

# Relationship analysis between Order Chiroptera and burned forest areas



Big Brown Bat

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Northern Long-Eared Bat

## Abstract

Fires can be beneficial to forest health, especially in the Central Pine Barrens Region of Long Island which is a fire dependent ecosystem, but fire can be detrimental to some fauna living in the forest. The northern long-eared bat (*Myotis septentrionalis*) is a species which has been federally listed as threatened; some research has pointed to the fact that fires might be beneficial to the *M. septentrionalis* population in the long term by creating snags in which the species can roost. In the immediate short term, fires can burn parts of the bats which are not protected by fur, or smoke inhalation can harm adults and non-volant young. The purpose of this research was to determine if there is any difference between bat species utilizing burned and unburned forests at Brookhaven National Laboratory (BNL), with particular focus placed on the presence or absence of *M. septentrionalis*. Static acoustic surveys were conducted by placing detectors in burned and unburned forest locations to determine what species were using each forest type, and the bat calls were identified using Sonobat® and SCAN'R® (automated snapshot characterization and analysis software). 87% of the total collected calls were in the northeastern portion, or areas which had experienced fire in the past 10 years, although more research is needed to identify any significant correlation. This knowledge can help BNL determine where are possible roost areas are. This is beneficial for the planning of prescribed fires, so that during the pupping season additional preparation of the burn units will be conducted to minimize the impacts on the roosts.

## Introduction

The northern long-eared bat (*Myotis septentrionalis*) was once a common bat species in the region, but its population sizes have been decreasing drastically due to white nose syndrome (*Pseudogymnoascus destructans*), a fungal disease which has been decreasing bat populations globally (USFWS, 2013). *M. septentrionalis* has recently been federally listed as threatened. Understanding the habitats in which these species live and their responses to habitat modification are key to the conservation of the populations (Cox *et al.*, 2015). Prescribed fire, or fires in general, have the ability to create roost sites for many different species of bats, assisting their population (Cox *et al.*, 2015; Johnson *et al.*, 2011; Lacki *et al.*, 2009; Perry, 2012). The purpose of this study was to compare the frequency of bat calls in forests which had previously been burned by a fire to those which had not had a fire before. This was to see if fire did in fact affect bat foraging frequency in an area. The information gives an idea of how often the site is used by the different species.

## Methods

**Study Area:** Brookhaven National Laboratory, Long Island, New York

**Study Period:** June 2016 to August 2016

**Static Surveys:**

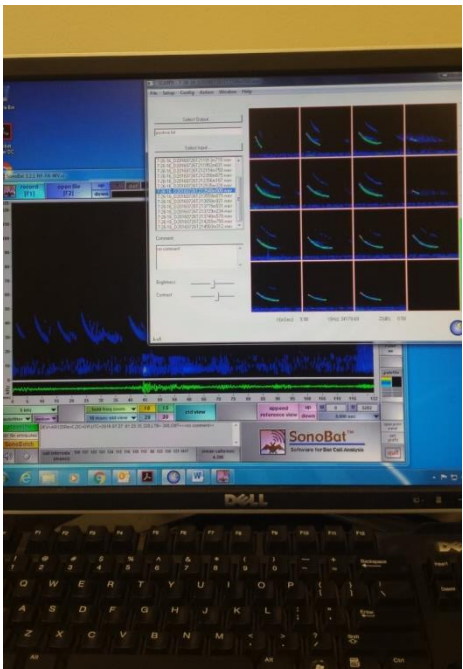
- Four Song Meter SM2BAT+® detectors were deployed in both the northeastern and southern portion of the lab, each with two Wildlife Acoustics® SMX-US ultrasonic microphones attached.
- The detectors recorded calls from 30 minutes after sunset until sunrise in 10 minute on/off intervals.

**Mobile Surveys:**

- An AR 125 Ultrasonic Receiver® by Binary Acoustic Technology® was used to constantly record bat calls along a pre-determined onsite route.
- Surveys took place between 2100 and 2230 on nights of good weather of speeds between 5 and 15 miles per hour.

