2023 Voluntary Pre-Listing Conservation Report for the Little Brown and Tricolored Bats

The Ohio Department of Transportation's Federal Aid construction program and state funded maintenance program impact suitable habitats for the little brown bat (Myotis lucifugus, MYLU) and tricolored bat (Perimyotis subflavus, PESU). Due to declining populations, these species are being assessed for listing under the Endangered Species Act and the PESU has been proposed to be listed as endangered under the Act. In order to enhance and preserve habitat for the benefit of MYLU and PESU, ODOT developed a conservation program under the U.S. Fish and Wildlife Service (USFWS) Policy Regarding Voluntary Prelisting Conservation Actions (Program). Approved conservation measures completed under this plan can be used to offset potential impacts from future ODOT projects. ODOTs voluntary conservation actions undertaken as part of the agreement are being used to protect MYLU and PESU hibernacula. Under this agreement, ODOT identified, purchased, enhanced, and protected MYLU and PESU hibernacula. Therefore, the protection of bat hibernacula is a priority conservation action for ODOT. The goal of this conservation action is to provide hibernating bats with safe hibernacula that are not susceptible to human disturbance; and, therefore, have high potential to sustain and increase the bat populations that inhabit them. The monitoring performance of ODOT's four sites and discussed below.

Tunnel 9

Ohio's largest studied hibernaculum for PESU, was gated in 2019. Counts of MYLU and PESU increased dramatically at Tunnel 9 following gating (see tables and figures below). A conservation easement has been placed over the gated openings and tunnel. No modification to the gate or tunnel is recommended at this time.

Tunnel 7

Ohio's fourth largest studied PESU hibernaculum is Tunnel 7, gated in 2021. Counts of MYLU and PESU have not increased following gating and manipulating. Counts of PESU (pre-gating high of 4 bats to post-gating high of 6) and MYLU (5) have not changed significantly. All of the little brown bats are found over water where temperatures are the least variable. Counts of big brown bats have declined post-gating and manipulation (pre-gating high of 116 to post-gating high of 81). This decline likely results from the microclimate modifications that were designed to reduce the variability temperatures during winter. However, the big brown counts also demonstrate that further microclimate improvements are needed, as no more than 16 big brown bats have ever been counted in railroad tunnels known to be important to little brown and tricolored bats (see Temperature Data Table). ODOT OES recommends reducing airflow at the gated entrance of the hibernaculum. This could be completed with the addition of insulation board, tin or metal plates added to the gate. A potential solution will be studied in greater detail. A conservation easement is placed over the gate side of the tunnel and a majority of the tunnel, however the gate on the west side of the tunnel is not located on lands protected by an easement.

It is possible that the current property owner that the western gate is located on will not agree to an easement over that gate.

Nolan Tunnel

Ohio's largest studied hibernaculum for MYLU, gated in 2022. Counts of MYLU and PESU increased dramatically at Nolan tunnel following gating (see tables and figures below). A land survey for the proposed conservation easement will be completed this winter. The easement should be in place by 2024. No modification to the gate or tunnel is recommended at this time.

Flushing Tunnel

Ohio's third largest studied hibernaculum for MYLU and PESU. Flushing Tunnel remains ungated. The sole entrance to this site is located ~50 m from the side of a road in the village of Flushing, Ohio. ODOT is working on the real estate tasks that would need to be completed to gate this tunnel.

Winter Temperature Variability

Of Ohio's largest hibernacula, Tunnel 7 has the coldest and most variable temperature (see figure below). Conversely, Flushing Tunnel has the warmest and least variable temperature. Based on data collection at other railroad tunnels (data not shown), few MYLU and PESU use sites with highly variable temperatures. The temperatures observed at Flushing Tunnel, nearly 11° C, are surprising but indicate that the thermal stability of this site outweighs the suitability of these temperatures for fungal growth. Data collection is still underway, but the greater population in Nolan Tunnel, which also has a stable winter temperature, suggests that slightly cooler temperatures are preferable to those recorded at Flushing Tunnel. Similarly, the variability in temperatures at Tunnel 9 may explain why there are fewer bats at this location compared to Nolan Tunnel. To reduce temperature fluctuations in Tunnel 7, Dr Joe Johnson, University of Cincinnati, will propose ideas for gate modifications to the resource agencies within the next few weeks.

