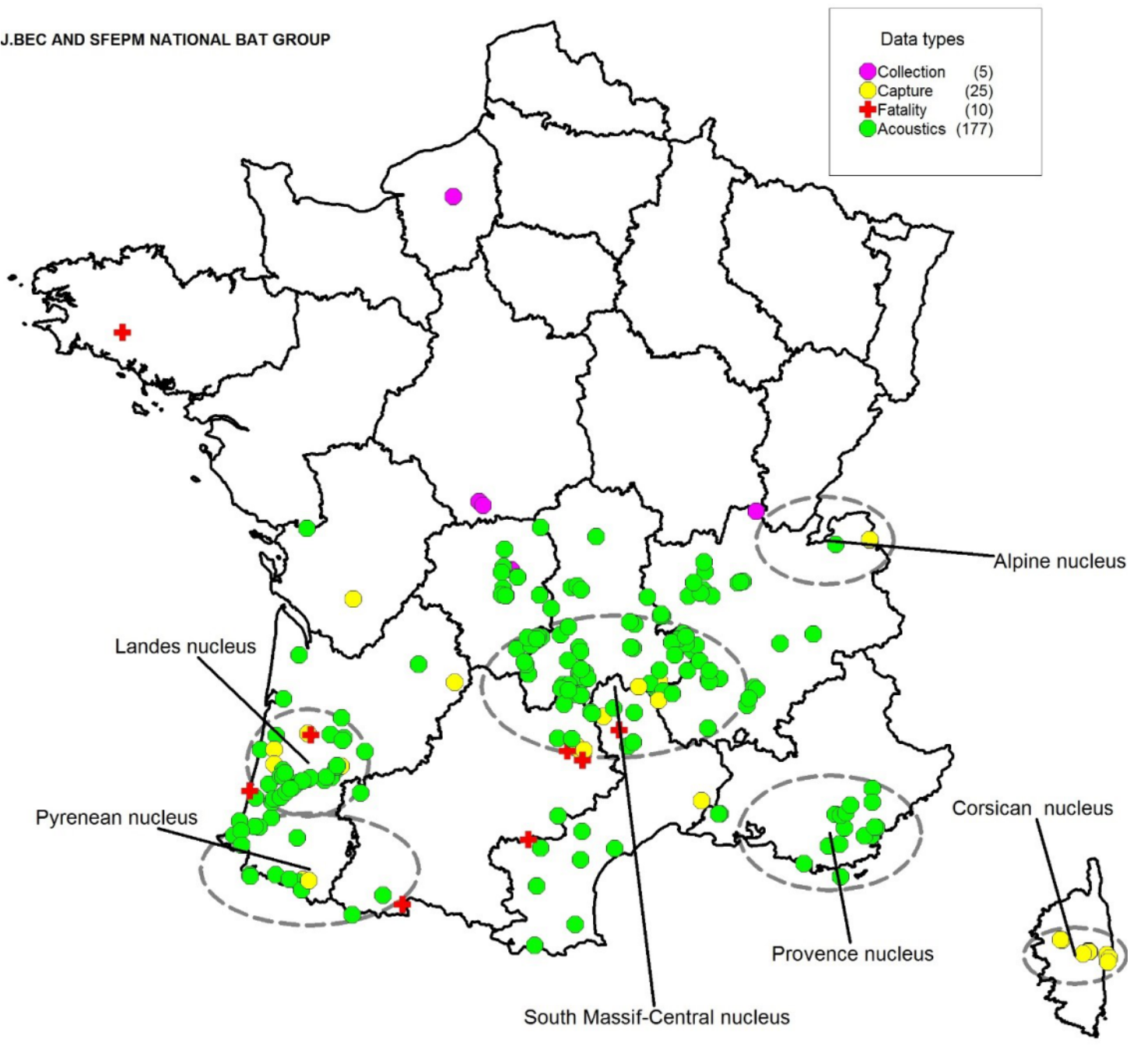
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The first hint of possible breeding of the greater noctule (*Nyctalus lasiopterus*) in France was recorded in July 2006 when a dead lactating female was found on the Atlantic coast (Landes département). Since then, the development of ultrasound surveys increased the number of contacts with the species all over southern France. The first roosts of breeding females were discovered in late June 2012 in the Lévézou – study area 1 – (Aveyron, Midi-Pyrénées) and about 180 km to the north in the Combrailles – study area 2 – (Puy-de-Dôme, Auvergne). Both areas are part of the same geographical region, the Massif Central, and face increasing wind energy development. The first aim of the study was therefore to find roosts and improve knowledge on the species to evaluate the wind energy impact on the greater noctule population in both areas.