**Call Analysis:**

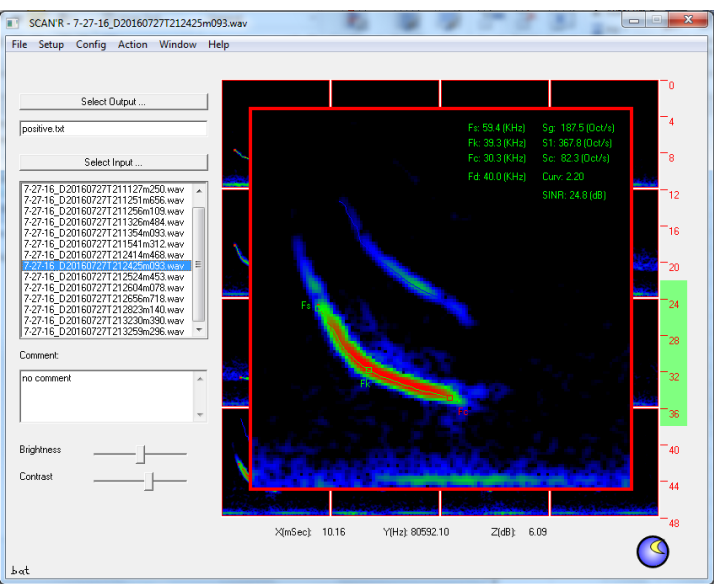
- Snapshot Characterization and Analysis Routine (SCAN'R®) and Sonobat® were used in order to identify species which made the calls.
- GPS locations were placed in Google Earth to determine the habitat that the bat was in.



Using SCAN'R® and Sonobat® to identify bat calls.



Bat detector set up in one of the burn plots.



Big Brown Bat (*Eptesicus fuscus*) call sonogram

## Results

- The most likely species of bat to be found was the big brown bat (*Eptesicus fuscus*), classified with the silver-haired bat (*Lasionycteris noctivagans*).
- 552 calls were positively identified from static surveys, 144 calls were positively identified from mobile surveys.
- Most of the calls came from areas which had had experienced a burn in the past 10 years (Figures 2-4)

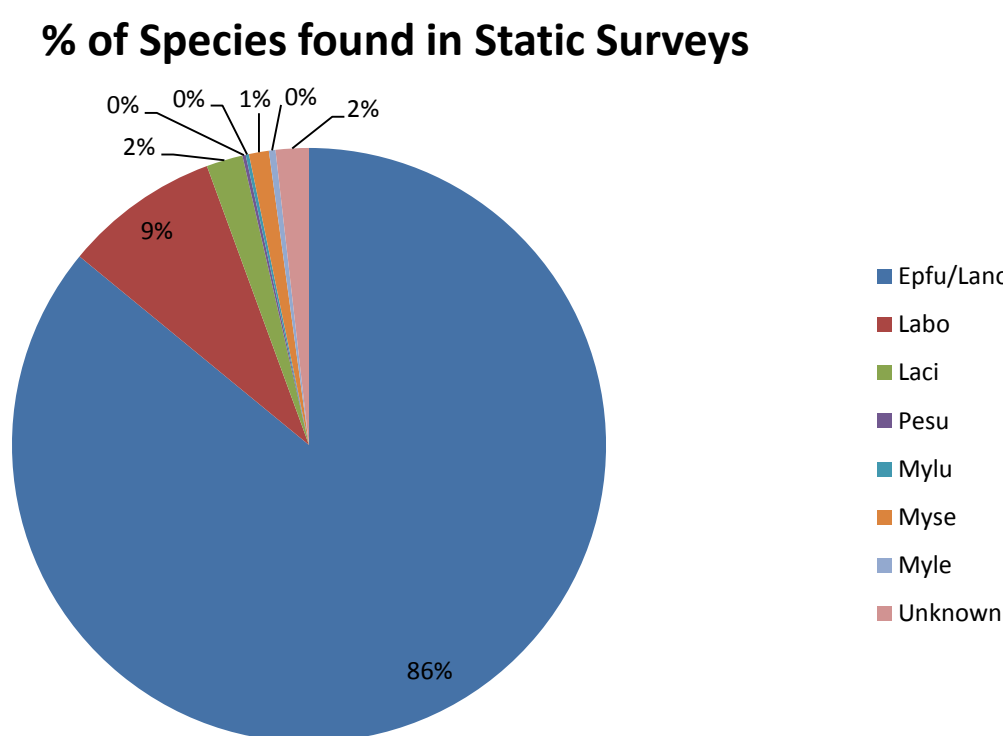


Figure 1. Total percents of bat species located during the study: Epfu= Big brown bat, Lano = Silver haired bat, Labo= Red bat, Laci= Hoary bat, Pesu= Tri-colored bat, Mylu= Little brown bat, Myse= Northern long eared bat, Myle= Small-footed bat.

