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## Over-wintering and Reproduction by the Big Brown Bat, *Eptesicus fuscus*, in New Brunswick

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The first evidence of over-wintering and reproduction by the Big Brown Bat, *Eptesicus fuscus*, in New Brunswick is documented based on 24 new specimens and other reports from southern New Brunswick. Previously, this species was known in New Brunswick from three specimens and several unverifiable sightings. New distributional records, combined with echolocation surveys, suggest that *E. fuscus* is an insignificant component of forested ecosystems along the Fundy coast of central New Brunswick. In New Brunswick, the Big Brown Bat appears to be closely associated with human-occupied buildings. New Brunswick data support a previous suggestion that such behaviour may have promoted a northward range expansion by *E. fuscus*, and perhaps an increase in populations in more northerly regions.

**Key Words:** Big Brown Bat, *Eptesicus fuscus*, behaviour, distribution, hibernation, reproduction, New Brunswick

The Big Brown Bat, *Eptesicus fuscus*, reaches the northern limit of its eastern North American range in southern New Brunswick (van Zyll de Jong 1985). Although Morris (1948) stated that the Big Brown Bat occurred in New Brunswick, the presence of *E. fuscus* in the province was not confirmed until 4 September 1959 when a specimen was collected at St. Andrews, Charlotte County (Gorham and Johnston 1962). Squires' (1968) synopsis for the species in the province included only this single specimen and an indirect reference to an observation by S. W. Gorham. Subsequently, two additional specimens have been collected at Saint John, St. John County, 3 September 1976 and near Mactaquac, York County, on 4 September 1982. There is also a report of a Big Brown Bat echolocation sequence from Fundy National Park. (Tremblay 1989\*, 1992) and several unsubstantiated sight

records from various southern New Brunswick locations dating from 1930 to 1995 (Appendix 1; Squires 1967; Christie 1986). Sight records are based on bats observed roosting in a barn, in flight, or removed from mist nets during bird banding operations.

Until now, there has been no indication that the Big Brown Bat reproduced in New Brunswick. Also, in spite of extensive searches of New Brunswick bat hibernacula in caves and abandoned mines there have been no observations (McAlpine 1983) of this bat species over-wintering in the province. Here we compile 39 reports, both published and unpublished, for the Big Brown Bat in New Brunswick. These reports include 24 new specimens, plus two additional observations verified with archived photos and measurements. Most of the new data presented here has been collected incidental to ongoing monitoring programs for rabies.

There are five cases of the Big Brown Bat over-wintering in New Brunswick. Four of these bats, and

\* see Documents Cited section



possibly the fifth, were all discovered moving about inside heated buildings between December and 23 March 1996–2001; NBM files, NBM 5796, 5821, 5936). Among the 24 new specimen records is a non-volant, near hairless, young collected from a building in Fredericton, 22 June 1999 (NBM 5792). A home in Central Hampstead, Queens County, also appeared to support a maternity colony under the metal flashing covering the roof of a 19<sup>th</sup> century farmhouse. One of the bats (NBM 5797) taken at this site, although well-furred, has a forearm length of 36.1 mm well below the range for adults of the species cited by van Zyll de Jong (1985).

Until recently, *E. fuscus* was known primarily as a cave or mine hibernator. However, Whitaker and Gummer (2000) suggest that prior to European colonization of North America, the Big Brown Bat hibernated mainly in hollow trees, and that this has pre-adapted the species to exploit buildings. New evidence shows that the hibernacula of choice for this species in Indiana are the attics of heated buildings (Whitaker and Gummer 1992; Whitaker and Gummer 2000). Whitaker and Gummer (2000) propose that historically the Big Brown Bat was limited to a more southerly range due to a dependence on hollow trees for hibernation, but recent use of heated buildings may have allowed the species to extend its range northward and to increase populations in more northerly areas. However, Whittaker and Gummer (2000) found that most buildings serving as hibernacula harboured very few bats ( $\bar{x}$  = 2.7 bats for buildings which did not serve as summer maternity roosts). Brigham (1987) has reported that *E. fuscus* discovered active in buildings during winter in Ottawa weighed less and had significantly shorter forearm lengths than inactive bats hibernating in caves. The short mean forearm length of active bats studied by Brigham (1987) indicates that many were juveniles. He hypothesized that *E. fuscus* may become active in winter when energy reserves are critically low. While this suggests that active bats may not be those which will survive the winter in these buildings, two of our records came from the same building five years apart, suggesting long-term use of the site and successful over-wintering by some individuals.

Records presented here provide the first evidence of *E. fuscus* as a reproducing and over-wintering species in New Brunswick. While uncommon, the Big Brown Bat appears to be more abundant in New Brunswick than documented previously. With few Big Brown Bats in buildings, it is possible that the species has been overlooked in the past in New Brunswick. However, there have been an increasing number of bats submissions from New Brunswick for rabies testing since 1987 (6 in 1987, a high of 48 in 2001), the source for most of the recent Big Brown Bat data for the province presented here.

