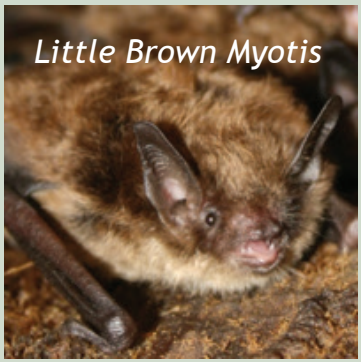
Best Management Practices for Bats


Little Brown Myotis

Eastern Small-footed Myotis

Northern Myotis

Protecting the land we love for future generations

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Introduction

There are eight species of bats within Ontario consisting of the Hoary Bat (Lasiurus cinereus), Silver-haired Bat (Lasionycteris noctivagans), Eastern Red Bat (Lasiurus borealis), Big Brown Bat (Eptesicus fuscus), Little Brown Myotis (Myotis lucifigus), Northern Myotis (formerly the Northern Long-eared Myotis) (Myotis septentrionalis), Eastern Small-footed Myotis (Myotis leibii), and Tri-colored Bat (formerly the Eastern Pipistrelle) (Perimyotis subflavus).

White Nose Syndrome (WNS) is a condition that is responsible for the loss of millions of bats in North America. Bat colonies have experienced losses of up to 95 to 100 percent within two to three years of detection. WNS was discovered in North American in 2006 and first identified in Ontario in 2010 (Wildlife Section, Species Conservation Policy Branch, Ministry of Natural Resources and Forestry, 2015).

WNS is caused by an invasive fungus called Pseudogymnoascus destructans which is a cold-loving fungus that thrives in low temperatures and high levels of humidity. These habitat characteristics are similar to the hibernacula characteristics of the cave-dwelling bats. When present, P. destructans infects the skin of bats, particularly the muzzle, ears and wings and causes the bats to emerge from torpor prematurely and engage in abnormal activity, thereby consuming vital fat and water reserves. Infected bats suffer from dehydration, starvation and heat loss, resulting in high rates of mortality (Wildlife Section, Species Conservation Policy Branch, Ministry of Natural Resources and Forestry, 2015).

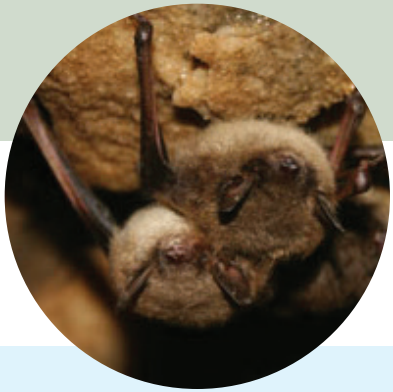
The Big Brown Bat, Little Brown Myotis, