

NCDOT Structure Surveys for Bats: Insight on Frequency of Bat Use and Emerging Trends in North Carolina Bridges

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Chris Cunningham, P.E.
Institute for Transportation Research and Education
North Carolina State University



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<p>16. Abstract</p> <p>Habitat assessments for bats on transportation structures are standard practice for the North Carolina Department of Transportation (NCDOT). These surveys are done as part of compliance for Endangered Species Act (ESA) Section 7 Consultation with the United States Fish and Wildlife Service (USFWS) to establish presence/absence or determine potential impacts to protected species. All data collected goes into a database which helps expand the collective knowledge of bat use within transportation structures in North Carolina. Currently, there are over 3,000 survey records in the NCDOT Bat Bridge Inspection database, with the earliest dating back to the mid-1990s.</p> <p>Several bat species found in transportation structures are federally protected. Therefore, it is important for NCDOT to understand the habitat preferences for these species which helps with transportation project compliance with the Environmental Site Assessment.</p> <p>Three primary tasks were completed. First, a meeting was held to discuss the project and associated data. Following this discussion, a review of the draft article and associated data was conducted by two or more independent staff. Based on that review and input from NCDOT, researchers conducted basis statistical analysis (t-test, ANOVA, etc.) in Excel-based format (for future use by NCDOT) and provided text for the draft report for consideration and incorporation by NCDOT. The results of this effort provided NCDOT and regulatory agencies much needed data analysis to better understand bat roosting locations in NC and best mitigation practices for endangered bat species.</p>					
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INTRODUCTION

Habitat assessments for bats on transportation structures are standard practice for the North Carolina Department of Transportation (NCDOT). These surveys are done as part of compliance efforts for Endangered Species Act (ESA) Section 7 Consultation with the United States Fish and Wildlife Service (USFWS) to establish the presence of and determine potential impacts to protected species when construction or maintenance activities occur. All data collected goes into a database which helps expand the collective knowledge of bat use within transportation structures in North Carolina. Surveys for bats on bridges are conducted by internal staff and experienced contractors. NCDOT also receives survey data from partners who are surveying NCDOT bridges for their own interests, such as the North Carolina Wildlife Resources Commission or university researchers.

In 2014, BSG created an electronic data collection method for Global Positioning System (GPS) enabled field data collection units in the form of a data dictionary. At that time, the original spreadsheet and coordinates were converted to a geometric location point layer with attributes that matched the data form fields and re-designed as the NCDOT Bat Bridge Inspection GIS database. To accompany the new data collection methods, a Standard Operating Procedure (SOP) for surveying structures for bat habitat was developed. The SOP and data dictionary further increased data collection consistency Department-wide for internal staff and external contractors.

In 2019, many surveyors moved away from using GPS units, and started collecting information on phones or tablets. At that time, NCDOT BSG provided an updated format for use on those devices through the ESRI Survey 123 form builder and software. This enabled users to capture data with mobile devices and analyze results in real time with ArcGIS Online. The paper form was digitized to create a field application which can sync to a group created in ArcGIS online. To date, NCDOT continues to maintain records of every NCDOT bridge that has been surveyed for bats. This technical assistance summarizes the results of NCDOT structure surveys for bats through 2023. The goal is to offer natural resource managers and transportation agencies insight on the frequency and emerging trends of bat use within North Carolina bridges.

METHODOLOGY

NCDOT Biological Surveys Unit partnered with NCSU – ITRE to perform a draft article review as well as a statistical analysis of the excel database that aids NCDOT in tracking bats observed in bridges to help inform the Department and the US Fish and Wildlife Service on what species of bats are consistently using bridges and what bridge parameters were showing preferred bat use in North Carolina. An Analysis of Variance (ANOVA) was performed on the summarized data. A binomial regression model was fit to the raw bat data.

RESULTS

Several edits were provided to the NCDOT Biological Surveys Unit in the draft article for better reading and understanding by the Department, other states and regulatory agencies. A summary table of Bat Species by Federal Protection and White-Nosed Fungus status due to the large number of bats that are currently being kept track of. The ANOVA analysis looked at the effect of the number of times a bat was counted on a bridge with respect to the protection status, vulnerability to the WNS fungus, whether the WNS fungus was present in North Carolina, and also the interaction effects between these variables. A separate ANOVA was performed for each region (East or West) of the state, as the bats' behaviors differ in each part of the state.

None of the variables tested were significant sources of variation in the count of bats on either side of the state. Based on the data we have available, there is insufficient evidence to prove that the introduction of a deadly fungus has negatively impacted the numbers of endangered bats in North Carolina bridges.

The binomial regression model, with an AIC of 2888.4, showed that bats were more likely to be observed at concrete bridges, and were more likely to be observed at a bridge prior to the arrival of the WNS fungus.