Appendix B. Manual for determining bat presence at bridges and identifying bats most commonly detected in bridges in western North Carolina

When inspecting bridges for bats, we advise bringing tools to aid in discovery—a headlamp, high-powered (~1000 lumen) spotlight, binoculars, and a mirror on a pole to look into crevices beneath a bridge) or a remote endoscope-style camera on a pole (to show video on a cell phone). When feasible, use a ladder or snooper truck to visually inspect crevices that are otherwise inaccessible. Use a fine-scale ruler to measure the size of any guano pellets observed, which may help to differentiate big brown bats (*Eptesicus fuscus*) vs. smaller species such as *Myotis*. An acoustic bat detector will allow you to hear the high frequency sounds of bats, if present.

Walk the deck to inspect all guardrail crevices, and gaps between metal or wood posts and the bridge structure. Lean over the guardrail and use a mirror on a pole to inspect deck crevices open at the sides of the bridge. Underneath the bridge, use a spotlight to examine all visible parallel and perpendicular crevices for bats. Back several feet away from the bridge to view crevices over pier caps (deck crevice) with binoculars and a spotlight. This may allow you to see up to 3 feet or more into the crevice. Examine every exposed wall under the bridge and look behind or alongside swallow and wasp nests for roosting bats. Look up into any clogged drain pipe extensions/scuppers.

From the bridge deck, look over the guardrail or edge of the bridge to check surfaces on top of bridge pillars/caps for accumulated guano. Check horizontal surfaces underneath the bridge for guano pellets, but also use the spotlight to look for guano hanging on the walls or inside vertical crevices. Examine rocks, plant leaves, or the ground beneath crevices or near pillars for guano pellets that have fallen from a roost site or as bats emerged. Large accumulations of guano can emit a slight smell of ammonia.

Look for staining on vertical walls, around crevices, and on pier caps. Bat staining is generally light to dark brown in color, but can dry to a whitish crust. Often, staining from bats can be distinguished from water or salt staining by the presence of guano, stuck to the surface where the staining is or onto surfaces nearby. Look closely at suspected staining with binoculars or with the naked eye to search for intermixed guano.

Use a bat detector with a speaker to listen for the high frequency sounds of bats. Social calls, which are sometimes emitted while bats are at roost, are often lower in frequency and may be audible to the human ear during the day if you are quiet while visiting the bridge. Using a bat detector will enhance your ability to detect bat sounds, however. Bats at roost tend to be more vocal near emergence time (within an hour of the official sunset time), but it is possible to hear bats at any time of day if they are active. If you are able to watch the bridge at dusk (stay until at least 30 minutes after sunset), we recommend using the bat detector to record bat calls. Avoid pointing the microphone directly at a concrete structure. Rather, try to record bats as they enter the airspace around the bridge. This will yield more clear and identifiable calls.

On the following pages, we present images taken at bridges in western North Carolina. We show signs of bridge use by bats, photos of species observed at bridges, and photos of guano pellets and how to differentiate *Eptesicus* vs. small bats.

<u>Bats pictured in this manual</u>:

Eptesicus fuscus, big brown bat

Myotis grisescens, gray bat

Myotis leibii, eastern small-footed bat

Myotis sodalis, Indiana bat

Perimyotis subflavus, tri-colored bat

Tadarida brasiliensis, Mexican free-tailed bat

Signs of bridge use by bats

Guano on pier cap of bridge, visible by looking over the edge from the bridge deck.

Guano on pier cap, showing staining.

Guano on rocks beneath bridge roost.

Guano on rocks beneath roost.

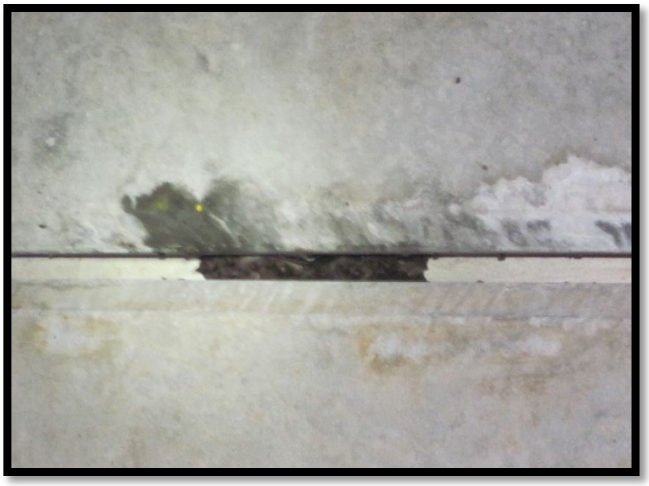
Guano under bridge.

A continuous accumulation of guano under bridge, partially broken down.

Guano in bridge crevice.

Staining on the underside of a bridge crevice used by *Myotis grisescens*, *Tadarida brasiliensis*, and *Eptesicus fuscus*.

Staining on the underside of a bridge crevice used by *Myotis grisescens*, *Tadarida brasiliensis*, and *Eptesicus fuscus*.



Bats roosting in a crevice with staining.

Guano and staining.

Salt staining not from bats

Salt deposits, staining not from bats

Bat roosting in open under a bridge.

Using a mirror to detect bats in crevices under a bridge.

Identification of bat species roosting in bridges

Myotis grisescens in clogged drainpipe – Note monochromatic gray colored fur (sometimes paler below), fully furred and pointed face, pointed ears, sharp tragus, long (40+ mm) forearm.

Myotis grisescens in drainpipe.

Myotis grisescens in crevice – Note monochromatic gray colored fur, fully furred face, and long forearms.

Myotis grisescens in crevice – Note monochromatic gray-colored fur.

Myotis grisescens in crevice – Note fully furred pointed face, pointed ears, and long forearms. The bat appears relatively large compared to other *Myotis* species but is distinguishable from the characteristics of *Eptesicus fuscus*.

<u>*Myotis grisescens*</u> (L) and *Eptesicus fuscus* (R) in crevice – Note the gray bat lacks a prominent muzzle with bulbous glands. The big brown bat has more rounded ears. Fur color differs across the two species.

Eptesicus fuscus in crevice – Note dark face and ears, along with prominent muzzle.

Eptesicus fuscus in crevice with guano – Note reddish-brown fur, dark and prominent muzzle with bulbous glands, and long forearm.

Tadarida brasiliensis in crevice – Note wrinkles on muzzle and dull-colored fur. Also, the base of the ears almost come together on the forehead.

Myotis sodalis roosting underneath a bridge - Note dull color of fur, pinkish cast to nose, and snub nose. Also note the presence of guano pellets on the vertical wall of the concrete beam.

Myotis leibii roosting in guardrail crevice - Note reddish brown fur, dark mask on face, dark ears and wings, and small size.

Perimyotis subflavus roosting in a culvert – Note reddish brown color of fur, red forearms contrasting with black wings, small size.

Identification of bat guano to genus

Small guano, likely from *Myotis* or *Tadarida.*

Eptesicus fuscus guano.