



CANADIAN WILDLIFE
FEDERATION

HelpTheBats.ca



Safely Managing Bats in Buildings

Bats 101

Bats are important for the health of our environment and economy. In fact, bats save the agricultural industry millions each year by consuming a variety of insects that harm crops. Since most species of bats in Canada only give birth to a single pup each year, their population grows very slowly. This means that each individual bat is important for the stability and maintenance of their population. Unfortunately, bats face many threats, most of which are human caused. Of the 19 species in Canada, nearly half are listed as species at risk federally at varying degrees of endangerment.

The largest threats to bats are:



Humans inadvertently introducing the fungus causing deadly White-nose Syndrome in bat colonies.

- It grows on the exposed skin of bats as they hibernate during the winter.



Eviction from roosting sites and persecution on account of centuries of negative portrayal.

- Evictions reduce suitable roosts that offer the right microclimate and are safe from predators and other disturbances.



The use of pesticides which can reduce and/or contaminate their food source (insects).

- Bats can come into direct contact with harmful pesticides or it can accumulate in their bodies through the insects they eat.



Destruction of their natural habitats.

- Deforestation affects bat species that rely on forests for roosting and foraging. In particular, the loss of old-growth forests threatens certain bats.



Collisions with wind turbines.

- Wind turbines kill between 600-900 000 bats per year, primarily a threat to the more migratory species of bats.



A bat infected with White-nose Syndrome (*Pseudogymnoascus destructans*).

PHOTO: CWF



PHOTO: CWF

The Importance of Roost Sites

Roost sites play a major role in the survival of all bats by providing:

- Places to keep warm
- Shelter from weather and predation
- Locations for social interaction
- Places for females to give birth and raise young

Different species have specific roosting needs - some prefer natural sites like tree cavities or rock crevices while others will also make use of human-made structures. There are four species that may roost in such structures in Canada, such as residential buildings and attics. These include the Big Brown Bat, Yuma Myotis (found only in B.C.), Little Brown Myotis, and more rarely, the Tri-colored Bat. The last two are listed as Endangered species in Canada and warrant additional consideration and protection. This can cause issues with landowners who are concerned about the presence of bats in their homes and can lead to the eviction of bats from buildings.



The direct consequence to closing an occupied roost is the loss of key habitat since maternity roosts are extremely critical to the survival of local populations. If carried out at an improper time of year, an eviction has the potential to be lethal to pregnant females who are already in the late stages of pregnancy. If the young are present but not yet flying, an eviction will most certainly result in the death of pups that would be trapped inside.

Since the species of bat that can roost in buildings are highly social and often return to the same roosts year after year, colony evictions can also have indirect consequences on local populations by:

- Breaking up the colony and restricting the information they pass on to one another.
- Increasing exposure to predators and weather elements, until they find a new roost.
- Burning energy as they search for a new roost.



Little Brown Bat

PHOTO: Ann Froschauer,
USFWS/Wikimedia Commons

.....

Since bats typically have a network of roosts, an eviction at one site may not seem like a big deal since they are able to move to their other roosts. But they may face the same fate of eviction from these subsequent buildings. At some point in this chain, an eviction will be one too many for the colony to survive.

.....

Bats and Humans

While sharing a living space with bats has the potential to pose some health risks to humans (i.e., rabies, histoplasmosis), these risks are often misunderstood.

Rabies is often associated with bats, however, less than one percent of bats contract rabies, which is similar to the rate of many other mammals.

Histoplasmosis is a lung infection caused by spores of a histoplasma fungus entering the body, typically through inhalation. The fungus can grow in a buildup of bird or bat droppings in some parts of Canada, but not necessarily all bird or bat droppings will contain the fungus. If infected, most people tend to recover on their own, otherwise medication can be prescribed.