Annual Qualitative Assessment of Hibernacula Structures and Gates

All gates appear to be in good condition and all hibernacula appear to be stable structurally. In Nolan Tunnel, there is a large collapse that occurred years before gating. One side of tunnel near the back of the hibernaculum collapsed, but this likely does not threaten the integrity of the site in the immediate future.

Summarization of Relevant Harp Trapping Data

Spring and fall harp trapping suggest that species diversity and abundance is underestimated during winter counts, as northern long-eared bats have been captured at Tunnel 7, Flushing, and Nolan Tunnels. Only one northern long-eared bat has ever been observed during winter counts (Flushing Tunnel, March 2023). These bats likely hibernate in deep crevices where they cannot be seen.

The weights of bats emerging in the spring range from 6–10 g. Although more years of data are needed before a statistical analysis can be performed, male bats (most of our sample size) emerging from Tunnel 9 tend to be heavier than bats and Flushing or Nolan Tunnels.

Annual Quantitative Survey of Hibernaculum

Counts of Ohio's five most important railroad tunnel hibernacula. For sites that have been gated, post-gating counts are denoted in bold and italic font.

Site	Date	Winter	MYLU	MYSE	PESU	EPFU
Flushing 1	3/17/2020	2020	64	0	2	0
Flushing 1	12/22/2020	2021	119	0	7	0
Flushing 1	3/10/2022	2022	118	0	11	0
Flushing 1	3/4/2023	2023	139	1	7	0
Nolan	2/28/2021	2021	230	0	2	0
Nolan	***12/21/2021***	***2022***	***575***	***0***	***7***	***0***
Nolan	***12/15/2022***	***2023***	***667***	***0***	***14***	***0***
Tunnel 7	2/27/2019	2019	7	0	1	102
Tunnel 7	3/5/2020	2020	5	0	4	116
Tunnel 7	***3/5/2021***	***2021***	***0***	***0***	***0***	***47***
Tunnel 7	***3/4/2022***	***2022***	***5***	***0***	***5***	***81***
Tunnel 7	***3/4/2023***	***2023***	***5***	***0***	***6***	***60***
Tunnel 9	12/19/2017	2018	48	0	0	0
Tunnel 9	***2/27/2019***	***2019***	***138***	***0***	***19***	***0***
Tunnel 9	***3/5/2020***	***2020***	***146***	***0***	***49***	***1***
Tunnel 9	***3/5/2021***	***2021***	***119***	***0***	***26***	***2***
Tunnel 9	***3/4/2022***	***2022***	***232***	***0***	***40***	***16***
Tunnel 9	***3/4/2023***	***2023***	***247***	***0***	***30***	***0***

Results of spring harp trap surveys conducted at railroad tunnel hibernacula (spring 2023 not included). Note that these data are collected as part of a grant provided by the Ohio Department of Natural Resources.

Site	Females	Males	Total
Flushing			
MYLU	3	10	13
PESU	0	2	2
Nolan			
MYLU	3	11	14
PESU	1	3	4
Tunnel 9			
MYLU	10	27	37
PESU	0	6	6

Results of fall harp trap surveys conducted at railroad tunnel hibernacula. Note that these data are collected as part of a grant provided by the Ohio Department of Natural Resources.

Site	Females	Males	Total
Flushing			
MYLU	6	104	110
MYSE	0	1	1
PESU	2	1	3
Nolan			
MYLU	5	52	57
Tunnel 7			
MYSE	2	2	4
Tunnel 9			
MYLU	15	82	97
MYSE	0	6	6
PESU	0	8	8

Figure 1. Winter counts little brown bats (A), tricolored bats (B), and big brown bats (C) at Ohio's five largest known hibernacula. Individual hibernacula are shown in different colors. Dashed arrows represent when various hibernacula were gated.

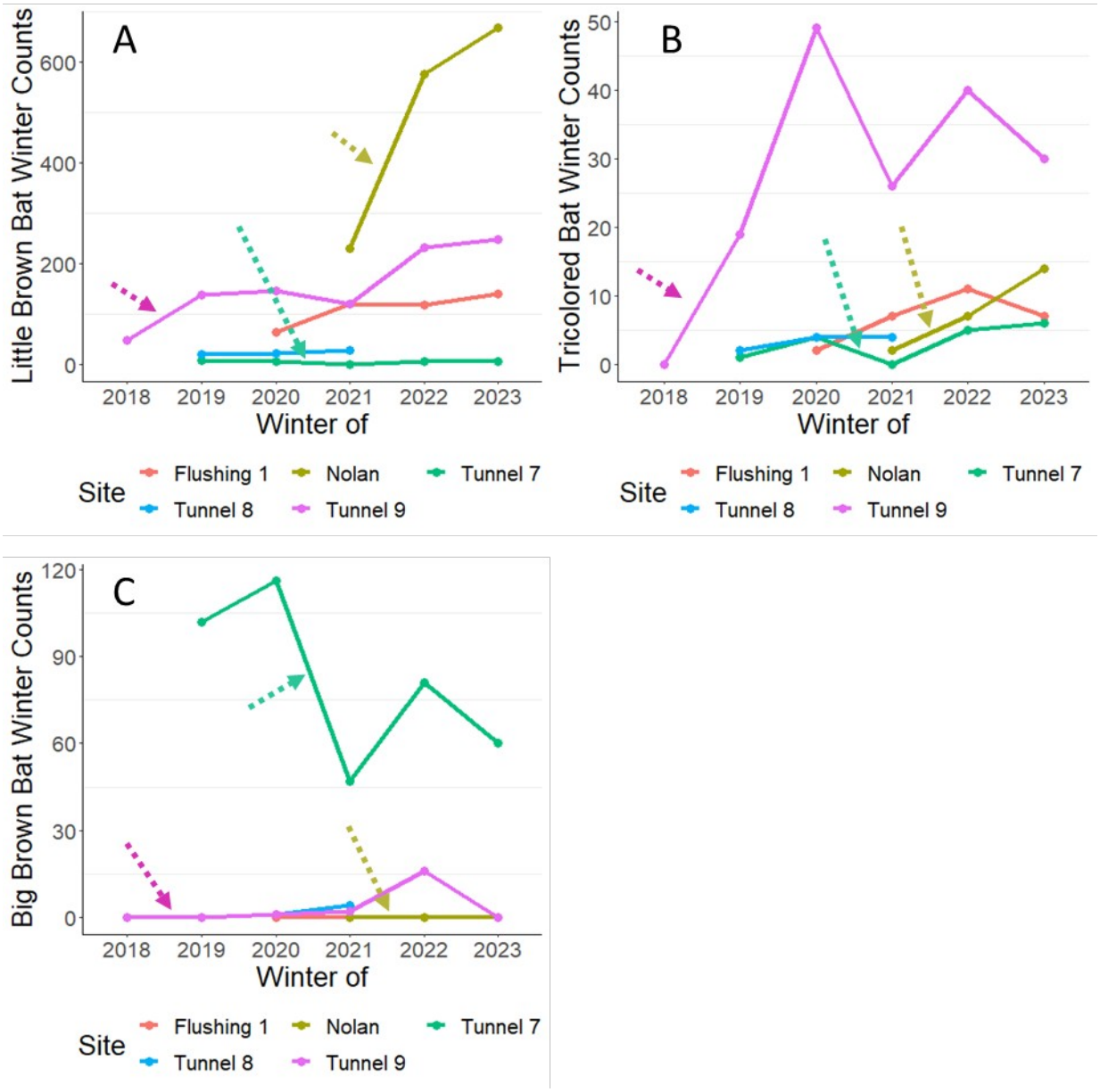


Figure 2. Temperatures within Ohio's 5 largest railroad tunnel hibernacula, except for Tunnel 8. Needs to be updated with Nolan 2023 data.

