Assessment of Survey Methods for Counting Bat Emergence at Gray Bat and Southeastern Myotis Caves

Senior Thesis Prospectus

BACKGROUND

It is necessary to monitor cave sites used by bats in the southeastern states because many of them have been altered in response to anthropogenic impacts (Southern Wildlife Consultants 2008). Bats are an important group of mammals because of their high biodiversity and the economic benefits they provide as consumers of agricultural and forest pests (O'Shea and Bogan 2003). Bats have unique life history traits such as reproducing only once annually, giving birth to only 1 young and not beginning to reproduce until 1-year of age. These traits make them particularly vulnerable to changes in their environment. Alterations of bat habitats can lead to significant mortality and roost abandonment. Two species of particular interest in Georgia are the endangered gray bat (*Myotis grisescens*) and the southeastern myotis (*Myotis austroriparius*). It is not only essential to monitor these populations to ensure that they are not declining too rapidly, but it is also essential to know what kind of survey method yields the most accurate counts while still being particle to conduct on an annual basis.

I propose to compare two survey methods discussed by O'Shea and Bogan's (2003) for monitoring gray bat and southeastern myotis populations. Visual counts do not require expensive equipment or skilled technicians and is cost-effective, but it is subject to a high variation and observer bias. Use of night vision digital recorders along with additional high-powered near-infrared lights to film the emergence (Elliott et al. 2006) is labor intensive, requires technical equipment, and costs more than visual counts. Setting up the camera to receive the best image in the video is critical and knowing the flight paths of the bats is required (Sabol and Hudson 1995). However, night vision cameras are more accurate than using visual counts.

My study is a part of ongoing monitoring efforts at gray bat and southeastern myotis caves in Georgia. Visual counts and videos have been recorded at gray bat and southeastern

myotis caves since 2005 when the project began. The 3 known gray bat caves in Georgia are Frick's Cave, Lowry Cave, and Chickamauga Cave. Frick's and Lowry are both summer roosts for bachelor colonies while Chickamauga is a maternity roost (Southern Wildlife Consultants 2008). There are also 2 known southeastern myotis caves in Georgia, including Climax Cave and Chokee Creek Cave, which are both used for pup-rearing.

OBJECTIVE

The main objective of this project is to determine if visual counts can be used as an accurate survey method for gray bat and southeastern myotis cave emergences.

METHODS

Use of the night vision digital video recorder was adapted from methodology used by Elliott et al. (2006). The reasoning behind using near-infrared lighting is that bats cannot see these wavelengths, therefore; it should not disturb their behavior (Elliott et al. 2006). The video cameras (Sony Handicam) were positioned at the entrance so that the entire emergence area was within the camera field of view (Southern Wildlife Consultants 2008). The videos vary in the amount of time recorded anywhere from approximately 1 hour to 2 hours. Generally, the videos begin at sunset and end when a small number of bats are exiting the cave. The videos represent a complete and accurate count of the emergence numbers and can be used as a standard for comparison for the visual counts.

Visual counts were completed in the summer of 2008 following the methodology of Sabol and Hudson (1995). Because it was not realistic to conduct a complete count for the entire emergence duration, a complete count during a 1-minute interval was used. For the 1st minute out of every 5 minutes, a white light was shown on the cave opening and every bat exiting the cave was counted as best as possible. To get the total emergence number, the observor had to subtract

the number of bats flying back into the cave from the amount that exited. To get the overall emergence from this visual count, the number of bats exiting during the other 4 minutes was interpolated.

I will be analyzing a total of 12 videos, 3 per cave, taken over the summer of 2008. I will be analyzing 3 videos from each of the caves mentioned above, except for Chokee Creek Cave which has already been counted. Three videos were taken on consecutive nights at each cave in order to establish intra-colony variation (O'Shea and Bogan 2003). The videos were recorded during late June and July because this is when the colonies were at their maximum size. At the maternity colonies, the surveys had to be finished when the adults were present but before young became volant. To analyze the difference in counts between visual counts and video counts, I will first watch the videos to get an accurate count of the number of emerging bats from each cave. The videos can be slowed down to a frame-by-frame shot to get the most accurate count possible. After I have watched each video, I will compare my final video count to the visual count recorded for that cave. The difference between the 2 counts will be represented as a percentage.

ANTICIPATED RESULTS

Looking at past data, results from visual counts have both underestimated and overestimated actual emergence count (Southern Wildlife Consultants 2008). For example, in 2007 for Chokee Creek Cave, the visual count was as close as 99.7% of the actual count. In contrast, visual counts have under- or overestimated actual counts by as much as ?%, For example, visual counts over or under estimated counts by ?% at Frick's Cave in 2007. Accuracy may be based on the size of the cave entrance. My hypothesis is that the bigger the cave

entrance, the more likely an observer is to underestimate the visual count because it is more difficult to accurately count bats emerging from a larger area.

SIGNIFICANCE

It is important to know which survey method yields the most accurate results because that survey method should be used most of the time when possible. Although the most accurate survey method is needed when monitoring cave emergence, the most practical method is also needed. Even though using video cameras may be the most accurate method, it is also the most expensive and labor intensive. If it is determined that visual counts can yield a fairly accurate emergence count, then they can be used in place of video cameras. This will save researchers time, effort and money in the long run when monitoring cave emergence.

Literature Cited

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Project Timeline

1. Completion of data collection (watching videos)- May 2009

2. Completion of data analysis- September 2009

3. Submit draft to advisor- October 2009

4. Submit thesis to committee- November 2009

5. Present results- December 2009