



# Pest Facts

## Bats

Bats, the only truly flying mammal, belong to the order Chiroptera. Cosmopolitan in distribution, bats are classified into about 900 species, second in number only to rodents among the mammals.

About 40 species of bats are found north of Mexico and are divided into two groups; those which congregate in large numbers (colonial) and those which live alone (solitary). The colonial species most often encountered in and around buildings in the United States are the little brown bat, big brown bat, the Mexican free-tailed bat, the pallid bat, the Yuma myotis, and the evening bat. Members of the solitary group include Keen's bat, the red bat, the silver-haired bat and the hoary bat, typically roost in tree foliage or under bark, but are occasionally found associated with buildings, some only as transients during migration.

At all times, non-destructive methods of bat management should be used to alleviate problems. Bat proofing is the only reliable and permanent method which does not harm the bat, but makes the building inaccessible. Extermination methods which use chemicals to remove bats are temporary at best, potentially harmful to residents and serve to drive the bats farther into the structure to escape. Additionally, there are currently no registered pesticides for use on bats.

The biology of several bats species are included here, with significant inter-specific differences that need to be listed if a comprehensive management strategy is to be successful. Any problems caused by bats are limited to species distribution. Therefore, pest managers do not need to know specific traits for every type of bat. Additionally, information concerning the medical importance, signs of infestation and management techniques have been listed. It is important to remember that certain bats are protected by law. Contact your local wildlife specialist or pest management professional for information and assistance addressing your specific problem.

### **GENERAL BIOLOGY/BEHAVIOR**

Bats range in size from a house mouse to much larger. Their bodies are covered with fur and possess small eyes. Color and head characteristics will vary greatly. Bat wings are formed by a thin membrane that extends from the greatly elongated forearm and fingers to the hind limb and body.

Bats navigate by means of a sonar-like echolocation system which enables them to avoid solid objects and detect flying insects even in total darkness. Most bats found in the United States are nocturnal and feed principally on night-flying insects.

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Bats generally mate in the fall and winter, but the female retains the sperm in the uterus until spring, when ovulation and fertilization take place. Pregnant females may congregate in maternity colonies in buildings, behind chimneys, beneath bridges, in tree hollows, caves, mines, or other retreats. No nests are built. Young bats grow rapidly and are able to fly within 3 weeks.

Bats prepare for winter around the time of the first frost. Some species migrate relatively short distances, whereas certain populations of the Mexican free-tailed bat may migrate up to 1,000 miles. Bats in the northern United States and Canada may hibernate from September through May. Hibernation for the same species in the southern part of their range may be shorter or even sporadic. Some may fly during warm winter spells (as big brown bats may in the northwestern part of the United States). Bats often live more than 10 years.

The habits of bats may determine the type of control method used, so it is advantageous to know the species involved before designing a management program. For example, it is important to know if the species forms large colonies, because the management approach differs from that used on a species which roosts singly or in limited numbers. If the species migrates through an area and rarely stays any length of time, then management may not be necessary, particularly if the bat roosts out doors. Pest management professionals should become familiar with the identification and biology of the bat species in their area, particularly those that commonly use buildings as roosts.

## **BAT SIGNS**

In addition to direct observation, the accumulation of guano and urine below a roosting site indicate the presence of an active bat infestation. Bat droppings may be mistaken at first for mouse droppings, but are more irregular in shape and crumble readily. The odor and stains caused by urine and guano may be clues, as are high-pitched squeaks and rustling sounds coming from a wall or storage space. Some discoloration from body secretions is commonly found around the edges of small openings where bats may enter a building.

Bats are able to squeeze through narrow slits and cracks. For purposes of bat management, pay close attention to any gap of approximately 1/2 x 1 1/2" or a hole 5/8 x 7/8". Such openings must be considered potential entries for at least the smaller species, such as the little brown bat which require no more than 3/8" or the diameter of a dime.

Bats use roosting sites that are indoors (human dwellings, outbuildings, livestock quarters, warehouses), semi-enclosed (loading docks, entrance foyers), partially sheltered areas (window shutters, signs). Unusual roosting areas include wells, sewers and graveyard crypts.