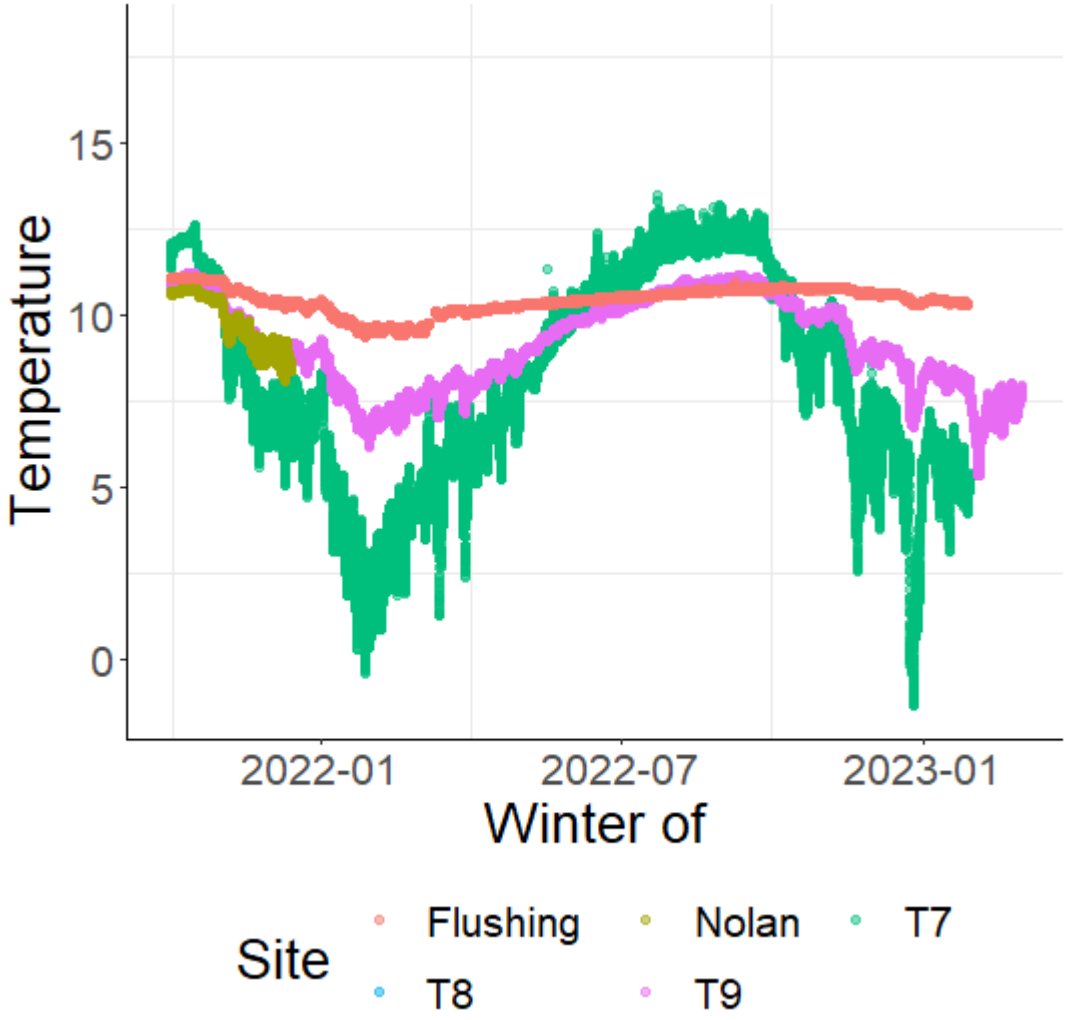




Photo 1 Little Brown Bats



Photo 2 Tricolored bat



Photo 3 Little Brown Bats and brachiosaurus



Photo 4 Tunnel 9 gate



Photo 5 Tunnel 7 gate



Photo 6 Nolan Tunnel gate



Photo 7 Flushing Tunnel to be gated.