



Pests and Pesticides in Child-serving Facilities: An IPM Newsletter

Got Bats?

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Big brown bat, *Eptesicus fuscus*. Credit: https://www.extension.org/pages/62813/ipm-action-plan-for-bats#.VZWd2_IvhHw

Bats are valuable members of the ecosystem that may consume 25 to 125% of their body weight in insects each night. Scientists estimate bats are worth more than \$3.7 billion a year in reduced crop damage and pesticide use in the U.S. During the winter, bats hibernate in caves, mines, rock crevices, tree hollows, drainage pipes or in buildings. Some bats are colonial and hibernate in groups, and others are solitary. About mid-April females start establishing maternal colonies where the young are born.

Two colonial species, the big brown bat and the little brown bat, are likely to roost in structures in Tennessee. In fact, the big brown bat is the only bat known to inhabit human structures on a year round basis. Recently the Mexican or Brazilian free-tailed bat made its way to Tennessee and in the southeastern U.S it occurs exclusively in man-made structures. However, it is uncommon in Tennessee and is only known from Knox and four counties lying to the east or southeast as well as Montgomery county. Eastern colonies of the Mexican free-tailed bat are small and may contain several hundred individuals compared to the large colonies found in Texas where approximately 20 million of these bats are known to occur in one cave!

Special Points of Interest

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If you suspect that bats are roosting inside a structure, do an outdoor inspection at dusk over several nights to observe whether or not bats are leaving the building. Two people are better than one for this activity. Note the key entries/ exits so that they may be sealed after young bats become independent. Spotting a bat indoors in winter or two or more isolated bats indoors between March and October is usually a sign that bats are domiciled in a structure.

Occasionally bats accidentally enter structures through open doors or windows. Often these may be young bats that are still not adept in navigation. If a bat enters an area in a school, calmly remove all students and staff from that area and seal access to the area until the bat is removed or escapes. Removal of a stray bat is best left to someone that is trained in wildlife removal techniques, has the necessary protective equipment, and is vaccinated to prevent rabies. About 1 % of bats carry rabies, but it is wise to protect yourself from an accidental bite or contact with saliva. Only testing can confirm if a bat carries the rabies virus. Advise the school community not to handle any wildlife. See *Bats In Schools* at <http://agrilife.org/batsinschools/> for more information on removing bats and other topics.



Little brown bat, *Myotis lucifugus*. Credit: <https://www.extension.org/pages/62813/ipm->

Bats only need an opening as small as $\frac{3}{8}$ " or the diameter of a dime to gain entry. Bats use existing gaps; they cannot chew or claw to make new openings. Signs of a bat infestation include smudges of body oils on the outside of the building where bats enter, piles of guano either inside or along the foundation of the structure, urine stains on the ceiling, pungent odor from accumulation of guano and noise coming from inner walls or upper levels of the building. Bat guano may be confused with rat feces, but it is $\frac{1}{8}$ to $\frac{1}{4}$ -inch long, shiny, filled with insect parts and crumbly when dry. Bat guano accumulating in a dark damp environment has the potential for supporting the growth of spores that cause histoplasmosis, a respiratory disease. Spores become airborne when the guano is disturbed. Proper techniques and protective equipment are needed to remove large quantities of guano. Call a professional for cleanup.

Sealing possible entry points is the best way to prevent bats from establishing a roost within a structure. Check for gaps at the roof wall interface, around soffits and fascia boards, under loose flashing, in unscreened vents and around utility and pipe penetrations. Exclusion must be done after bat pups have gained the ability to fly usually by the end of August; otherwise, the young will be trapped and die. As dead bats decompose, both odor and insect problems result. If bats are present, before all entry points are



Mexican or Brazilian free-tailed bat, *Tadarida brasiliensis*. Credit: http://www.extension.org/pages/62813/ipm-action-plan-for-bats#.VgmF_5eAs3S

sealed one-way exits must be established so that bats can leave but not reenter. It is recommended that the temporary exits be left in place at least a week to make sure all bats have had a chance to escape. See <http://icwdm.org/handbook/mammals/bats.asp> for information on constructing one way exits. Both 2-inch diameter tubing and 1/6-inch polypropylene netting are successfully used to construct one way exits. Use metal flashing, ¼-inch hardware cloth, sealant, and caulk to seal gaps.

Tennessee is home to 16 species of bats. See the Tennessee Bat Working Group website <http://www.tnbgw.org/> for information on the biology of species and their distribution. White nose syndrome, a fungal disease, is devastating bat populations in the eastern U.S. While we may not want to share our living space with bats, we must be careful to exclude bats without causing injury to them. Tennessee Wildlife Resources Agency has a list of animal control operators by county that have permits to work with nuisance wildlife- <https://twra.state.tn.us/ADC/Pages/Login/ViewActivePermits.aspx>. Although a permit is not needed to exclude bats from a structure, many of these companies have training and experience in excluding bats from structures and disinfection of a prior roost.

