

Note

Record number of Big Brown Bat (*Eptesicus fuscus*) overwintering in a building at the northern limit of their range in eastern Canada

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Abstract

Big Brown Bat (*Eptesicus fuscus*) is believed to overwinter typically in heated buildings at the northern limit of its range, often singly and generally fewer than 12 per building, as well as in underground environments. As the species is a relatively recent arrival in Maritime Canada, little information is available on its natural history in the region. Here we report a case from New Brunswick, where it appears that at least 122 Big Brown Bats overwintered together in the attic of a brick building constructed in 1947. Exit from this winter hibernaculum occurred abruptly, with a peak in mid-March and a secondary, but lower, peak in mid-April.

Key words: New Brunswick; Big Brown Bat; *Eptesicus fuscus*; hibernation; winter roost; range expansion; bat conservation; human-wildlife conflict

Because North American bats spend a large portion of their time in roosts, particularly during winter for those that hibernate (Agosta 2002), understanding bat roosting ecology is important to bat conservation. However, there are limited data on the winter roosting of bats outside underground hibernacula in the northern hemisphere. Big Brown Bat (*Eptesicus fuscus*) appears to be particularly flexible in terms of hibernating patterns (Halsall *et al.* 2012). Indeed, the proclivity of the species to overwinter in heated buildings has permitted it to extend its range northward (Whittaker and Gummer 2000). Big Brown Bat is a relatively recent arrival to Maritime Canada, with the first specimen reported from St. Andrews, New Brunswick, in 1959 (Gorham and Johnson 1962). The species remained rare in the province until about 1980, when it was encountered with increasing frequency, both overwintering and in summer maternity colonies (McAlpine *et al.* 2002). A further increase occurred in New Brunswick after 2013, with the first Nova Scotia confirmation in 2017 (McAlpine *et al.* 2024). Overwintering was previously restricted to heated buildings, but, in 2021, Big Brown Bats were observed in

an underground hibernaculum in New Brunswick for the first time (McAlpine *et al.* 2024). Otherwise, little information is available on the natural history of the species in the region.

Here we report a record number of Big Brown Bats overwintering together in a building situated at the current northern limit of the species' range in northeastern North America. We also provide details on the timing of exit from this building at the conclusion of the hibernation period.

The hibernaculum building (Tobique Valley High School) was erected in 1947 and is made of brick. It is located about 200 m back from the Tobique River along the main street in Plaster Rock (population 1002), Victoria County, New Brunswick (46.9135°N, 67.3920°W). Four air vents just below the roof line, each ~10 × 25 cm (two on each side about 20 m apart), provided bat entry/exit points to an attic area of about 585 m² (Figure 1a). The attic includes blown-in insulation on the floor, unfinished roof trusses, and uninsulated brick walls and roof; there are no temperature data for the attic. Against the interior wall and immediately below each of the four vents was a



FIGURE 1. a. Tobique Valley High School, Tobique Valley, New Brunswick, site of a Big Brown Bat (*Eptesicus fuscus*) hibernaculum. Arrows mark two of four entry/exit points to the attic hibernaculum. b. Interior of the hibernaculum. Arrow marks an entry/exit point above an accumulation of straw that supported a European Starling (*Sturnus vulgaris*) nest. Sheath knife added for scale. Photos: D.F. McAlpine/New Brunswick Museum.

single Starling (*Sturnus vulgaris*) nest. An accumulation of straw supporting one nest was over a metre in height and several metres in diameter (Figure 1b). Bats had been occasionally observed in the school during the three years before 2025 (D. Currie pers. comm. 8 May 2025). The limited bat guano present was scattered on interior brick walls, mostly near the entry/exit vents. The lack of guano accumulations in the school suggested the site had not been used as a maternity roost.

On 25 October 2024, screened covers were installed on the outside of the previously open vents (without knowledge that bats were already in the building). In March–April 2025, dozens of bats, both dead and alive, were observed in areas of the school occupied by students and staff. Live bats were netted and released out of doors. In late April, because of health and safety concerns, the school was closed and students dispersed to other nearby schools.

Media (Tutton 2025) reported that the species involved was the federally protected and Endangered (SARA Public Registry 2025) Little Brown Bat (*Myotis lucifugus*). White-nose syndrome has dramatically reduced the New Brunswick population of this species (Vanderwolf and McAlpine 2021), and it overwinters almost exclusively in caves or abandoned mines (Fenton and Barclay 1980). On 1 May 2025, D.F.M. visited the school and identified the species as Big Brown Bat (New Brunswick Museum mammal collection MA- 0199951- 0199953), which is well known for hibernating in human-occupied dwellings (Whittaker and Gummer 1992, 2000).

Because exits from the attic were now unavailable, the bats that roused from hibernation dispersed into the space below. For several years, school personnel had been diligent in recording daily observations of bats as they were captured and released outside or found dead in the school. Data for the 2024–2025

hibernation season (October–May), based on counts by school personnel of live bats netted and released or dead bats discovered in the school ($n = 107$), and dead bats retrieved by D.F.M. from the hibernaculum area on 1 May ($n = 15$), allow us to estimate that the site supported 122 Big Brown Bats. This assumes that released bats did not find their way back into the school (unlikely given that bats apparently could not find an exit route in the spring). In 2025, a relatively abrupt peak in numbers of bats observed/day occurred on 17 March followed by the near-daily occurrence of 1–3 bats/day until mid–late April when there was a much smaller peak in numbers (Figure 2).