Surface areas on walls, under loose woodwork, between bricks and around other bat entryways often have a smooth, polished appearance. The stained area is slightly sticky, may contain a few bat hairs, and is yellowish-brown to blackish in color. The smooth gloss of these rub marks is due to oils from fur and other bodily secretions mixed with dust, deposited there as the animals pass repeatedly for a long period of time. Openings marked in this way have been used heavily by bats.

Disturbing sounds may be heard from vocalization and grooming, scratching, crawling or climbing in attics, under eaves, behind walls and between floors. Bats become particularly noisy on hot days in attics, before leaving the roost at dusk, and upon returning at dawn. Note that rustling sounds in chimneys may be caused by birds or raccoons and scratching and thumping sounds in attics and behind walls may indicate rats, mice or squirrels.

Fecal pellets indicate the presence of animals and are found on floors, in wall recesses and outside the structure at its base. Fecal pellets along the inside walls may indicate the presence of rodents or even cockroaches. Since most bats north of Mexico are insectivores, their droppings are easily distinguished from those of small rodents. Bat droppings tend to be segmented, elongated and fragile. When crushed, they become powdery and reveal shiny bits of undigested insect remains. In contrast, rodent droppings tend to taper, are unsegmented, are harder and more fibrous, and do not become powdery when crushed (unless extremely aged).

Bat excrement produces an unpleasant odor as it decomposes. The pungent, musty, acrid odor can often be detected from outside a building containing a large or long-term colony. The odor also attracts arthropods which may later invade other areas of the building. Bat guano may provide a growth medium for microorganisms, some of which are pathogenic (i.e., histoplasmosis) to humans. Guano accumulations may fill spaces between walls, floors and ceilings. It may create a safety hazard on floors, steps, and ladders. Accumulations may also result in staining ceilings, soffits, and siding, producing unsightly and unsanitary conditions.

Bats also urinate and defecate in flight, causing multiple spotting and staining on sides of buildings, windows, automobiles and other objects at and near entry/exit holes or beneath roosts. Bat excrement may also contaminate stored food, commercial products and work surfaces.

Bat urine readily crystallizes at room temperature. In warm conditions under roofs exposed to sun and on walls, the urine evaporates quickly leaving a whitish powder-like coating. Although fresh urine of a single bat is relatively odorless, that of any moderate sized colony is obvious, and the odor increases during damp weather. Over a long period of time, urine may cause mild wood deterioration.

## **MEDICAL IMPORTANCE**

Bats are often blamed in a number of human diseases with paralytic rabies receiving the most attention. Bat rabies was first recognized in the United States in 1953 and since then has been identified throughout most of the country except for Alaska and Hawaii. The virus has been found in every species of North American bat (30 species). However, transmission to humans is rare.

How rabies is maintained and circulated in the bat community is poorly understood, although transmission from parent to offspring is known to occur, at least in some species. Rabid bats seldom exhibit symptoms which characterize rabies in other animals. Some typical bat symptoms include a more than usual erratic flight pattern, especially landing frequently in areas or on surfaces they would not normally be expected. Appearance in daylight hours, particularly midday, should be viewed with suspicion. A common rabies symptom in bats is weakness or paralysis, depriving the bat of its ability to fly or cling to its roost, so it flops over or lies helpless on the ground, often near its roost. Most human exposure comes from people being bitten attempting to pick up an infected bat.

Anyone bitten or scratched by a bat should seek medical attention, regardless of how normal or healthy the bat appears. The wound should be washed with detergent/soap water and medical attention obtained as soon as possible. If the bat can be caught or killed (without damaging the skull), it should be kept for rabies examination. Post-exposure vaccination is required unless the bat is confirmed to be rabies-free.

Histoplasmosis, an often fatal systemic fungal disease affecting humans, may be a significant hazard to people who remove bats and their guano. The bats themselves do

not transmit histoplasmosis, but the fungus can be contracted by inhaling airborne spores in the dust of bat guano, which support its growth.