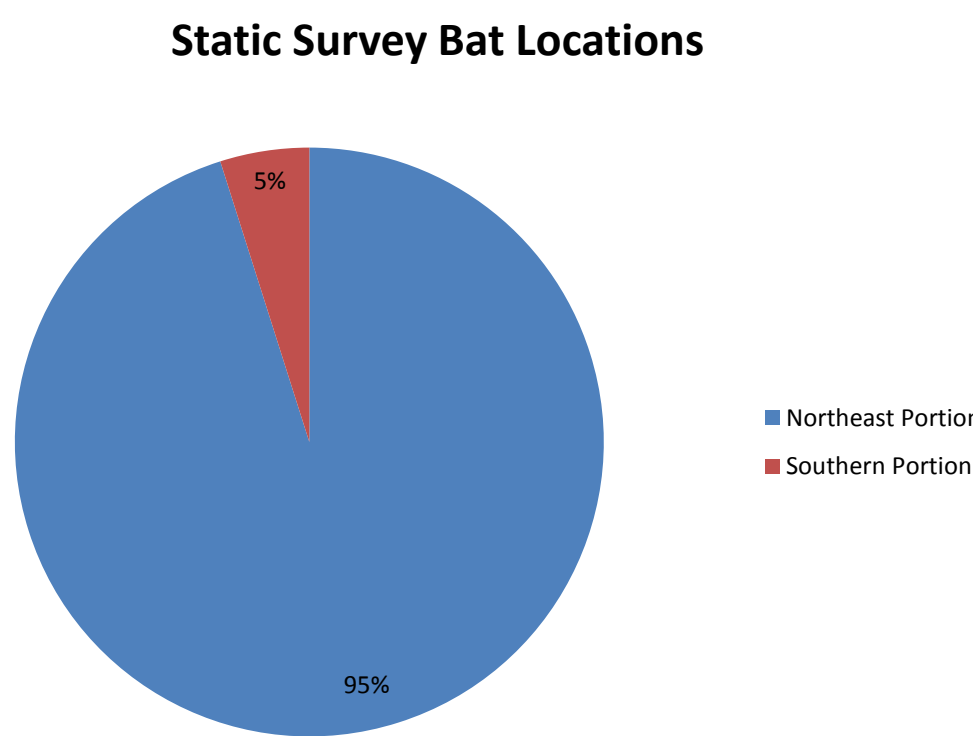


Figure 2. Percent bat species located in each stand during static surveys.

