VDOT

Preliminary Bat Inventory Guidelines for Bridges and Buildings

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 consider 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 and buildings (houses, barns, sheds, etc.) that may provide habitat for many bat species and preliminary indicators intended to determine if any bat species are using these. **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, that modify or remove roost potential on buildings or that would disturb roosting bats.** 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 and buildings 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 and no less than two business days prior to beginning work.

Individuals inspecting bridges or buildings 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 requires crawling.

Favorable Characteristics

Bridges

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 usings 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.

<u>Buildings (houses, barns, sheds, etc.)</u>

Access to Structure Interiors

Openings as small as one-quarter inch (1/4") can make a structure accessible to bats. Loose fascia or soffit boards, openings, or even protected areas behind shutters could be potential access or roost points. Once inside, bats are typically found near the roof ridge. However, they may be found in other areas (such as in the soffit or between joists or walls), if access is available. Inspection should focus on points of access and areas visible during an interior inspection (including the roof ridge).

Preliminary Indicators of Bat Presence

The four indicators presented here document physical observations that can easily be made for individual bridges or buildings. Each of these indicators should be considered on its own merits; the presence of even one of these 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 in these areas. 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, joints 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. All identified access points on buildings should be closely inspected. 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. For long or tall bridges where it is not possible to see these features, it may be necessary to use a snooper truck and traffic control to adequately review bridges for evidence of bat use. The responsible party should use its discretion in determining the level of review needed to adequately document its due diligence. Bridges that meet one or more of the following bulleted characteristics may be suitable candidates for use of snooper trucks and traffic control when conducting bat inventories.

- Bridges for which the need for certainty in regard to bat presence is paramount.

- Tall, long or inaccessible bridges, where pedestrian inspection would be unsafe or the tops of all pier caps cannot be viewed (this would include bridges with sufficient curvature so that these structures are obscured).

When bats are determined to be using bridges or structures the department or resource agencies may require additional work to determine what, if anything, must be done to insure compliance with the Endangered Species Act.

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 and proximity to structural components (e.g., large guano deposits on S abutment and first two piers from the S end of the bridge; first pier from the E abutment). Clearly photo document any observations (including absence of indicators) and include them with the completed form. A checklist is provided in Appendix A to assist the user in completing the 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. For bridges, check under likely roosting spots such as cracks, cave-like areas, and expansion joints. On or in buildings, guano may be present at the entry point, either as piles on the structure or the ground, beneath roost locations (which typically occur near the roof ridge line) or stuck to walls near entry points, either inside or outside the structure (Utah State University 2015; Bats in Houses 2015). 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). Ceilings, walls, and joists may be stained in buildings. Stains may have a musty odor, but care should be used with this, as other sources may be the cause of any odors (mildew, pet odor, etc.).

References

Bats in the Attic web page, 2015. *http://batsintheattic.org/inspection.html* Accessed October 26, 2015

Bernardin, Lochmueller, and Associates, Inc. 2007. Bridge Inspection Checklist for Bats. Unpublished. Evansville, Indiana.

Indiana Department of Transportation. 2010. INDOT Bridge Inspection Manual. Indiana. Available from: *http://www.in.gov/dot/div/contracts/standards/bridge/inspector_manual/index.htm*.

Keeley, Brian W. and Merlin D. Tuttle. 1999. Bats in American Bridges. Bat Conservation International, Inc, , Austin, TX. Resource Publication No. 4, 41 pp.

Utah State Unviersity Cooperative Extension Service. 2010. Wildlife Damage Management Service: Bats; accessed at *http://extension.usu.edu/files/publications/publication/NR-WD-004.pdf* on October 26, 2015; 4 p.

Vermont Fish and Wildlife Department. 2013. How to tell the difference between little brown and big brown bats. Website (*http://www.vtfishandwildlife.com/wildlife_bats.cfm*) accessed and pdf downloaded on April 17, 2013.

Appendix A – Bat Inventory Form and Checklist

VDOT Virginia Department of Transportation

Environmental

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 or when required to complete this form for buildings (houses, barns, sheds, etc.). Each bridge/building to be worked on must have a current inventory.