In addition to rabies and histoplasmosis, bats have been implicated as a reservoir for other diseases such as Chagas (American trypanosomiasis), endemic relapsing fever and St. Louis encephalitis (all vectored by insects which feed on bats).

Bats carry ectoparasites, particularly the bat bug (*Cimex pilosellus*), which closely resembles the common bed bug. These may attack people when bats infest a building. Mites, ticks, and fleas are also listed among bat parasites. Bat guano often attracts filth flies, cockroaches and other coprophagous (feces eating) insects. Whenever bats are controlled by exclusion or some other method, consideration must also be given to the simultaneous control of ectoparasites and other insects that may be left behind.

### **COMMON SPECIES IDENTIFICATION**

See enclosure (1) for an identification key

#### Colonial Bats

Little Brown Bat (*Myotis lucifugus*)

#### Identification

Forearm: 1.3 to 1.6" (3.4-4.1 cm)

Wingspan: 9 to 10.5" (22.9-26.9 cm)

Ears: 0.5 to 0.6" (1.4-1.6 cm)

Foot: Approximately 0.4" (1.0 cm); long hairs on toes extend beyond claws.

#### Color

Pale tan through reddish brown to dark brown, depending on the geographic location.

The species is a rich dark brown in the eastern United States and most of the west coast.

Fur is glossy and sleek.

Confusion may occur with a few other "house" bat species. In the East, it may be confused with Keen's bat, which has longer ears and a longer, more pointed tragus (the appendage at the base of the ear). In the West, it resembles the Yuma myotis and little brown may be indistinguishable in some parts of the northwestern United States where they may hybridize (inter-breeding).



Little Brown Bat

### Habits

This is one of the most common bats found in and near buildings, often located near a body of water where they forage for insects. Summer colonies are very large, commonly roosting in dark, hot attics and associated roof spaces where maternity colonies may include hundreds to a few thousand individuals. Colonies may also form beneath shingles and siding, in tree hollows, beneath bridges, and in caves. Litter size is 1 in the Northeast; twins occasionally occur in some other areas. The roost is often shared with the Big Brown Bat though the latter is less tolerant of high temperatures. Separate groups of males tend to be smaller and choose cooler roosts within attics, behind shutters, under tree bark, in rock crevices and within caves.

In the winter, little brown bats in the eastern part of their range abandon buildings to hibernate in caves and mines. These sites may be near summer roosts or up to a few hundred miles away. Little is known of the winter habits of the bat in the United States.

The life span has been established to be as great as 30 years. The average life expectancy however, is probably limited to only a few years.

### Big Brown Bat (*Eptesicus fuscus*)

#### Identification

Forearm: 1.6 to 2.0" (4.5-5.0 cm)

Wingspan: 12.8 to 13.8" (32-35 cm)

Ears: with rounded tragus

#### Color

From reddish brown, copper colored, to a dark brown depending on geographic location. This is a large bat without distinctive markings.



Big Brown Bat

### Habits

This hardy, rather sedentary species appears to favor buildings for roosting. Summer maternity colonies may include a dozen or so and up to a few hundred individuals, roosting behind chimneys, in enclosed eaves, in hollow walls, attics, barns, and behind shutters and unused sliding doors. They also form colonies in rock crevices, beneath bridges, in hollow trees and under loose bark. Litter size is 2 in the East to the Great Plains; from the Rockies westward, 1 young is born.

The big brown bat is one of the most widely distributed of bats in the United States and is probably familiar to more people than any other species. This is partially due to its large, easy to observe size, but also to its ability to overwinter in buildings (attics, wall voids, and basements). Its close proximity to humans, often brings this bat into human living quarters and basements in the summer and winter. Big brown bats also hibernate in caves, mines,

storm sewers, burial vaults, and other underground harborage. While this bat will travel as far as 150 miles (241 km) to hibernate, the winter quarters of the bulk of this species are largely unknown.

#### Mexican Free-Tailed Bat (*Tradarida brasiliensis*)

##### Identification

Forearm: 1.4 to 1.8" (3.6-4.6 cm)

Wingspan: 11.4 to 12.8" (29.0-32.5 cm)

Tail (interfemoral membrane)- does not enclose the lower 1/3 to 1/2 of the tail, hence the name "free-tailed"

Foot: long, stiff hairs as long as the foot protrudes from the toes.

