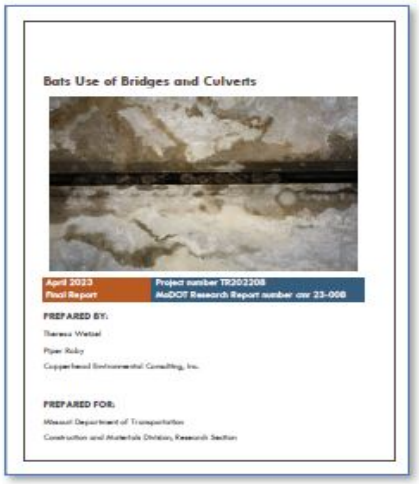
For more information contact: Brent Schulte (573) 526-4328

Research Summary

Bats Use of Bridges and Culverts



Bats use natural roosts such as trees and caves, but many species also use anthropogenic roosts such as buildings and transportation structures. A growing number of transportation departments are integrating bat management techniques into structure maintenance schedules. This document compiles what is known about how bats use bridges and culverts, determines what technologies are available for surveying these structures for bats, and reports on available methods for removing bats and deterrents for discouraging bat use during construction and repairs. To accomplish this task, a thorough search was conducted using journal articles, transportation documents, media stories, and answers to questionnaires sent to state and federal agencies in the United States (U.S.). Although we report on all species found, the focus of the study was on five species that that have some federal status: endangered Indiana bat (*Myotis sodalis*), endangered gray bat (*Myotis grisescens*), threatened northern long-eared bat (*Myotis septentrionalis*), tricolored bat (*Perimyotis subflavus*) that is proposed endangered, and little brown bat (*Myotis lucifugus*) that is under review for listing.

Based on reported studies, 13.8% of the 8,648 structures surveyed across 21 studies in the U.S. showed signs of bat use. At least 25 bat species have been documented using transportation structures in the U.S., including species that are federally threatened or endangered. Most of the published literature reviewed focused on locating bats in bridges and culverts and identifying the characteristics of preferred structures and surrounding habitat. Though bats have been documented using metal and wooden structures, it is overwhelmingly evident that bats prefer concrete bridges and culverts, likely for the material's thermal properties and frictional properties for ease of roosting. Distance to water and suitable foraging habitat also seem to be important, though this may be based on habitat availability. Bats are mostly found under older bridges with expansion joints, hinges, and weep holes or areas of deterioration that create crevices or cave-like spaces. Multiple species use transportation structures as maternity roosts, night roosts, transitional roosts during migration, and in southern states, a few species use structures as hibernacula.

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Researchers and agency personnel use common tools to find bats in structures such as a spotlight and binoculars. For difficult to access sections, a borescope camera that records videos and images can be helpful. Another option is drones fitted with thermal cameras to record areas of the bridge that researchers cannot see and may also be used to aid in emergence counts. Acoustic

detectors have been used at bridges and on drones to detect bats, but this technique does not help in estimating colony size or species use. Since bat use can be seasonal or sometimes difficult to detect, some transportation departments are funding research to develop new techniques to assist practitioners in identifying bridges with bat use.

When bat use has been documented, managing the individuals or colonies during maintenance or replacement of deteriorating structures is important. This can be done with deterrents and/or exclusions. In general, deterrents discourage bats from approaching a structure whereas exclusions are physical barriers in the bats' preferred roosting spots. In most cases and if scheduling allows, maintenance and/or exclusion can be done when the bats are not occupying the structure (e.g., at night or in winter). If more time sensitive repairs need to be made on a structure with a bat colony, ultrasonic acoustic deterrents have been found effective in temporarily discouraging bats from roosting on the structure.

In addition to avoiding and minimizing disturbance to bats using transportation structures, there are some mitigation options. These include but are not restricted to, providing alternate roosting structures, protecting known hibernacula, funding research, in-lieu fees, and preserving bat habitat.

Figure 1. Gray bats (*Myotis grisescens*) roosting in a bridge.

Project Information

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CONTACT INFORMATION:

Brent Schulte
Intermediate Research Analyst
Missouri Dept. of Transportation
1617 Missouri Blvd.
Jefferson City, MO 65109
(573) 526-4328
Brent.Schulte@modot.mo.gov