Although there are plenty of misconceptions surrounding bats, risks like rabies and histoplasmosis are legitimate concerns and it is important for people to avoid direct contact with them. If a bite, scratch, or histoplasmosis exposure is suspected, consult a medical professional immediately for guidance. [For more information, visit our webpage on bats, humans and rabies.](#)

While evicting a bat colony might reduce these risks to humans, improper management of the colony can pose devastating risks to local bat populations, and since some bats that may be found in buildings are legally listed as Threatened and Endangered provincially and/or federally, these situations need to be handled with caution to prioritize the wellbeing of both humans and bats.

In the 21st century, you're more than 300 times more likely to be struck by lightning than to die from rabies.

Histoplasma is found in the soil in only a few parts of Canada and bird and bat droppings allow it to grow.

Consult a medical professional for any known or suspected wild animal bite or scratch.



Understanding Roosting Behaviour

For the past several years, the Canadian Wildlife Federation has been studying the movement patterns, roosting behaviour and roost network of bats in buildings. A primary focus has been the Endangered Little Brown Myotis, and to a lesser degree the Big Brown Bat, both of which commonly use buildings in Canada. Through this work we have been able to shed light on several questions:

- How far and how often do bats travel from one roost to another?
- How many different roost sites does one colony have?
- What happens to bats after they are evicted from a roost?
- Do bat boxes work as mitigation when a colony is evicted?

To answer these questions, we used small tags that emit a radio signal which were attached to a subset of bats in a given colony. This allows us to follow each individual to their roost until the tags naturally fall off on their own after approximately two weeks. Bats were followed daily to track their normal movement patterns and roost use. Two of our sites allowed us to look at changes in bats' normal movements as a result of an eviction. At these sites, one of which had a colony of Little Brown Myotis and the other a colony of Big Brown Bats, the homeowners planned a humane removal of the bats, which allowed us to follow individuals before and after the eviction to look at the effect it had on them.

Paired with the tracking work, one or more bat boxes were installed at each study site, regardless of whether an eviction was to take place since even with no eviction, bat boxes can still provide additional roosting habitat. However, at the eviction sites, it was of particular importance to allow us to assess their ability to compensate for the loss of habitat.



Little Brown Myotis
PHOTO: James Page
(CWF)



A Little Brown
Myotis with a tag
PHOTO: CWF

Understanding Roosting Behaviour

Here is some of what we discovered:

- Bats are persistent and loyal to their roost sites and will attempt (and sometimes succeed) to get back in after an eviction. But they also use up to seven additional roost sites in an area.
- The colony does not necessarily move all together when changing roosts (i.e., some go to one roost, some to another).
- The majority of alternate roosts will be close by – typically within 200 to 500 metres. But some bats move quite a distance, going as far as seven kilometres between roosts and likely farther, as we weren't able to relocate several bats throughout our studies.
- Most bats in the study, whether Little Brown Myotis or Big Brown Bat, and regardless of an eviction, roosted in human structures rather than natural ones. Of the human structures, most of these were buildings, and a small number of bat boxes.
- Bat houses installed along with an eviction ended up being used by bats in the colony – some within seven days. However, they did not house as many bats as the original roost – i.e., many bats went elsewhere.
- In colonies where an eviction did not take place, bat houses were still used at times by bats, but to a much lesser degree.
- Since bats primarily use buildings over bat houses and natural sites, they're susceptible to a domino series of evictions if landowners continue to evict bats from their homes instead of managing them in place. Females especially rely on established good quality maternity roosts to give birth and raise their pups year to year, so evictions from these maternity roosts may be particularly harmful to the colony.

Based on these findings, unless a bat colony becomes problematic for the homeowner's health, safety or well-being, an eviction should be a last resort.

Therefore, we have developed a set of instructions for managing bats in buildings which should be followed before resorting to an eviction.

Step 1: Assess the Situation

Step 2: Use Bat Houses as a Management Strategy

Step 3: Get Familiar with the Colony

Step 4: Evict as a Last Resort



Little Brown Myotis
in a Building
PHOTO: CWF



Bat House on a
Building
PHOTO: CWF

Step 1: Assess the Situation

Determine if the bats are causing major problems in the home.

