VDOT

Preliminary Bat Inventory Guidelines for Bridges

VDOT Environmental Division

Adapted from the Indiana Department of Transportation 2010 Bridge Inspection Manual and the Bernardin, Lochmueller and Associates 2007 document.

VDOT is required to take into consideration on projects those bat species that are protected by the Endangered Species Act and avoid activities that would take or harass these species. The guidelines in this document describe favorable characteristics of bridges that may provide habitat for many bat species and preliminary indicators intended to determine if any bat species are using bridges. **Presence of any bat species, or indications of their presence, must be coordinated with VDOT Environmental staff prior to undertaking any activities below the deck surface on all bridges.** If additional information is required to complete reviews beyond that required in the preliminary screening, that information will be gathered or procured by VDOT staff.

**This guideline applies to bridges statewide.** Individuals conducting reviews for bats must use the Bat Inventory Form provided in Appendix A and must provide a copy of the completed form to the responsible District Environmental Manager within two days of the date of inventory.

Individuals inspecting bridges should employ appropriate safety measures in conducting these reviews and avoid touching any bats. In addition to the standard required safety equipment for working on VDOT projects, recommended equipment include a flashlight (preferably a headlamp), hard hat, binoculars or spotting scope, digital camera, inventory form and a fine- to medium-point permanent marker or pen. It is advisable that individuals also consider having a dust mask, cellular phone, and boots if access beneath structures is desired. Easily removed, protective cover-alls may be advisable if access beneath bridges requires crawling.
Favorable Characteristics

**Cracks in Concrete**

Cracks in the concrete are used by bats as a foothold in roosting (Photo 1, Appendix B). In addition, some bats may be hidden from sight in wider cracks in the concrete and behind deteriorating concrete sections in the ceiling or walls. Look for cracking along support beams and inner walls especially below a fillet (a concrete filling between ceiling and vertical beam). During inspection, sounds may be heard coming from behind such cracks and/or expansion joints.

**Expansion Joints**

Expansion joints can provide protected cover for bats (Photos 2 and 3), but do not always provide habitat, depending upon whether they are obstructed by road debris or other blockages to use. If possible during inspection, individuals should look into expansion joints or in other cracks with a flashlight. If joints are used by bats, often there will be guano under the joints, but not always, since the joint may be located over water.

**Cave-like Environment**

While inspecting bridges, look for dark environments that mimic cave-like conditions. Structures that have enclosed sides or are protected on both sides by embankments or hillsides would provide conditions that loosely approximate these conditions. However, any structure with low-profile abutments (i.e., less than 4 feet above ground surface) are not likely to be suitable, due to easy access by predators. This may involve crawling under low areas so a hard hat is recommended.

**Large Rivers in Wide Floodplains**

Many concrete bridges that span larger rivers in wide floodplains offer excellent areas for roosting, although bats are not restricted to using these sites. These areas tend to have an ample food supply and may also serve as historic flyways for bats during migration (i.e., March-May and September-November). These bridges may also offer opportunities for mating in late fall.
Preliminary Indicators of Bat Presence

The four indicators presented here document physical observations that can easily be made for individual structures. Each of these indicators should be considered on its own merits; the presence of even one of these on a bridge is enough documentation to confirm bat usage. If questions arise regarding interpretation of these indicators, individuals should contact the District Environmental Manager for clarification or assistance. (NOTE: Some of these—visual and sound—will not be present during normal hibernation periods, as bats do not hibernate under bridges. Hibernation usually occurs between mid-September and mid-April, but caution should be used with this time frame, depending upon seasonal variations in climate.)

Individuals should visually inspect the underside of bridge spans and the tops of substructures, moving as close as reasonably possible to the structural features being inspected, to document presence/absence of indicators described below. When close review is not possible, individuals must carefully evaluate these features to the best of their ability to determine if indicators of bat presence exist using binoculars, spotting scopes or zoom/telephoto lenses.

Record observations on the form and make note of locations of positive indicators of bats either on sketches of the structure or by verbally describing locations in the form. When describing locations, use cardinal points (N, S, E, and W) to identify ends of the bridge (e.g., large guano deposits on abutment and first two piers from the S end of the bridge; first pier from the E abutment). Photo document any observations (including absence of indicators) and include them with the completed form.

Visual

Look for bats flying or roosting (hanging) during inspection. A flashlight or headlamp will be needed and binoculars may be necessary when viewing higher areas. If bats are present, record numbers as best as possible and their locations. Note any dead or injured bats. A sketch map would be helpful.