Reference: *Bats In Schools* at <http://agrillife.org/batsinschools/> and the Tennessee Bat Working Group website <http://www.tnbgw.org/>

See these sources for information on bat-proofing a structure.

Prevention and Control of Wildlife Damage Handbook at http://icwdm.org/Handbook/mammals/mam_d5.pdf

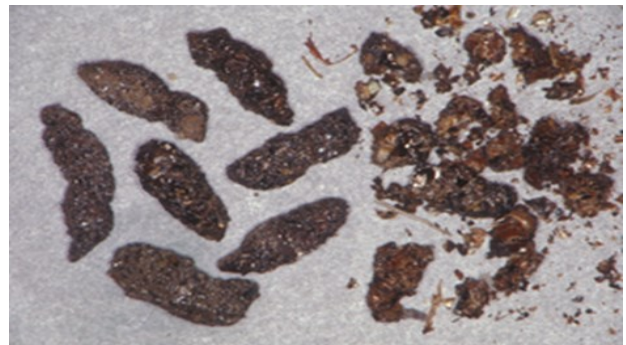
Bats in and Around Structures, <http://ianrpubs.unl.edu/eublic/pages/publicationD.jsp?publicationId=1549>.

More information on bats and bat proofing includes:

eXtension offers both an IPM Action Plan for Bats at http://www.extension.org/pages/62813/ipm-action-plan-for-bats#.VZRE_fIVhHw and a recorded webinar at https://learn.extension.org/events/936#.VZVBH_IVhHw

Tennessee Wildlife Resources Agency also has information on the 15 species of bats found in Tennessee at <http://www.tnwatchablewildlife.org/display2.cfm?habitat=&sort=aounumber&typename=Mammal&Taxonomicgroup=Mammal%20-%20Bats..>

CDC has information on bats at <http://www.cdc.gov/features/bats/>.



Bat droppings: bat fecal material is shiny black with many insect parts. Credit: Jim Kalisch. <http://ianrpubs.unl.edu/eublic/pages/publicationD.jsp?publicationId=654>

Action Plans for Pests Commonly Encountered in the School Environment



Part of an IPM program includes having plans for managing pests. A plan details the strategies that will be used to achieve specific goals. The IPM coordinator may request that the PMP develop action plans for pests commonly encountered within the school environment. Management plans serve as guidance documents to engage staff and teachers in their roles in preventing and suppressing pest problems. Sanitation, exclusion, and habitat modification can be proactive steps in pest management as well as supplemental steps to take when evidence indicates that it is necessary to treat. For example, taking care to remove food debris that has accumulated under equipment or in corners eliminates a food source that can compete with a bait applied to control cockroaches.

A set of action plans for pests commonly found in the school environment is available on the eXtension website: <https://www.extension.org/pages/20295/using-integrated-pest-management-action-plans-for-schools#.VZWU4flVhHw>. Some of the action plans include those for rodents, cockroaches, tramp ants, fire ants, yellowjackets, mosquitoes, flies and ticks. Ask your PMP to develop other plans if you don't see one for a pest that is commonly encountered in your school district.

Stop School Pests—A National IPM Standard Training and Certification Program

IPM is a team effort; all members play a role. Success of an IPM program depends upon the members' understanding of their roles and their cooperation. Knowledge of IPM varies within the school community so educating the school community on how behavior and actions impact pest management is important.

Do you need help with educating the school community with the roles they play in achieving a successful IPM program? Check out the excellent on-line learning lessons at Stop School Pests at <http://cals.arizona.edu/apmc/StopSchoolPests.html>. Lessons are available for custodians, maintenance staff, landscape and grounds staff, food service staff, nurses, facilities managers, teachers and administrators. Note that this is a work in progress and more material will be added and adapted to regional needs as time goes by. At present no quiz or certificate is offered when completing the lessons.

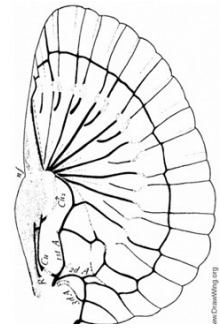


Earwigs

Pat Barnwell

Contrary to popular myth earwigs do not crawl into people's ears and lay eggs in their brains. The name earwig is derived from "ear" + "wig" or "beetle worm". Some argue "wig" is a corruption of "wing", and the name is derived from the shape of the extended hind wing that resembles an ear in shape.

Earwigs with pinchers extending from their rear ends appear menacing but are a nuisance rather than a threat. They do not transmit disease-causing organisms or bite but may use their pincers in self-defense. European earwigs, found in the southern and southwestern U. S., release foul-smelling chemicals called quinones when disturbed. Earwigs also release aggregation pheromones in their feces so a large number may occur in an area.