##### Color

Dark brown to dark gray. Fur of some individuals may have been bleached to a pale brown due to ammonia fumes from urine and decomposing guano. Confusion is not likely to occur with other species that commonly inhabit human buildings.

##### Habits

The Mexican Free-Tailed Bat forms the largest colonies of any warm-blooded animal, establishing sizable colonies in buildings particularly on the West Coast and in the Gulf states from Texas east. Hundreds to thousands may be found in buildings or under bridges. It is primarily a cave bat in Arizona, New Mexico, Oklahoma and Texas; buildings are used as temporary roosts during migration. Litter size is one.

These bats often share roosts with other species. In the West, for example, they may be found in buildings with *A. pallidus*, *M. yumanensis* and *E. fuscus*. Some males are always present in the large maternity colonies, but they tend to segregate in separate caves.

A few Taderida may overwinter in buildings as far north as South Carolina in the east and Oregon in the west. Most of this species migrate hundreds of miles to warmer climates (largely Mexico) for the winter.



Mexican Free-tailed Bat

#### Pallid Bat (*Antrozous pallidus*)

##### Identification

Forearm: 1.9 to 2.4" (4.8-6.0 cm)

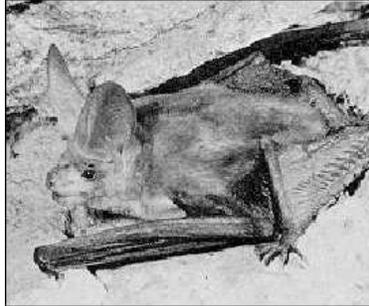
Wingspan: 14 to 15.4" (36-39 cm)

Ears: large; widely spaced and more than half as long as the combined length of the bat's head and body.

Eyes: large

#### Color

Pale, upper parts are light yellow, the hairs tipped with brown or gray. Bottom is pale creamy, almost white. This large, light colored bat is relatively easy to recognize. Confusion with other species that commonly inhabit human buildings is not likely to occur.



Pallid Bat

#### Habits

Maternity colony size ranges from about 12 to 100 individuals. Roost sites include buildings, bridges, and rock crevices; less frequently, tree cavities, caves and mines. Litter size is most commonly 2. The roost is frequently shared with *T. brasiliensis* and *E. fuscus* in the west. While groups of males tend to segregate during the nursery period (sometimes in the same building), other males are found within the maternity colony.

An interesting feature of the Pallid bat is that they fly close to the ground, may hover and take most prey on the ground, not in flight. Prey includes crickets, grasshoppers, beetles and scorpions. They will also forage among tree foliage.

Pallid bats are not known to make long migrations, though little is known of their winter habits.

#### Yuma myotis (*Myotis yumanensis*)

##### Identification

Forearm: 1.3 to 1.5" (3.2 to 3.8 cm)

Wingspan: about 9.3" (23.5 cm)

Ears: 0.5 to 0.59" (1.4 to 1.5 cm)

Foot: 0.4" (1.0 cm)

##### Color

Light tan to dark brown; bottom is whitish to buff.

Confusion may occur in the west with *M. lucifugus*, though the latter tends to have longer, glossier fur and is larger. In the northwest, interspecific breeding occurs with *M. lucifugus*,



making the species indistinguishable.

#### Habits

Maternity colonies, up to several thousand individuals, form in the summer in attics, under bridges, in caves and mines. Litter size is 1. Males typically segregate during the nursery period and roost as solitary individuals in buildings and other suitable harborage.

Yuma myotis is more closely associated with water than is any other North American species. Nearly all roosts have open water nearby. This species is not as tolerant as *M. lucifugus* of high roost temperatures and will move to cooler niches within a building when temperatures rise above 100 F.

Yuma myotis abandons maternity colonies in the fall, but its winter habitat is unknown.