- Bats are not rodents, and unlike rodents, bats will not chew wires or tear apart siding
 - The foremost damage bats may inflict within a building is a buildup of guano and urine.
- This can be remediated by:
 - Determining the exact location of the roost
 - Isolating it, if necessary, by sealing the area from other interior spaces
 - Placing a plastic ground sheet to catch guano and urine to avoid the staining and degradation of insulation
- Guano at the exterior of the building can be mediated with plants, flowerbeds, and a shelf or gutter.
 - Accumulated guano can then be cleaned off or kept, as it makes for an excellent fertilizer.
- Another common concern is that bats will invade human living spaces and potentially transmit diseases such as rabies.
 - While the risk of contracting rabies from bats is no greater than many other mammals, sealing the openings between the roost site and living quarters will decrease the chance of encountering bats.
 - Smooth surfaces can also be used to deter bats from certain entry points into the human living quarters, creating a retrofitted area that can be enhanced for the bats while eliminating the frequency of interactions between bats and humans.

While each situation is unique, as is an individual's comfort level, managing and maintaining, rather than evicting the roost is best to promote the bats' survival while minimizing the health impact for humans.

.....

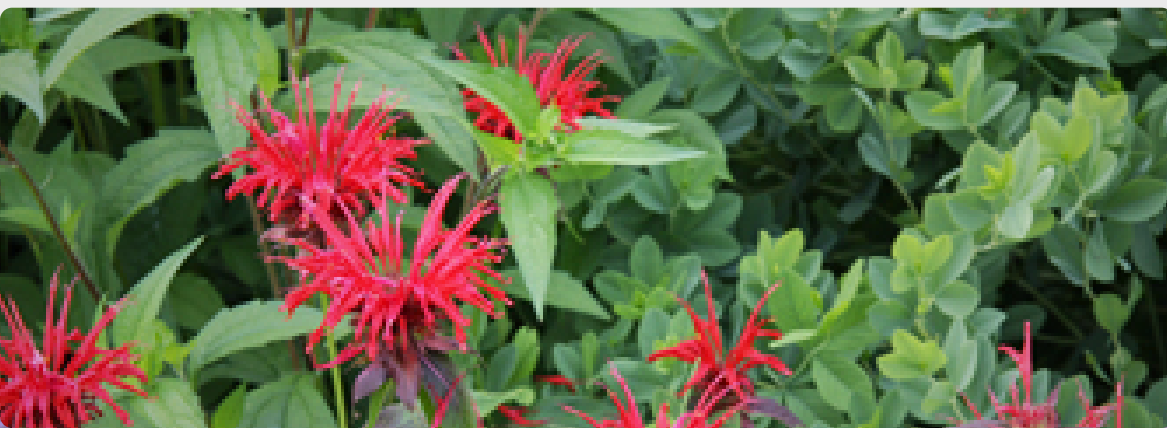
To avoid the risk of histoplasmosis when distributing guano in an enclosed space, it is important to wear protective equipment such as:

- Hooded coveralls
 - Goggles
 - Gloves
 - Air purifying respirator
-

.....

Local wildlife remediation companies may also provide cleaning services, which comes at a price but is likely less expensive compared to the cost of an eviction.

.....



Step 2: Use Bat Houses as a Management Strategy

A common way to manage bats is through the installation of bat houses. Bat houses act as an alternative roost for bats as opposed to buildings or trees. Bat houses that are installed in conjunction with an eviction are more likely to become occupied but are unlikely to be adequate to completely replace a roost site in a building.