Hind wing of earwig. Credit: J. H. Comstock, *The Wings of Insects* (fig. 305). <http://www.drawwing.org/insect/dermaptera-hind-wing>

European earwigs may be recognized by their elongated, flattened shape, short wings that cover one-half the abdomen, and pinchers or cerci at the posterior of the abdomen. Cerci are used for defense, prey capture, copulation, and folding of the hind wings. Males can be distinguished from females by the shape of cerci. Coloration in the insect varies from the dark reddish-brown of the body to the lighter yellowish-brown of the legs. Body length at maturity is 5/8 inch.

Males and females overwinter in burrows in the soil. After evicting males from the burrow in the spring, females lay 20 to 60 eggs. Eggs are guarded and tended until they hatch. Tending of the eggs may protect them from fungus. Maternal care continues through the first instar. As development progresses through four instars, antennal segments increase to 10 and coloration darkens. Earwigs feed on live and dead plant and animal material. Damage to plants often resembles that of slugs –chewed small irregular holes in the leaves sometimes to the point of skeletonization. Earwigs feed on vegetables, fruits and flowers. Consumption of aphids, caterpillar pupae, leaf beetle eggs, scale insects, spiders, and springtails is known.



Adult male (bottom) and female (top) European earwigs, *Foricula auricularia* Linnaeus. The forceps help determine the sex of the adult. Credit: Jim Kalisch, University of Nebraska-Lincoln. <http://entomology.unl.edu/images/earwigs/>

Earwigs are nocturnal and hide in cracks and crevices in moist dark environments during the day. Common environments include damp areas under mulch, dead leaves, logs, piles of firewood, boards, stones and other debris or in rotted wood where they feed on moist, decaying plant material. To minimize the possibility of an indoor invasion of earwigs: 1) channel water from rain gutters and downspouts away from the building foundation; 2) consider removing landscape mulch (wood chips, gravel, etc.) from against the structure; and 3) seal possible entry points around doors and windows.

References:

Capinera, John L..2010. Featured Creatures, European Earwig, EENY-483. University of Florida/IFAS. http://entnemdept.ufl.edu/creatures/veg/european_earwig.htm

Rankin, Susan M. and James O. Palmer. 2009. Dermaptera. In (V. H. Resh et als., ed.) *Encyclopedia of Insects*, 2nd edition. Elsevier/Academic Press p. 259-261

EPA Planned Webinars

The EPA Center of Expertise for School IPM hosts a webinar series featuring national experts from across the country relaying educational and practical strategies for establishing and improving integrated pest management programs in schools. We invite you to participate in the upcoming webinars and to review the information on the past topics (<http://www2.epa.gov/managing-pests-schools/webinars-about-integrated-pest-management-schools>).

- Sept. 21, 2015 -- How to Conduct a Pest Assessment at Your School
- Oct. 20, 2015 -- Managing Head Lice in Schools
- Nov 10, 2015 -- Writing an IPM Policy for Your School District
- Dec. 15, 2015 -- Bed Bugs in Schools
- Jan. 26, 2016 -- Washington State School IPM Enhancement Pilot
- Feb 23, 2016 -- Procuring IPM-Based Pest Management Services
- Mar. 15, 2016 -- IPM for Turf on School Grounds
- Apr. 19, 2016 -- Vertebrate Turf Pests
- May 17, 2016 -- Ants - The #1 Pest in Schools
- Jun. 7, 2016 -- Termite Mitigation in Schools - A Holistic Approach



Go to <http://www2.epa.gov/managing-pests-schools/how-conduct-pest-assessment-your-school> to download the first webinar

For more information on school IPM from the EPA see <http://www2.epa.gov/managing-pests-schools>

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For more information about IPM in Tennessee schools and other facilities, or to view past issues of *Pests and Pesticides in Child-serving Facilities*, please visit schoolipm.utk.edu.

NATIONAL IPM INFORMATION

eXtension's Pest Management In and Around Structures: Urban Integrated Pest Management http://www.extension.org/urban_integrated_pest_management

National School IPM
schoolipm.ifas.ufl.edu/

IPM in Schools Texas
<http://schoolipm.tamu.edu/>

IPM Institute of North America
www.ipminstitute.org/

School IPM PMSP—all schools IPM by 2015 http://www.ipminstitute.org/school_ipm_2015.htm

National Pest Management Association IPM
www.whatisipm.org/

EPA schools
<http://www2.epa.gov/managing-pests-schools>

For further information about the IPM program at your school or in your county, contact your county Extension Agent or the school IPM Coordinator. For county agent contact information, please visit <https://extension.tennessee.edu/Pages/Office-Locations.aspx>

Precautionary Statement

To protect people and the environment, pesticides should be used safely. This is everyone's responsibility, especially the user. Read and follow label directions carefully before you buy, mix, apply, store or dispose of a pesticide. According to laws regulating pesticides, they must be used only as directed by the label.

Disclaimer

This publication contains pesticide recommendations that are subject to change at any time. The recommendations in this publication are provided only as a guide. It is always the pesticide applicator's responsibility, by law, to read and follow all current label directions for the specific pesticide being used. The label always takes precedence over the recommendations found in this publication.

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