*Nyctalus lasiopterus* contacts in France according to the types of data



Study area 1 in the Lévézou (© Y. Peyrard)



Study area 2 in the Combrailles (© Y. Beucher)



Areas with nursery roosts

## Habitat

Both study areas are plateaus at 900 m a.s.l. The climate is continental and night-time temperature can drop below 8°C even in mid-summer. The habitat is a mosaic landscape of wet meadows, bogs, hedge-bound pastures (cattle and sheep), cereal fields, fragmented deciduous woods and conifer plantations, interspersed with artificial lakes and ponds; beech woods remain on steep northern slopes.

## Methods

We used several techniques: bat detector surveys, mist-netting and telemetry. We searched for roosts either by radiotracking or by following individuals, with bat detectors, to the wood where they flew at dawn and later listening to social calls in tree cavities. Exit counts were achieved visually or with an infrared surveillance camera. In the Lévézou bats were caught with a double height mist-net across a ford, while in the Combrailles, due to the lack of a suitable site for mist-netting, a harp-trap for tree cavities had to be used. The transmitters (Holohil BD-2 and BD 2C, and Biotrack PIP3 on collar) did not exceed 5% of the bat body mass.



Mist-netting site in the Lévézou (© C. Boléat)

To avoid disturbance at the drinking and foraging site, we deliberately radio-tagged only 3 females at a time in the Lévézou. For the same reason we captured only once in the wood hosting the nursery roosts, at the beginning of August when young were flying.

To assess the phenology of the greater noctule, batcorders were set up at the top of trees in both study areas from late February to November.

