

Note

Predation of a brown bat (Vespertilionidae) by a Green Frog (*Lithobates clamitans*) in Ontario, Canada

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Abstract

On 31 July 2019, a Green Frog (*Lithobates clamitans*) was observed consuming a Big Brown Bat (*Eptesicus fuscus*) at Meux Creek, Neustadt, Ontario. The bat was likely roosting at a nearby undercut bank when it was preyed by the frog, which required nearly 90 min to consume its prey. This is the first record of a Green Frog consuming a bat species in Canada.

Key words: Green Frog; *Lithobates clamitans*; Big Brown Bat; *Eptesicus fuscus*; opportunistic feeding; first record; amphibians; bats

The diet of adult (post-metamorphic) Green Frog (*Lithobates clamitans*) is diverse, but consists primarily of invertebrates (Hamilton 1948; Jenssen and Klimstra 1966; Stewart and Sandison 1972; Werner *et al.* 1995); consumption of vertebrates is rare (Jenssen and Klimstra 1966; DeGraaf and Nein 2010). Further, Green Frogs typically consume smaller prey items compared with American Bullfrog (*Lithobates catesbeianus*; Werner *et al.* 1995), which are known to predate opportunistically on vertebrates and especially other frogs (Werner *et al.* 1995; Cross and Gerstenberger 2002; Jancowski and Orchard 2013; Gibson and Hoffman 2019). An important difference between these species is that Green Frogs prefer more terrestrial habitat than bullfrogs and consume a higher ratio of terrestrial prey items compared with other sympatric frog species (Stewart and Sandison 1972; Werner *et al.* 1995). The predation of vertebrates by bullfrogs is common (Werner *et al.* 1995; Jancowski and Orchard 2013; Gibson and Hoffman 2019); however, predation of bats by any species of anuran is rare (Kirkpatrick 1982; Filho *et al.* 2014; Mikula 2015; Mancina *et al.* 2016).

On 31 July 2019, we observed the apparent predation of a bat (Vespertilionidae) by a Green Frog in Meux Creek near Neustadt, Ontario, Canada (44.458°N, 81.018°W, elevation 280 m above sea

level). Meux Creek is a perennial stream that is ~15 m wide at this location. The near-stream riparian area was characterized by eroded banks, mowed grass, and cut banks with herbaceous and woody riparian cover. The channel itself consisted of a series of riffles, runs, and pools with some large instream woody debris. The observation occurred when a thrashing disturbance was noted on the riverbank, followed by an object tumbling from the bank into the water. We immediately identified a frog with a large prey item struggling in its mouth. On closer inspection we observed a Green Frog (later confirmed from photos using a dichotomous key) with black, membranous wings protruding from its mouth (Figure 1). The prey item was identified as a bat and likely a Big Brown Bat (*Eptesicus fuscus*) based on regional abundance in 2019 resulting from population declines of Little Brown Bat (*Myotis lucifugus*) related to white-nose syndrome (Frank *et al.* 2014). The frog remained near the bank, motionless, at a depth of ~30 cm, with the bat immobilized in its mouth for 5 min.

During this time, we were able to document the event with digital photographs and a short video. After the frog had consumed most of the bat, we captured the frog in a net to identify both species. We estimated the snout–vent length of the frog at 7.5–8.0 cm. Because the bat appeared to be similar in size,



FIGURE 1. Green Frog (*Lithobates clamitans*) consuming a Big Brown Bat (*Eptesicus fuscus*), 31 July 2019, Meux Creek, Neustadt, Ontario, Canada. Photo: Fabio Vilella.

we estimated its length at 8–10 cm, which would give it an approximate mass of 11–25 g (NCC 2021). After release, the frog remained underwater near the bank where it took another 90 min to completely consume the bat.

Predation of bats by anurans is known, particularly in the tropics (Gouveia *et al.* 2009; Mikula 2015; Mancina *et al.* 2016), but as far as we know there is no documented evidence of a Green Frog depredating bats in Canada (Mikula 2015). Big Brown Bats (especially solitary males in summer) are known to roost in various crevices (Kurta and Baker 1990), but foliage roosting of vespertilionids appears to be rare in Canada (Davey and Fraser 2007; Huynh 2009). The bank where the frog and bat appeared was ~2 m high with a severe undercut of ~0.75 m. Herbaceous vegetation overhanging the bank was near total and created a dark, shaded undercut that would protect a roosting bat from wind and precipitation. Based on the lack of observations in the literature, this is likely an opportunistic predation of a roosting bat that is unlikely to occur with any frequency.

Our observation represents the first record of a Green Frog consuming any bat species in Canada, and the northernmost record of any frog spe-

cies predating bats in North America (Mikula 2015). This record confirms *L. clamitans* as an opportunistic predator that will eat prey items larger than those making up the bulk of its diet. Some frog species will wait at bat roosting sites for falling bats (Gouveia *et al.* 2009); however, our discovery yielded no other bats under the cut bank, further reinforcing the conclusion that this was an opportunistic event and unlikely to be a widely distributed behaviour. This observation further expands the knowledge of opportunistic feeding behaviour of amphibians on large prey items and represents a first for a non-bullfrog species in North America.

Author Contributions

Writing – Original Draft: J.J.W.; Writing – Review & Editing: J.J.W., C.M.B., B.J., and F.V.; Investigation: J.J.W., C.M.B., B.J., and F.V.

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