Houses can be purchased or built as a DIY project, but there are specific factors, in addition to general guidelines, that may make them more favorable for the bats, for example:

- **Size** – A minimum of 45 cm (18 inches) in length (aka height), but 60 cm (24 inches) or more is better. A minimum width of 25 cm (10 inches), although 38 cm (15 inches) or more is better.
- **Height of the installed House** – Install 2.75 to 3 m (9 to 10 feet) above the ground.
- **Number of Chambers** – Three or more chambers with 0.75 to 1 inch spacing and holes to pass internally between them.
- **House Placement** – Install on a building, when possible, especially human occupied (i.e., heated) buildings. If it cannot be placed on a building, then a pole is the next best option. Houses on trees are less effective.
- **Sun Exposure** – If installing only one bat house, place it in partial sun (6 to 8 hours/day).
- **Multiple Bat Houses** – Several well-placed houses are best. It is most ideal to have at least three houses with varying sun exposure.
- **Distance to Water** – Installing near water is ideal, but it is not as critical as the other factors listed above.
- **Ventilation** – Vents on the front and sides of the house reduce the chance of lethal overheating.



.....

Check out our full construction and installation guidelines for bat houses at [HelpTheBats.ca](https://www.helpthebats.ca).

.....

Step 2: Use Bat Houses as a Management Strategy

There is no guarantee that installing a bat house will prevent bats from roosting in your home.

However, bats typically have a network of roosts they use day to day and throughout the summer, so the addition of bat houses can encourage bats to incorporate the houses into their roost network and they can be helpful in mitigating the loss of an existing roost site (i.e., when evicting a colony).

In cases where an entire roost that houses a large colony, like a barn or a large attic, is being removed, it may be best to install a bat condo which is larger than a bat house and can accommodate thousands of bats.

.....

Our research has shown that the longer a bat house is installed, the more likely it is to become occupied, so it is important to maintain a bat house, even if there is no immediate uptake.

.....



Little Brown Bats in a Bat Box
PHOTO: Karen Vanderwolf

Step 3: Get Familiar with the Colony

It is important that the homeowner is educated on the bat colony living in the home.

Information on local bat species and identification of the species within the roost, their status, myths, and misconceptions, will allow for an informed decision on how to proceed.

In order to decide next steps in terms of regulations, mitigation (number/size of bat boxes or condo) and whether there is a possibility of overwintering in the building, it is important to determine:

- the species present
- the size of the colony
- if it is a maternity colony

Locating entry/exit points by watching the building at sunset will allow for more accurate information on the location within the building, where management actions need to focus, and enable a count of the number of bats present.

See CWF's bat monitoring protocol at www.helpthebats.ca for more information on carrying out an emergence count.

BAT ROOST MONITORING





Be a citizen scientist!

Without the participation of community groups and homeowners, CWF's bat house program would not be successful.

Monitoring bat roosts is as simple as identifying the entry/exit points of the roost and counting how many bats emerge. Checking the roost during the day with a light is a good way to know if bats are present, but avoid shining lights at the entrance often or while bats are emerging.

When to monitor?

Monitoring sessions start at sunset and can last up to an hour or until you haven't seen a bat exiting the roost for at least 10 minutes. Ideally roosts should be monitored four times per summer (spread out from late May to October). But at minimum once in June and again in early August. The latter session will account for new pups.

How to monitor?

- 1 | Familiarize yourself with the following steps and the datasheet below to know what information you will need to collect and how to record it.
- 2 | Identify entry/exit points prior to your survey night and plan to have one person monitor each point.
- 3 | Select an evening in early June and another in early August to monitor – ensure weather is favourable (no rain or high winds and clear skies).
- 4 | Just before sunset, situate yourself at least 10 metres from the roost so you don't disturb the colony's activity. Tip: use the sky as a backdrop behind the bats to increase your visibility.
- 5 | Begin your tally as soon as you see the first bat leave the roost. This is typically at sunset, and your monitoring may take up to 60 minutes for all bats to leave the roost.
- 6 | Count each bat that emerges. If bats re-enter the roost, be careful not to count them again.
- 7 | If bats emerge quickly and simultaneously, do your best to estimate how many emerged.
- 8 | End the survey once you have not seen a bat emerge for 10 minutes.
- 9 | Record information on bat boxes to the [Canadian Wildlife Federation](http://CanadianWildlifeFederation.org)

For additional information on bats: HelpTheBats.ca | info@cwf-fcf.org



Step 4: Evict as a Last Resort

If after weighing the pros and cons and having been educated on the realities of sharing a space with bats, it is decided that an eviction is the best course of action, it is extremely important to consider the bats' life cycle to ensure their survival and that no bats end up trapped inside the home. There are two common methods for removing a bat colony from a building:

Eviction

- This happens when there is an active colony within a structure.
- A one-way door is installed to allow bats to leave the structure, but they are not able to re-enter the roost.