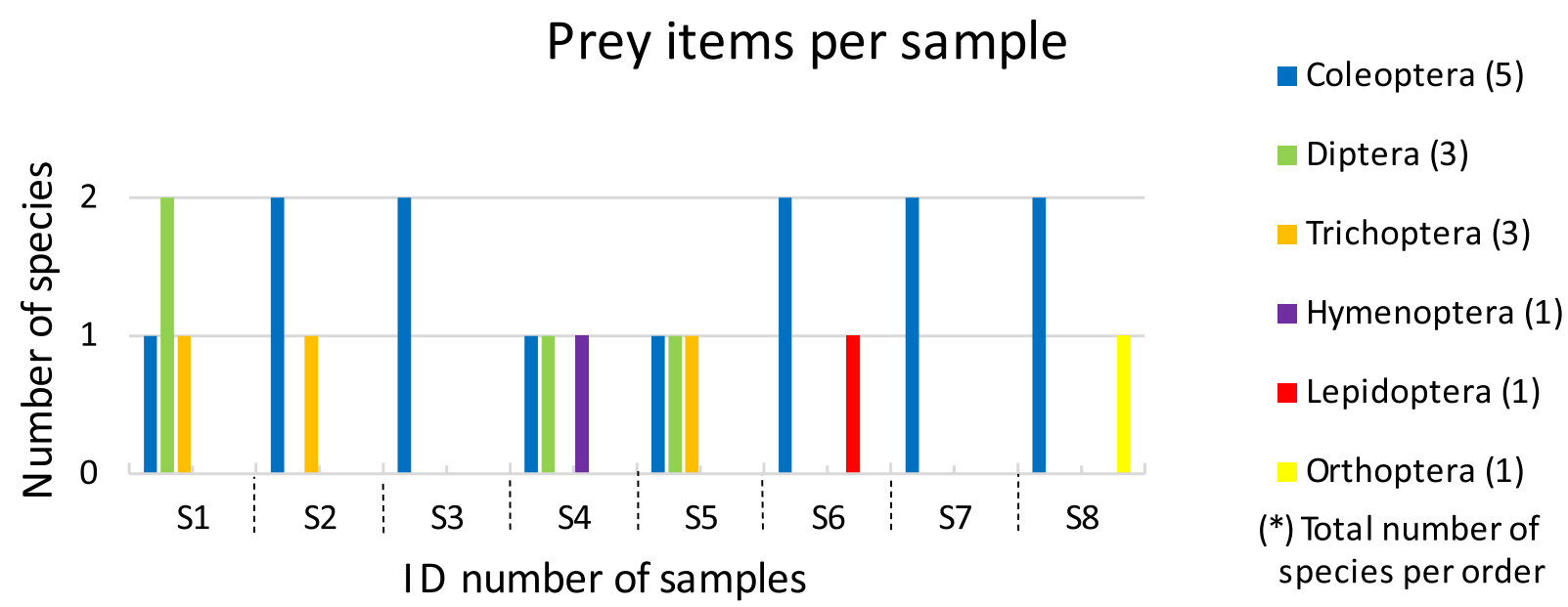
In the Lévézou, we also collected saliva swabs for future genetic analysis and faeces samples to determine the diet by DNA analysis.



Greater noctule above the ford in the Lévézou (© Y. Peyrard)

Foraging grounds are close to the roosts (300 m) or further away but in both areas the distance does not appear to exceed 10 km. In the Lévézou six have been identified, mainly above wet meadows, riverine vegetation, open water bodies and above the woodland canopy. In the Combrailles one greater noctule was also foraging above the street lighting of a village. Several individuals can forage at the same location, but no bat has been observed foraging inside woodlands.

Faecal pellets of 8 adult greater noctules confirmed that Coleoptera were the most diversified and abundant in the diet. The absence of bird DNA in the faeces was not unexpected, as our samples were collected between June and August and not during bird migration as other studies have shown.



Different observations in both sites suggest that parturition in the Massif Central could start at the end of May or beginning of June and extends to early July. The earliest flying juveniles were captured on July 18<sup>th</sup>, 2014.

In 2014, batcorders on tree-tops recorded the first greater noctules on March 17<sup>th</sup> in the southern area and April 7<sup>th</sup> in the northern area. We are waiting for the results for the last contacts in the autumn. Our capture data suggest that adult females may start migration at the end of August or beginning of September and we estimate that the greater noctule is present in the Massif Central from the first week of April to the beginning of October.

## Conclusions

The main results of the 2014 survey season were the unexpected discovery of male roosts in the Combrailles, about 50 m from the nearest female roost, and the presence of nearly 90 individuals in the Lévézou.