Sound

Listen for high pitched squeaking or chirping during inspection and identify location(s) for later examination by VDOT staff. This may be helpful in locating bats within deep cracks or open joints. A sketch map would be helpful.
Droppings (Guano)

Bat droppings are small (mouse-like in appearance but less regular), brown or black pellets (Photos 4-6). Older droppings may be gray in color. These droppings will accumulate on the ground, floor of a covered bridge or on structural components below where bats roost. Droppings may also adhere to support beams and walls below roosts.

Note bat droppings and their location, along with a subjective measure of the quantity. Check under likely roosting spots such as cracks, cave-like areas, and expansion joints. If guano is present, the inspector may wish to wear a dust mask. Also, it is advisable to wear rubber boots to minimize tracking of any guano into vehicle(s) and other places.

Appendix C includes useful information that provides a size comparison between two bat species and their guano (Vermont Fish and Wildlife 2013) and a separate sheet describing subjective measures of guano quantity that should be used in describing any evidence of bat guano observed.

Staining

Stains may appear wet and are usually found in dark places. Look for four to six inch wide dark stains located on concrete support beams and walls immediately below the ceiling of the bridge, and beneath joints (Photos 6-9).
References


Appendix A – Bat Inventory Form
This form will be completed and submitted to the District Environmental Manager prior to conducting any work below the deck surface on bridges. Each bridge to be worked on must have a current inventory.

Any bridge suspected of providing habitat for any species of bat will be removed from work schedules until such time that VDOT has obtained clearance from the US Fish and Wildlife Service, if required. Additional studies may be undertaken by VDOT to determine what species may be utilizing structures prior to allowing any work to proceed.

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Inventory Conducted By: ______________________________

Signature: ______________________________

District Environmental Use Only

Date Received by District Environmental Manager: ____________
VDOT Bat Inventory Form Instructions

1. Inventories must be completed prior to conducting any work below the deck surface, regardless of whether inventories have been conducted in the past. **Due to the transitory nature of bat use, a negative result in one year does not guarantee that bats will not use that structure in subsequent years.**

2. This form must be completed no less than ten (10) business days prior to initiating work at each bridge location. Legible copies of this document must be provided to the District Environmental Manager within two (2) business days of completing the inventory.

3. Estimates of numbers of bats observed should be placed in the Notes column.

4. Droppings (guano) should be roughly quantified, using the Characterizing Guano Deposits sheet from VDOT’s “Preliminary Bat Inventory Guidelines for Bridges.” Enter abbreviations for quantities (S, M, L) in Droppings column on form.

5. Any questions should be directed to the District Environmental Manager.
Appendix B - Photos
Characterizing Guano Deposits

Small deposits – scattered guano on structures, but does not cover continuous areas.

Moderate deposits – guano covers more or less continuous areas, but does not accumulate to the point of obscuring features.

Large deposits – guano covers large areas, able to obscure some features of the bridge substructure.
Photo 1: Bats hanging from cracks along support beams

Photo 2: Visible bats within an expansion joint

Photo 3: Example of open concrete joint used by bats

Photo 4: Guano deposits visible from bridge deck, on top of pier

Photo 5: Guano deposit on pier, obscuring structural features

*Photos courtesy of Jeff Gore, Florida Fish and Wildlife Conservation Commission
** Photos courtesy of Rick Reynolds, Virginia Department of Game and Inland Fisheries
Photo 6: Staining along longitudinal joint. Note guano deposits on ground*

Photo 7: Staining on underside of expansion joint from bat use. Note bats in vicinity*

Photo 8: Staining on sides of pier caps*

Photo 9: Guano staining on side of pier**

*Photos courtesy of Jeff Gore, Florida Fish and Wildlife Conservation Commission
** Photos courtesy of Rick Reynolds, Virginia Department of Game and Inland Fisheries
House Bats
The little brown bat and the big brown bat are referred to as “house bats” and can typically be found in buildings in Vermont from mid-April to October. Occasionally, the big brown can be found in buildings throughout the winter months, hibernating in attics or basements. When both species are present, size is the easiest characteristic to distinguish the two species – big brown bats are more than twice the size of little brown bats.

Little brown bat
- Adult little brown bats are typically only 2.5 – 4 inches long from nose to tail, about the size of an adult’s thumb.
- Fur is uniformly dark brown and glossy on the back with slightly paler, grayish fur underneath.
- Wing membranes are dark brown with a typical wingspan of 8.5–11 inches.
- Little brown bat guano is about the size of a typical grain of uncooked rice. The big brown bat guano is larger.

Big brown bat
- Larger in size than little brown bats, about 4 to 5 inches in body length.
- A broader nose stands out compared to that of a little brown.
- The fur looks long and silky, and is typically chocolate brown in color.
- The wing membranes, ears, feet and face are dark brown to blackish in color with an 11-13 inch wingspan.