Exclusion

- This happens when a colony is not currently within the structure (i.e., when the bats have left to overwinter elsewhere).
- This is different from when bats simply leave in the evening to feed because typically, the entire colony does not leave the roost on a given night. A barrier is installed to keep bats out, by retrofitting the building or by sealing entry points.

Proper timing of an eviction or exclusion is essential. If an eviction is carried out at the wrong time of the summer, flightless pups can potentially be blocked inside the building, preventing their mothers from regaining access to the roost to care for them.

.....

Identification of the species of bat that are roosting in the home is critical prior to an eviction or exclusion. Little Brown Myotis will leave their summer roost (ex. a building) to overwinter in caves; however, big brown bats are able and often choose to overwinter in buildings.

.....

Step 4: Eviction as a Last Resort

After determining what type of roost is occupying the building (maternity or day roost vs. overwintering bats), use **Table 1** to determine the most optimal timing of an eviction and/or exclusion of the colony.

General Life Cycle of Hibernating Bats	Hibernation		Spring emergence and pregnancy		Pups born		Nursing	Pups able to fly		Mating		Hibernation
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maternity Roost or Day Roost	Exclusion Possible Check to be certain bats aren't in the roost.		Eviction Possible Bats will have returned from hibernation. Pregnancy is in early stages.		No Eviction Females are in late stages of pregnancy or pups are newborn. An eviction would leave females with no place to give birth or pups would be trapped inside.				Eviction Possible Pups can fly; evicted bats will likely be able to find a new roost or are returning to hibernation sites.			Exclusion Possible Check to be certain bats aren't in the roost.
Over-wintering in a building	No Eviction Bats are in the roost and would not survive outside temperatures.		Eviction Possible Bats are in the roost, but temperatures are warming up.		No Eviction Females are in late stages of pregnancy or pups are newborn. An eviction would leave females with no place to give birth or pups would be trapped inside.				Eviction Possible Pups can fly. Bats will likely be able to find a new roost.		No Eviction Bats will not have time to find an alternative over-wintering site. They will likely attempt to re-enter the structure or freeze on exterior walls.	No Eviction Bats are in the roost and would not survive outside temperatures.
For additional information on bats: HelpTheBats.ca												

A crucial step before carrying out an exclusion or eviction is the installation of multiple bat houses around the property according to the recommendations mentioned in Section 2.

Installing bat houses ahead of the planned eviction/exclusion will give bats the opportunity to explore the new alternative roosts, increasing the likelihood of occupancy in the aftermath of the eviction.

Installing bat houses as alternative habitat during an eviction can decrease the negative impact of eviction for both species. Following the eviction, it is important to ensure that the colony is completely evicted from the building with no individuals observed to be trapped inside and/or having regained entry.

.....

Check out our full construction and installation guidelines for bat houses at HelpTheBats.ca.

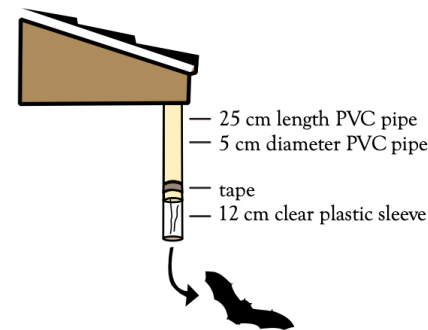
.....