#### Evening Bat (*Nycticeius humeralis*)

##### Identification

Forearm: 1.3 to 1.5" (3.3-3.9 cm)

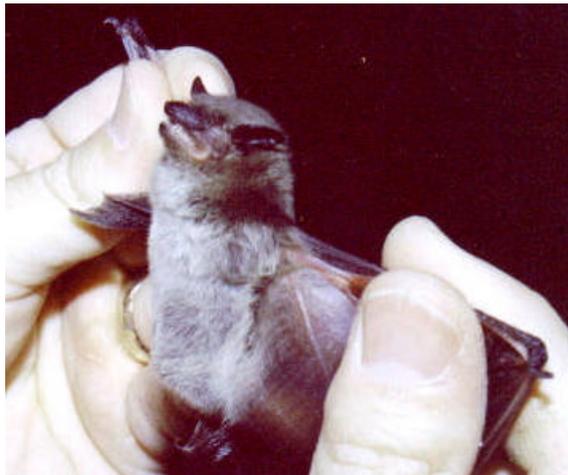
Wingspan: 10.3 to 11" (26-28 cm)

Ears: with short, curved and rounded tragus

##### Color

Medium brown with some variation to yellow-brown in subtropical Florida. No distinctive markings.

Confusion may occur with the Big Brown Bat, which can be readily distinguished by its larger size. It bears some resemblance to the somewhat smaller little brown bat, but can be identified by its characteristic blunt tragus.



Evening Bat

#### Habits

Summer maternity colonies in buildings may consist of hundreds of individuals. Litter size is usually 2. Colonies also form in tree cavities and under loose tree bark. In the southeast, *T. brasiliensis* commonly inhabits the same building. This is one of the most common bats in towns throughout the southern coastal states. Very little is known about

this species and virtually nothing is known of its winter habitat except that it almost never enters caves.

## SOLITARY BATS

### Keen's Bat (*Myotis keenii*)

#### Identification

Forearm: 1.25 to 1.54" (3.2-3.9 cm)

Wingspan: 9.0 to 10.0" (22.6-25.8 cm)

Ears: 0.67 to 0.75" (1.7-1.9 cm) with a long, narrow, pointed tragus

#### Color

Brown, but not glossy; somewhat paler in the east. Confusion may occur with *M. lucifugus*, which has glossy fur, shorter ears, and does not have the long, pointed tragus.

#### Habits

Excluding small maternity colonies (up to 30 individuals), *M. keenii* are generally found singly in the east. Roosting sites include; behind shutters, under wooden shingles, sheltered entryways of buildings, in roof spaces, in barns, and beneath tree bark. In the west, this bat is known as a solitary species, roosting in tree cavities and cliff crevices. Litter size is probably 1. The roost is sometimes shared with *M. lucifugus*. The sexes probably segregate during the nursery period. In winter, these bats hibernate in caves and mines.



Keen's Bat

### Red bat (*Lasiurus borealis*)

#### Identification

Forearm: 1.2 to 1.5" (3.2-3.9 cm)

Wingspan: 8.9 to 10.2" (22.8-25.8 cm)  
Ears: 0.7 to 0.75" (1.7-1.9 cm) with a long, narrow, pointed tragus.

#### Color

Bright orange to yellow-brown; usually with a distinctive mark on the shoulders. Confusion may occur with the hoary bat, which is frosted gray in appearance and larger.



Red Bat

#### Habits

Red bats live solitary lives, coming together only to mate and migrate. They typically spend summer days hidden in the foliage of deciduous trees. The number of young ranges from 1 to 4.

These bats often chase insects that are attracted to lights, such as street lamps. This behavior most likely brings them in close proximity to people.

The red bat is well adapted for surviving drastic temperature change; it does not hibernate in caves, but apparently trees. Some migrate long distances. During migration, red bats have been known to land on high-rise buildings and ships at sea.

#### Hoary Bat (*Lasiurus cinereus*)

##### Identification

Forearm: 1.8 to 2.3" (4.6-5.8 cm)

Wingspan: 15 to 16.5" (38.0-41.0 cm)

Ears: relatively short, rounded, edged in black and with fur.

