Ohio Department of Transportation Research Project Fact Sheet

Leveraging Abandoned Railroad Tunnels for Bat Conservation	
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Agency	University of Cincinnati and Ohio University
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The Problem

The persistence of several species of bats in North America is threatened by white-nose syndrome (WNS). White-nose syndrome is caused by the fungus, *Pseudogymnoascus destructans*, which thrives in many underground environments that bats use for hibernation. Since *Pseudogymnoascus destructans* was accidentally introduced to North America, the northern long-eared bat (*Myotis septentrionalis*) has become federally endangered, the tricolored bat (*Perimyotis subflavus*) has been proposed for federal endangered status, and the little brown myotis (*Myotis lucifugus*) is currently under review for listing by the U.S. Fish and Wildlife Service. Currently, the largest known winter colonies of little brown myotis and tricolored bats in Ohio are found in abandoned railroad tunnels. These colonies are affected by WNS but are still able to survive the winter. However, bats in these habitats are vulnerable to human disturbance, as documented by dozens of hibernating little brown myotis being killed by an air gun (Figure 1). Our goal was to locate as many potential tunnel hibernacula as possible and to provide recommendations for managing these sites in the interest of bat conservation.

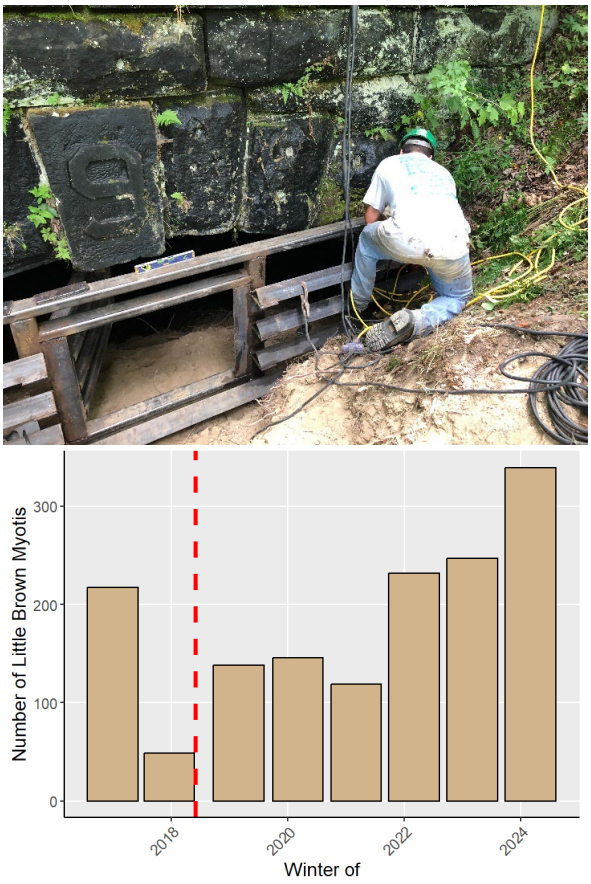

Figure 1: Installation of a bat friendly gate on an abandoned railroad tunnel in Ohio (top photo). Prior to gating, little brown myotis in this tunnel were shot during hibernation, causing a 77% decline (graph at bottom). Since gating, the population has slowly recovered.

Research Approach

We used the internet, U.S. Geological Survey topographic maps, and digital elevation models to locate abandoned railroad tunnels throughout Ohio. We visited 40 tunnels during winter to survey for hibernating bats and collect a suite of habitat variables. We used a combination of machine learning and generalized linear mixed models to understand the habitat features that best predicted counts of little brown myotis, tricolored bats, and big brown bats (*Eptesicus fuscus*). We then used the results to identify and prioritize management efforts to protect or enhance tunnels to promote the recovery of bat populations imperiled by WNS.

Findings

Twenty-six (65%) of tunnels were occupied by big brown bats, 12 (30%) by little brown myotis, 11 (28%) by tricolored bats, and 2 (5%) by northern long-eared myotis. Nolan Tunnel in Coshocton County is the

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largest known hibernaculum for little brown myotis in Ohio, with 806 bats counted in December of 2023. Tunnel 9 in Harrison County has a winter colony of up to 49 tricolored bats and is the largest known hibernaculum for that species. Counts of both little brown myotis and tricolored bats were greater in longer tunnels and tunnels with less temperature variation (Figure 2). Three tunnels were gated by ODOT during the course of this study, all of which experienced increases in winter bat counts following gating.