Step 4: Eviction as a Last Resort

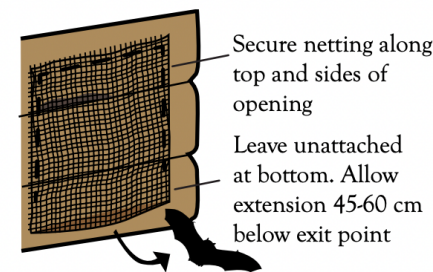
Step by step process for eviction:

1. **Refer** to table 1 to ensure the appropriate timing window for undertaking an eviction.
2. **Install** one or more bat boxes to provide alternate habitat for the colony that will be losing access to their roost site.
3. **Locate** entry/exit points by undertaking an emergence count. Visit www.helpthebats.ca to download a monitoring protocol.
4. **Seal** any other gaps that the bats may attempt to use to re-enter the building. Gaps can be sealed using caulking, aerosol foam, weather stripping, mortar, etc. depending on the gap and building material.
5. **Install** one-way doors during the daytime at the entry/exit points identified in step 3.
 - a. One-way doors should be made of screening or mesh that is rigid (such as window screening) to prevent bats from becoming entangled. Screening should start several inches above the hole and extend a minimum of 12 inches down the wall.
 - b. Secure the top and sides of the screening using high quality tape (ex. Duct tape), leaving the bottom unattached. The screen should be tight enough to allow space for bats to climb down (approximately one inch space), but not so tight as to prevent them from exiting their hole.
 - c. Upon exiting at sunset, the bats will encounter the mesh and climb down through the open bottom edge. When returning to the roost, the bats will be unable to re-enter, as they typically land at or just below the hole to climb in.
 - d. In situations where the entry point is vertical, a plastic tube (such as a 1.5-inch (40 mm) diameter pvc pipe) over the entry/exit point can be installed vertically as a one-way door. The bats can slide through the tube during emergence, but the tube will be too slippery with minimal space for landing for the bats to re-enter.
6. **Leave** one-way doors installed for a minimum of one week following the eviction, as not all bats leave their roost every night.
7. **Remove** one-way doors and seal the entry/exit points, as in step 4. Being thorough when sealing is important, as bats can re-enter a building through any crevice that is a ½ inch or wider.
8. **Bats can be very persistent** in finding alternate entries to their original roots, making exclusions very difficult for even experienced professionals. Successful bat-proofing of a building may require multiple attempts or a professional wildlife control company.

Following the eviction, it is important to ensure that the colony is completely evicted from the building with no individuals observed to be trapped inside and/or having regained entry.



ONE-WAY EXIT DEVICE USING PIPE EXIT DEVICE FOR HORIZONTAL SURFACE.



ONE-WAY EXIT DEVICE FOR VERTICAL SURFACE USING FIBERGLASS MESH SCREEN.

PHOTOS: BC Bats "Got Bats? Steps for Excluding Bats in Buildings: A Guide for Pest Management Professionals in BC"

Conclusion/Summary

- Little Brown Myotis tend to return to the same roosts, especially in the case of maternity roosts, and even after an eviction will try to regain access. This can make it difficult to keep them out permanently.
- Since they are classified as an Endangered species, any disturbance to even a small colony can have devastating effects on the local population.
- Unlike rodents, bats are very slow at reproducing, typically having only a single pup per year so evictions need to be handled with consideration and care because every individual counts.
- If there are bats in a home and they are not causing major problems, or if the risks of evicting them (i.e., contributing to their extinction) outweigh the positives, we suggest attempting other management alternatives to evictions (see [Step 1](#)).
- That said, people's health and well-being is of utmost importance and an eviction may be necessary in some cases.
- In a situation where a bat colony becomes problematic and an eviction is deemed necessary, it is extremely important to consider the bat's [life cycle](#) in order to ensure their survival and that no bats are trapped inside the building.
- Installing [bat boxes](#) surrounding their original roost prior to the eviction can encourage some of the bats to uptake the boxes rather than the original building roost, minimizing the negative impact that an eviction can have on the colony.

.....

Different bat species may have slight differences in their life cycles, which may affect the best management recommendations based on the species local to that specific area. Make sure you get familiar with the bats in your home before making any plans.

.....



CANADIAN WILDLIFE
FEDERATION

HelpTheBats.ca

Sblah