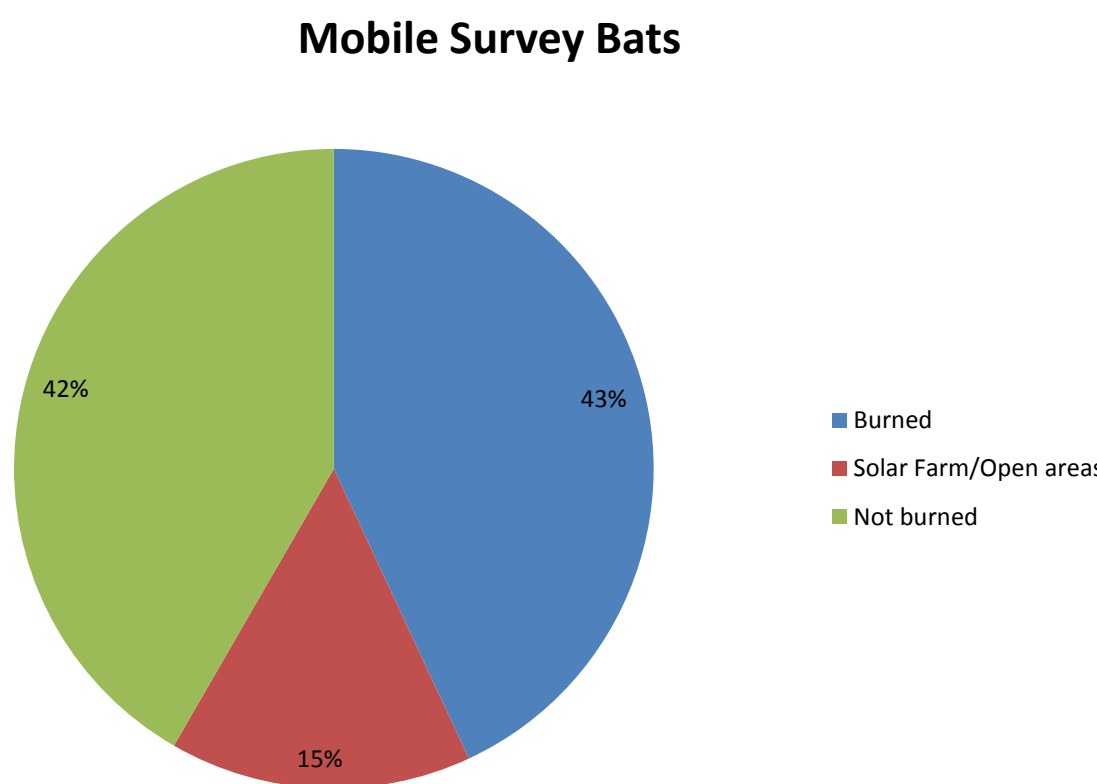


Figure 3. Percent bat species located in each stand during mobile surveys.

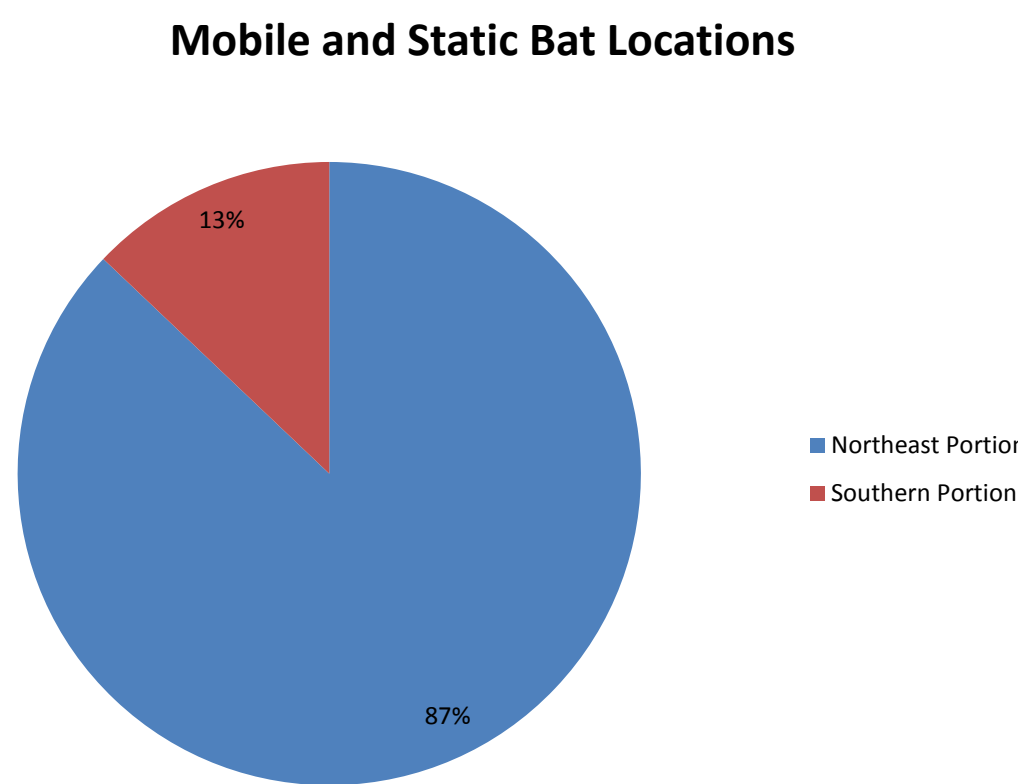


Figure 4. Percent bat species located in each stand during static and mobile surveys.

## Discussion

- The lack of calls by *M. septentrionalis* may be due to the fact that they require continuous forest cover and avoid edge (Yates & Muzika, 2006).
- Species were more likely to be found in the northeastern (burned) portion of the study site.
- The amount of calls detected declined as the summer progressed and could be due to either location or timing (Yates & Muzika, 2006).

**Future Research**

- Test if the decline in the call frequency was due to timing or the location of the calls
- Test if lower basal area does indeed increase the frequency of bat calls
- Mist netting can be done to determine if *L. noctivagans* is located in the area.

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