Any bridge/building 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 these assets prior to allowing any work to proceed.

Project Information			
District:	**Route:**	**CEDAR Project No.:**	**Latitude:**
	County:	**Charge Code:**	**Longitude:**

Structure Identifiers			
Federal Structure ID:	**Parcel No.:**	**D No.:**	**Building Description:** **If building is not part of an acquisition and does not have a Parcel No. and D No., enter a brief description here**
Date of Review:	**Deck Height Above Lowest Point** ☐ ≤ 2’ ☐ ≤ 4’ ☐ ≤ 6’ ☐ ≤ 10’ ☐ > 10’		**Bat Indicators** Check all that apply. Presence of one or more indicators is sufficient evidence that bats may be using the structure. ☐ Visual ☐ Sound ___ Droppings (S, M, L) ☐ Staining

Notes

Inventory Conducted By: _____

Company/Organization: _____

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 bridge deck surface or when required to do so for buildings, 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. Initial reviews may be conducted well in advance of proposed work. However, a copy of this form must be completed no more than one year prior to initiating work at each bridge/building location. Legible copies of this document must be provided to the District Environmental Manager within two days of the date of the inventory and no less than two (2) business days prior to beginning work.
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.

Bat Inventory Form Checklist

The following list provides a checklist of items to consider when completing the Bat Inventory Form.

- ☐ Have you used the most recent version of this form and guidelines?
  See https://insidevdot.cov.virginia.gov/Pages/Default.aspx and search for "Bat Inventory Guidelines" for the current version.

- ☐ Latitude/Longitude. Record latitude and longitude in decimal degrees (i.e., 36.123456). Longitude should be recorded as a negative number (i.e., -78.12345).

- ☐ Federal Structure ID. There are TWO structure IDs, a federal ID and a state ID. Insure that the federal ID is used and is 6 digits long. (Sometimes this is truncated to 5 or fewer digits. It's also possible that a much longer string with many leading zeros is provided. Add or delete zeros in front to reach the required character length.)

  - Example: The federal ID is 12345. Change this to read 012345

- ☐ Bat Indicators. Insure that droppings (guano) are characterized using the subjective methods in the guidelines and enter the abbreviated letter code in the Droppings field. Check all structural members described below:

  - For bridges. Structural members that should be checked include:

    - pier caps (top surface)
    - horizontal abutment surfaces
    - under deck irregular surfaces (cracks, efflorescence, spalling, etc.)
    - joints
  - For structures. Check any structural gaps, ridge lines or entry points.

  Document any guano or staining. Lack of any indicators should be documented as well.

- ☐ Notes. Describe the location of any observed indicators, using cardinal direction (N, S, E, W) and distance from abutments.

  - Example: 20 bats in 3rd joint E of W abutment

- ☐ Inventory Conducted By. Enter the name of the individual(s) conducting the review.

- ☐ Company/Organization. Enter the name of the company or organization of the person conducting the review.

- ☐ Site Photos. Photos (no smaller than 3" X 5" and of a resolution of at least 6 mega pixels) must be included with the report and, at a minimum, should document representative conditions of each of the structural members listed above, including absence of any indicators. Photos that show the road surface or surrounding landscape are informative, but do not adequately document conditions under the bridge or inside the structure.

- ☐ Bat Photos. If bats are observed, a clear photo should be taken of representative individuals and forwarded to the District Environmental Manager as soon as possible. Good quality photos can make identification easier.