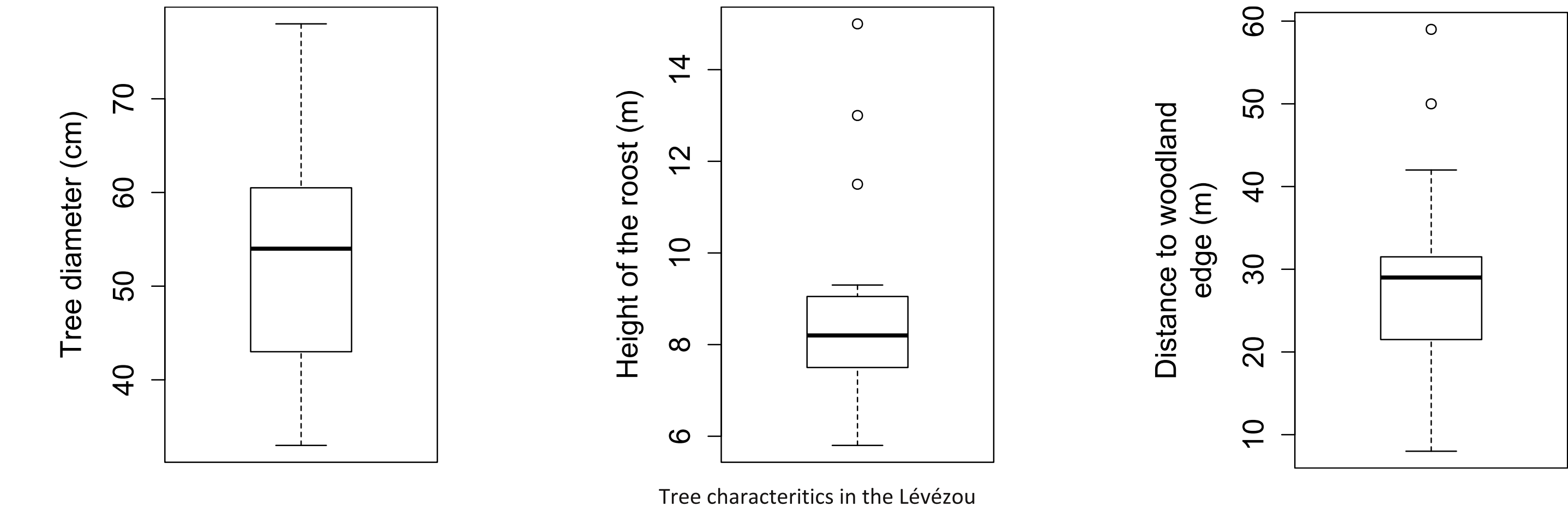
Although we always mist-netted the animals at the same spot in the Lévézou, we did not observe any avoidance behaviour, but we never captured the same individual twice.

## Results

During the 3 year study, 35 adult females were captured in the Lévézou, 15 were radio-tagged and 16 roosts were found.

	Lévézou							Combrailles					
	♀ ad	♂ ad	♀ juv	♂ juv	Radiotagged	♀ roosts	♂ roosts	♀ ad	♂ ad	juv	Radiotagged	♀ roosts	♂ roosts
2012	9	1	4	1	6 ♀	3	-	-	-	-	-	2	-
2013	12	-	2	3	6 ♀	10	-	2	-	1	1 ♀	1	-
2014	14	1	4	-	3 ♀	3	-	-	2	-	2 ♂	4	1

All roosts were in north-facing beech woods, in woodpecker cavities, either great spotted woodpecker *Dendrocopos major*, green woodpecker *Picus viridis* or black woodpecker *Dryocopus martius*. On June 1<sup>st</sup>, 2014 we counted 83 individuals coming out of a woodpecker cavity while other uncounted individuals were flying.



Tree characteristics in the Lévézou

In the Combrailles where more than 70 trees with suitable cavities are available in the same forest, 29 individuals were counted leaving a black woodpecker hole.

There is an urgent need to increase knowledge on this new priority species for autecological studies to implement conservation actions. The development of renewable energy facilities in the region is likely to increase the threats on its populations. This is a matter of concern because at least two wind farms in the Lévézou have already killed greater noctules and many new projects are waiting for building permission in the area.

As breeding females change roost with the young holding on to the teat (EXEN observation 2014), it is essential for them to find a wood which offers a dense network of trees with cavities within a reduced area. Managing the greater noctule habitat should be one of the aims of the future European Action Plan for Bats through partnership with woodland managers and private owners of woods, the most numerous in the study areas.

## Acknowledgements

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Roost with a radiotagged greater noctule (© L. Gaches)