Only about 30 echolocation sequences from nearly 160 000 collected in and around Fundy National Park show characteristics that suggest these sequences are either Big Brown or Silver Haired Bat (*Lasionycteris noctivagans*) (H. Broders, University of New Brunswick, unpublished). Likewise, bat surveys in central forested and southwestern coastal Nova Scotia show the Big Brown Bat to be virtually absent in these areas (Broders et al. *in review*\*). Also, Zimmerman and Glanz (2000) captured only four *E. fuscus* in 840 mist net hours along the forested central Maine coast. While it appears that *E. fuscus* is an insignificant component of forested ecosystems along the central Fundy coast of New Brunswick, targeted surveys for this species are lacking. In particular, there is a need to carry out echolocation surveys in tolerant hardwood stands in southwestern New Brunswick, where large trees (> 50 cm DBH) that might provide roosting sites are present, or at likely feeding areas nearby. In New Brunswick the Big Brown Bat reaches a northern range limit, where it appears to be closely associated with human-occupied buildings. This supports the suggestion by Whittaker and Gummer (2000) that such behaviour may have promoted a northward range expansion by *E. fuscus*, and perhaps an increase in populations in more northerly regions.

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### Appendix 1. Date, location, and source for records for the Big Brown Bat, *Eptesicus fuscus*, in New Brunswick.

- \*Bats verifiable by a specimen, or a photograph accompanied by measurements, deposited in the New Brunswick Museum (NBM) or Canadian Museum of Nature (CMN) collections.
- <sup>1</sup> Bats submitted to Animal Disease Research Institute, Ottawa for rabies testing. Big Brown Bats submitted for testing prior to 1996 cannot be verified with specimens; however, at least four of the five animals were identified by a technician experienced in identifying Canadian bats.
- Minimally, each of these records is documented in files housed at the NBM.

July 1930, Browns Flat, Kings County, NBM files.

\*4 September 1959, nr. St. Andrews, Charlotte County, CMN 27731

October 1967, Westfield area, Kings County, Squires (1967)

\*3 September 1976, Saint John, St. John County, NBM 1347

\*4 September 1982, Mactaquac, York County, NBM 1887  
1985<sup>1</sup>, Moncton, Westmorland County, NBM files

27 October 1985, Grand Manan, Charlotte County, Christie (1986)

23 June 1987<sup>1</sup>, Moncton, Westmorland County, NBM files

11 August 1987<sup>1</sup>, Fredericton, York County, NBM files

21 August 1988, Fundy National Park, Albert County, Tremblay (1989)

20 July 1988<sup>1</sup>, Sackville, Westmorland County, NBM files

\*? February 1990, Fredericton, York County, NBM files

12 July 1991<sup>1</sup>, Fredericton, York County, NBM files

25 September 1995, Kent Island, Charlotte County, NBM files

\*15 July 1996<sup>1</sup>, Fredericton, York County, NBM 5933

\*December 1996, Fredericton, York, County, NBM files

\*24 July 1997, Central Hampstead, Queens County, NBM 5793

\*24 July 1997<sup>1</sup>, Central Hampstead, Queens County, NBM 5794

\*24 July 1997<sup>1</sup>, Central Hampstead, Queens County, NBM 5795

\*24 July 1997<sup>1</sup>, Central Hampstead, Queens County, NBM 5797

\*15 January 1998<sup>1</sup>, St. Andrews, Charlotte County, NBM 5796

\*6 August 1998<sup>1</sup>, Saint John, Saint John County, NBM 5825

\*22 June 1999<sup>1</sup>, Fredericton, York County, NBM 5792

\* 2 July 1999<sup>1</sup>, Central Hampstead, Queens County, NBM 5823

\* 2 July 1999<sup>1</sup>, Central Hampstead, Queens County, NBM 5935

\*14 July 1999<sup>1</sup>, Fredericton, York County, NBM 5791

\*15 February 2000<sup>1</sup>, Fredericton, York County, NBM 5821

\*18 July 2000<sup>1</sup>, Fredericton, York County, NBM 5820

\* 30 August 2000<sup>1</sup>, Lincoln, York County, NBM 5819

\*23 March 2001<sup>1</sup>, Fredericton, York County, NBM 5936

\*8 June 2001<sup>1</sup>, Harvey, York County, NBM 5937

\*20 June 2001<sup>1</sup>, Islandview, York County, NBM 5938

\*25 June 2001<sup>1</sup>, St. Stephen, Charlotte County, NBM 5939

\*29 June 2001<sup>1</sup>, Central Hampstead, Queens County, NBM 5934

\*20 August 2001<sup>1</sup>, St. Stephen, Charlotte County, NBM 5940

\*4 September 2001<sup>1</sup>, Moncton, Westmorland County, NBM 5951

\*8 August 2002<sup>1</sup>, Sussex, Kings County, NBM 5952

\*14 August 2002<sup>1</sup>, Fredericton, York County, NBM 5953

\*21 August 2002<sup>1</sup>, Black's Harbour, Charlotte County, NBM 5954.



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