

Swarming behaviour and fall roost use of little brown and northern long-eared bats in Nova Scotia,

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This project was completed as an MSc thesis by Amanda Lowe at Saint Mary's University under the supervision of Hugh Broders. The thesis was defended in August 2012 and was titled "Swarming behaviour and fall roost use of little brown (*Myotis lucifugus*) and northern long-eared bats (*M. septentrionalis*) in Nova Scotia, Canada". This report is a short summary of the thesis.

Chapter 1- General Introduction

Temperate bats exhibit a poorly understood behaviour during the fall known as swarming, which has both survival and reproductive consequences. The goal of this project was to characterize how variation in physical conditions influence the movement patterns and resources used during the swarming season of the little brown bat (*Myotis lucifugus*), and the northern long-eared bat (*M. septentrionalis*) in Nova Scotia, Canada. The objectives were to: 1) investigate if the swarming behaviour of male little brown bats is influenced by individual differences in body condition and reproductive status; and 2) characterize the roosts used by both species during the season.

Chapter 2 - Body condition of adult male little brown bats (*Myotis lucifugus*) explain little of the inter-individual variation of swarming behaviour in Nova Scotia, Canada

Fall is a busy transition period for insectivorous bats that survive the temperate winter in hibernation. In addition to storing fat, these bats partake in a poorly understood behaviour known as *swarming*; both of which have direct and competing fitness consequences. Swarming occurs over 6-8 weeks prior to the onset of hibernation at hibernacula. One hypothesis to explain this behaviour is courtship and copulation. This study investigates if inter-individual differences in the amount of stored fat (i.e., body condition) impacts reproductive status and influences the swarming behaviour of adult male *Myotis lucifugus* in Nova Scotia, Canada. It was predicted that bats with a high

body condition would be reproductive and would remain at, and closer to, a swarming site than males of a lower body condition and reproductive status as these individuals must focus on fat storage. Males in an advanced state of reproduction had a significantly greater body condition than non-reproductive males. However, contrary to the prediction, males with a high body condition entered the hibernaculum significantly less often and spent significantly less total time swarming than males with a low body condition. There was no difference between radio-tagged bats of a low and high body condition in the probability of their relocation. Of the individuals that were relocated, there was also no difference in the distance they roosted from the swarming site. Variation in behaviour among males of different body condition suggests that one or more other factors have a significant influence on inter-individual variation in swarming behaviours.

Chapter 3- The fall roost-use of the Little Brown bat (*Myotis lucifugus*) and the Northern long-eared bat (*M. septentrionalis*) during swarming in Nova Scotia, Canada

Roosts are a vital resource for temperate bats (Order Chiroptera: Vespertilionidae) and despite the many studies characterizing the roost-use of bats, few have characterized roost-use during the fall swarming and migration period. This study characterizes the roost-use of the Little Brown bat (*Myotis lucifugus* LeConte 1831) and of the Northern Long-eared bat (*M. septentrionalis* Trouessart 1897) during this time, in Nova Scotia, Canada. All bats for this study were captured and released at a swarming site after being fitted with a radio-transmitter. Those that were re-located (31 of 43 bats) were within 13 km of the capture site, and switched to roosts within 4 km of the tree used previously. Little Brown bats used several roost structures including trees, tree stumps, rocks and houses, but Northern Long-eared bats roosted only in trees or tree stumps. Although tree types used as roosts were highly variable (species, diameter at breast height, etc.), most roosts were on the south side of the tree. Despite the high variation in roost types used relative to expected based on summer roost selection, coniferous snags in mid- to late-decay stages (4-7) found in predominantly coniferous forests were also important roost-

resources for these species during the fall. Preliminary results suggest that males and females of both species may not select roosts of similar characteristics, which may reflect the selection of micro-climates best suited to the energy demands associated with the behaviours typical of swarming season. This study provides a basis upon which future studies might be modeled to help determine how roost-resource use varies between the summer and the fall for temperate bat species, and whether resource-use differs between males and females.

Acknowledgements

This project was funded by the Nova Scotia Habitat Conservation Fund (Contributions from hunters and trappers), Natural Sciences and Engineering Research Council of Canada (Discovery Grant to HGB and CGS award to AL), and Saint Mary's University. In kind support was also provided by the Nova Scotia Department of Natural Resources, Wildlife Division.