Few data can be found on numbers of Big Brown Bats occupying buildings during hibernation, but they are generally believed to be low (i.e., <12 ; Whittaker and Gummer 2000). Among 32 buildings in Indiana and Illinois, Whitaker and Gummer (1992) found 1–86 (mean $[\bar{x}] = 9.3$) Big Brown Bats overwintering per building per visit. Among 63 buildings in Indiana, they found 1–72 ($\bar{x} = 11.6$) per building per visit at sites previously supporting maternity roosts, and 1–9 ($\bar{x} = 2.7$) at sites with no history of maternity colonies (Whittaker and Gummer 2000).

Whittaker and Gummer (1992) suggest that, historically, Big Brown Bats have overwintered in trees, although rock crevices and caves were also used (Johnson *et al.* 2024; Klüg-Baerwald *et al.* 2024). Because hollow trees are ephemeral (as are older buildings and access to them) and subject to variable

temperatures, Whittaker and Gummer (1992) suggest that the species may have evolved to reduce the risk to the population by limiting the size of congregations at any one site. Although overwintering Big Brown Bats may cluster together, the species is considered a solitary hibernator (Agosta 2002). Many Big Brown Bats are believed to overwinter singly and undetected in buildings (Whittaker and Gummer 1992), suggesting that the New Brunswick building reported here provided exceptional roosting circumstances and an adequate microclimate, i.e., temperature and humidity. The 585 m² available (~ 5 m²/bat), with multiple, easily accessible and sizable, entry points is probably unusual and allowed many Big Brown Bats to be well-dispersed in the available space.

Bats attempted to exit this building hibernaculum in numbers from mid-March through to mid-April. The few bats observed active in the school from December through February may have been individuals (particularly juveniles) that entered hibernation with insufficient fat reserves. Brigham (1987) found that Big Brown Bats active during the winter months had lower fat reserves and shorter forearm length than torpid bats. In Kansas, Big Brown Bats began to leave hibernation as early as 16 March and hibernation ended “sometime” in April (Phillips 1966). Fenton (1972) reported Big Brown Bats leaving underground hibernacula in Quebec and Ontario in early April and May. In Indiana, Whittaker and Gummer (2000) noted an influx of Big Brown Bats into a larger

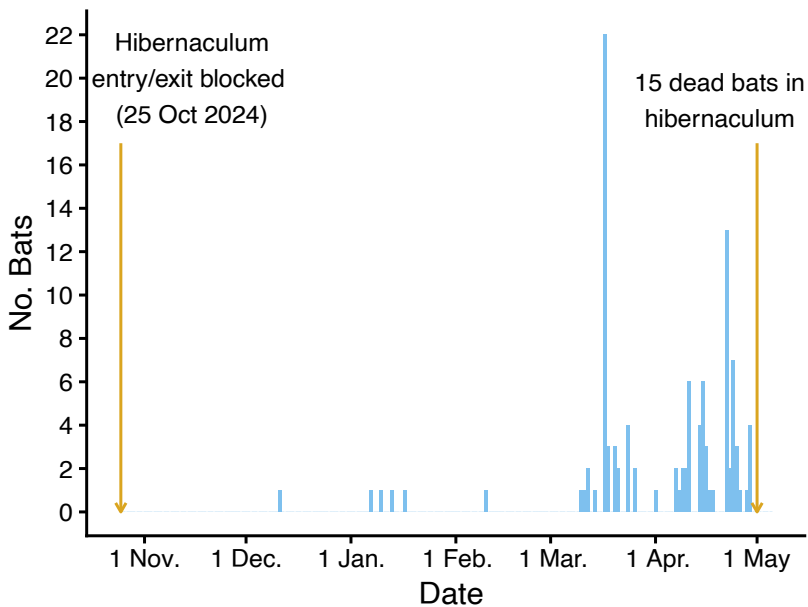


FIGURE 2. Daily plot of Big Brown Bat (*Eptesicus fuscus*) found dead or alive in the main school building during the 2024–2025 hibernation season.

building hibernaculum on about 20 March and speculated that these may be males moving into sites dominated by females. This was followed by the general dispersal of bats from the site in early April. We do not know the sex ratio of the bats at the New Brunswick site, but perhaps males attempted to exit first in mid-March, followed by the general break-up of the winter aggregation in April. Similar exit dates (early March through April) for the cessation of hibernation by Big Brown Bats can be extrapolated for southern Ontario based on spring returns to bat boxes (K.J.V. unpubl. data). The circumstances of the hibernaculum reported here highlight the flexibility of roost choice by Big Brown Bats and suggests a need for further monitoring to assess building use patterns, potential human-wildlife conflicts, and conservation implications for urban bat populations.

Author Contributions

Writing – Original draft: D.F.M.; Review and editing – K.J.V.; Conceptualization: D.F.M. and K.J.V.; Investigation: D.F.M.

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