Tail membrane: completely covered with fur on upper surfaces.

##### Color

Dark, but many hairs are tipped in white, giving it a frosted appearance. This bat also has a yellowish or orangish throat "collar." Confusion may occur with the much smaller silver-haired bat, which lacks the fur patches and markings on the ears, markings on the throat and has a tail membrane that is only lightly covered with fur on the upper surface.



### Habits

Hoary bats generally spend summer days concealed in tree foliage (often in evergreens), rarely entering homes, and are not commonly encountered by people. At their day roosts, they are usually solitary except when with young. The litter size is 2. The sexes segregate through most of the summer range. This is one of the largest bats in North America, a powerful flier, and migrates extensively.

## **BAT MANAGEMENT**

Bats are protected (endangered or threatened) in some states and local areas so their management should be preceded by checking state and local laws to determine what protection they may be afforded (see enclosure 2)

### Pre-management Considerations

To confirm bats are actually in or on a building, look for bats flying in and out of a site and/or for signs of infestation. A bat watch can be conducted by two people (more may be necessary to observe large or complex sites) posted at opposite corners of a structure. An evening watch begins about 30 minutes before dark and a morning watch begins about 1 hour before dawn. Observations should continue for approximately 1 hour. Observations can indicate exit/entry points and the number of bats. With practice, distinguishing some bat species may also be possible. For example, compared to the big brown bat, the little brown bat is noticeably smaller in size and its flight has more rapid wing beats, and more rapid turning and darting.

It may be necessary to watch for more than one night to compensate for weather conditions, bat's sensitivity to observers, noisy or inexperienced observers and improper use of light. Observations can be enhanced with a standard flashlight, but be certain to keep the bright part of the beam as far away as possible from the exit hole being observed. Bright light will increase the bat's reluctance to exit and may result in an incomplete exit of the colony. A valuable aid is a powerful, rechargeable flashlight equipped with a plastic, red pop-off filter. Also, an electric headlamp, supplied with rechargeable batteries and fitted to a climbing or spelunking helmet, allows hands-off illumination out and indoors. Bats are sensitive to light intensity and can visually

discriminate shapes and patterns in extremely low light conditions. They can only see black and white. Therefore, the low contrast illumination and soft shadows produced by red light has little effect on bats.

### Locating a Roost

It is not always possible or convenient to conduct a bat watch. Therefore, a detailed inspection inside the building for bats or bat signs may be necessary to find specific roosts. Daytime is best, especially during the warmer part of the day. Some types of structures appear to be preferable (older houses, structures in close proximity to water) as do certain roost locations, especially areas with little disturbance, low illumination, little air circulation and high temperatures.

### Bat Management Program

Successfully managing a bat infestation requires: 1) reducing building attractiveness, eliminating accesses to buildings, and 3) practicing sound conservation.

#### Reducing Building Attractiveness

Bats are attracted to certain areas because they provide an adequate resource base (i.e., shelter and food). Attempt to make your building less attractive. Lights should not be placed on the building, rather place lights away from the building on poles or other devices. If the outdoor lighting system is being changed, appropriate sodium vapor lights should be selected to reduce insect attraction. If painting a building, a darker shade of paint should be selected. Interior lighting, observable from the outside, should be eliminated as much as possible.

Floodlights may be used inside buildings where bats roost, on a limited basis, causing bats to leave and seek new locations away from the building. However, in some situations, it is impossible to direct light to all possible roosting locations, resulting in bats moving farther into the structure to undisturbed areas.

In small areas, bats may be repelled by the odor of naphthalene, the only EPA-registered repellent for indoor bat roosts. A typical building will require about 5 pounds per 2,000 sq. ft. Naphthalene is much more effective in confined spaces. Be sure to follow label instructions.

Although presented with fantastic claims of effectiveness, ultrasonic repellent devices do not work and should not be used to manage bats or any other pest.

#### Access Elimination

Openings larger than 3/8" (9 mm) must be eliminated to prevent bat access. Hardware cloth (1/4" (6 mm) or sheet metal are materials used most often to close entrances. Softer building material (aluminum, particle board and plywood), may also be used as bats, unlike rodents, will not gnaw.