Appendix B - Photos

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**

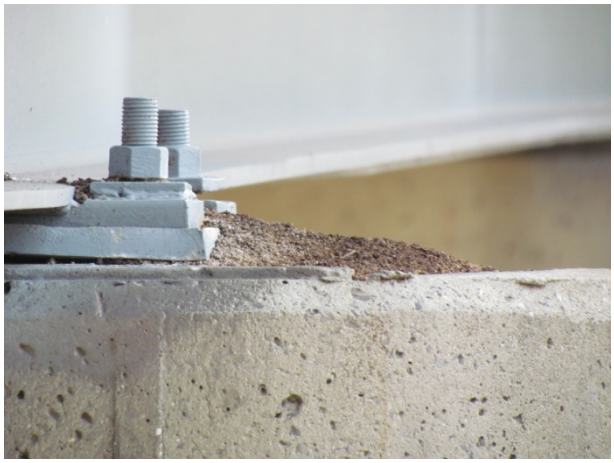


Photo 5: Guano deposit on pier, obscuring structural features

*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**

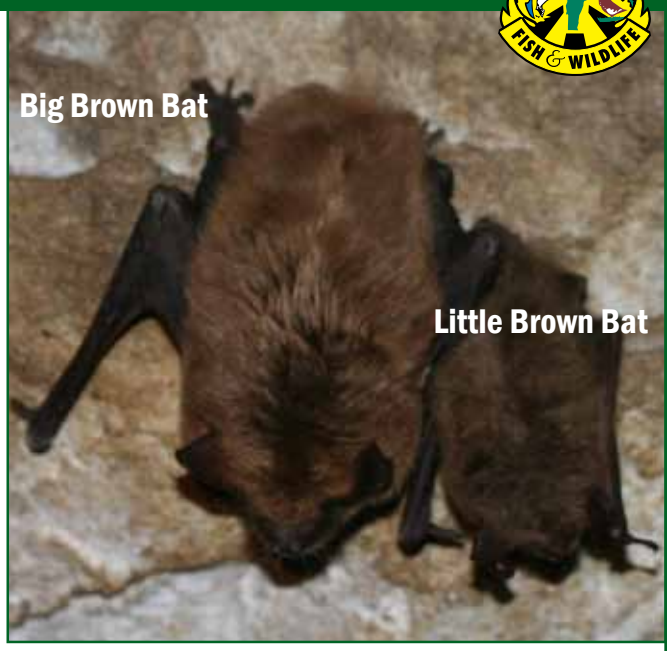
*Photos courtesy of Jeff Gore, Florida Fish and Wildlife Conservation Commission
** Photos courtesy of Rick Reynolds, Virginia Department of Game and Inland Fisheries

Appendix C - Useful Information

How to Tell the Difference Between Little Brown and Big Brown Bats

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.



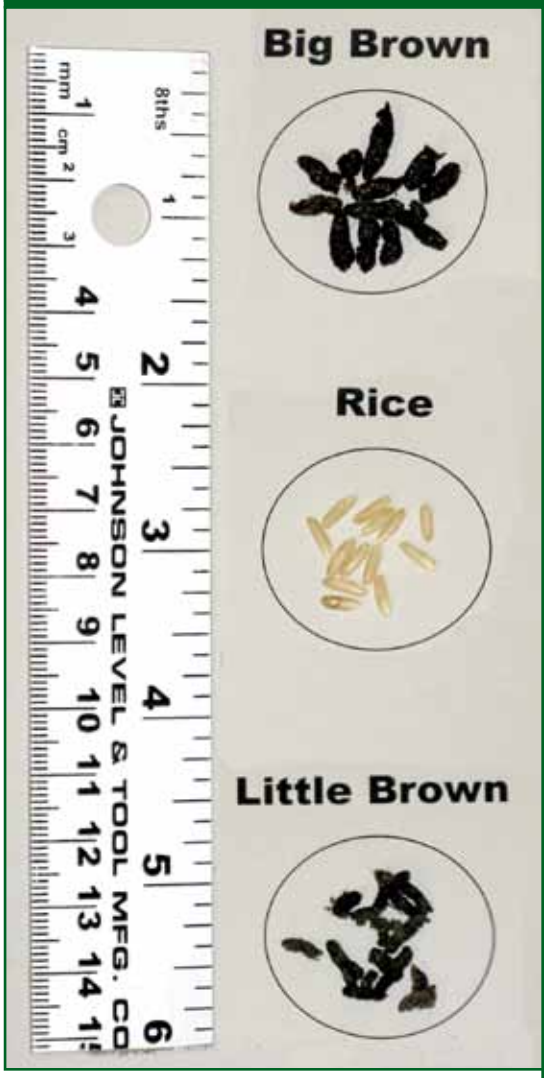
Little brown bat

- 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.

Comparing Guano Size



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.