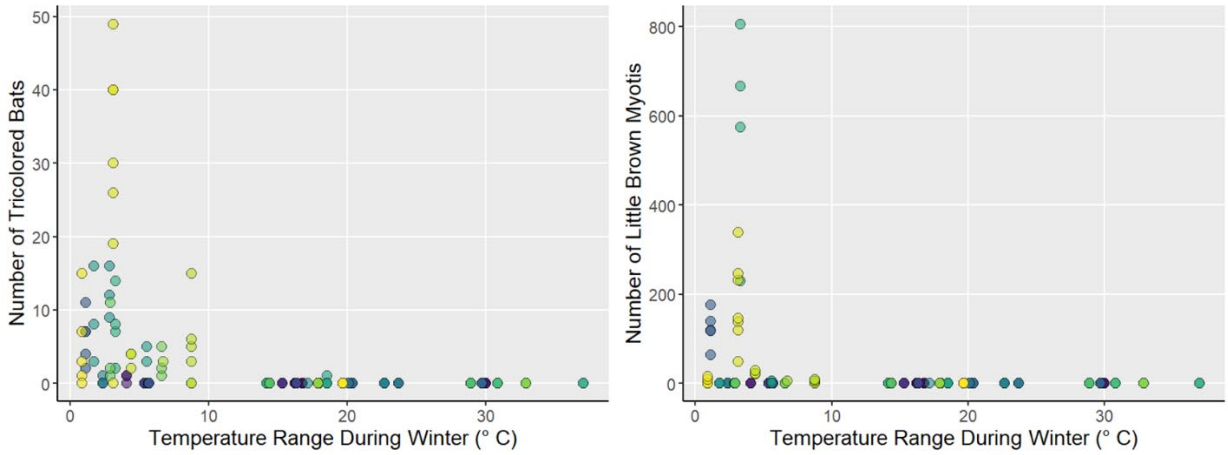

Figure 2:Winter counts of tricolored bats (left) and little brown myotis (right) were greater at tunnels with less temperature variation during winter, especially tunnels with a <5 C range in temperature. Different colored circles represent data collected from different tunnels (n = 39 sites with temperature and count data).

Recommendations

Abandoned railroad tunnels are home to the largest known winter colonies of tricolored bats in Ohio. These sites are being prioritized for conservation and management. This includes gating sites with important populations of little brown and tricolored bats by forging partnerships with landowners. Sites without important populations should be managed to minimize temperature variability and attract bats.

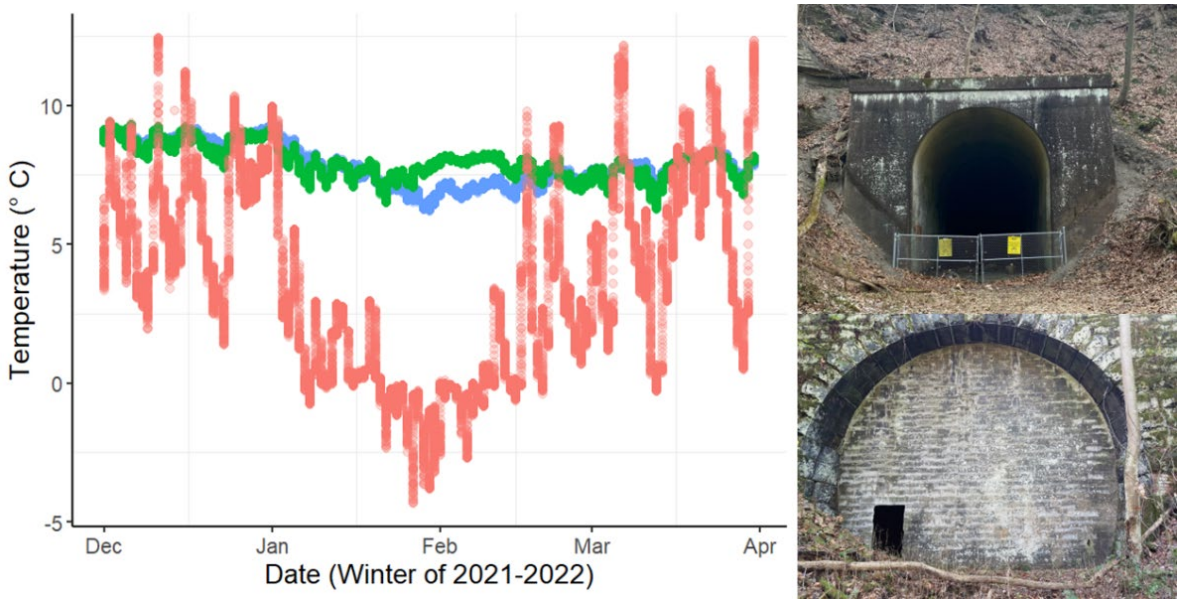

Figure 3: Winter temperature within three abandoned railroad tunnel hibernacula in Ohio (left), including two occupied by tricolored bats and little brown myotis (shown with blue and green circles) and one used only by big brown bats (red circles). Top right: an example of an abandoned tunnel occupied by only big brown bats (top) and a tunnel occupied by tricolored bats and little brown myotis (bottom right).

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