Foam insulation may be used to fill wall voids. The work should be conducted during the evening after all bats have left to feed. Additionally, ensure that excessive collections of guano are removed to prevent decay and odor.

Quick-setting hard putty may be used to close some small openings. Oakum weather stripping, caulking compound or equivalent materials are effective for closing long, narrow cracks. Copper mesh or large stainless-steel scouring pads are useful for temporarily plugging openings. Mortar is then used later to seal these openings permanently.

When bat-proofing, pay particular attention to chimneys, louvers, vents, cornices, warped siding, shingle/shake siding, and locations where the roof joins the sides and around eaves.

Species of bats that are crevice dwellers can often be eliminated by closing up all usable crevices. However, eliminating access to large buildings such as warehouses can be expensive and time-consuming. Where sanitation or public health reasons require that bats be eliminated immediately and bat-proofing is not readily achieved, netting over the entire side of the building may be necessary until more effective methods are completed.

Bat-proofing a building while a colony still occupies an area must be completed in two or more stages; initially seal all bat entries except one or two of the principle openings, then make the final closures about 1/2 hour after dark, after all bats have left the building. A one-way valve like structure can be used that will permit the bats to escape during the evening but prevent them from returning. These devices are commercially available. Where many exit holes exist, the same one way passage of bats can be accomplished by using light-weight plastic bird netting. The bats crawl out under the netting but are blocked by the netting when they attempt to return. Returning bats that do not disperse to other areas may cluster around the closed openings. If legal, bats may be carefully collected, taking precautions to avoid bites, and disposed of properly. Bats may bite if picked up. Because of the slight risk of contracting rabies, bats should always be handled with tongs or leather gloves. The building should be watched for several days at dusk to be sure the bats have not found another entry which may have been overlooked. The advantage of using exclusion devices or netting as a one-way valve is that all of the work may be completed during the day.

Depending on the species and time of year (particularly from early to mid-summer), there is always the possibility that some young may be present in the colony. They could be sealed in by bat-proofing and will subsequently die, creating an odor problem. Several products are available to help eliminate these odors, if retrieving the bodies is impossible. These products may also help relieve odor that remains from bat urine and guano even after the bats are gone.

#### Weather Stripping

The space between the floor and door bottom often provides an access for bats and must be sealed with weather stripping, a draft shield, or a gap stopper to close off the space. Weather stripping is made of a variety of materials including natural fibers, aluminum, fine wire, felt, hard rubber, vinyl and nylon. Also, if possible, consider repairing the door to ensure a tight fit.

#### Air doors

Air doors are a substitute for screen doors which must be opened during dark periods. Air doors must be of the correct capacity and installed correctly to discourage bats from entering.

#### Flashing

Wherever joints occur in a building, flashing may be installed to keep the facility "bat proof." Flashing consists of strips of metal or other material to cover cracks, crevices and holes. The materials most commonly used are galvanized metal, copper, aluminum and stainless steel.

#### Screening

Where screening is necessary, the mesh size must be small enough to prevent the access of bats. Steel hardware cloth should have 0.63 cm (1/4") mesh with three meshes or more per inch. Insect screening for windows should be 18 x 14 mesh.

Bats can enter ventilators, chimneys and windows that are not properly screened/secured. Once installed, insure a proper fit and proper maintenance.

#### BAT CONSERVATION

Once the bats have been removed or prevented access to a building, they must be given alternative accommodations. If not, they will most likely occupy other nearby structures or find alternative ways back into the original structure. Constructing bat boxes an adequate distance from the building will be sufficient. Construction ideas may be found in enclosure 3. Remember, bats provide a valuable service to us by consuming a large quantity of potentially harmful insects. Their presence in nature should be encouraged, just away from areas occupied by people.

For additional information regarding bat management, contact your local pest management professional, natural resources representative or DSCP at 510-337-8122, DSN 686-8122, or email [paa5245@exmail.dscp.dla.mil](mailto:paa5245@exmail.dscp.dla.mil).

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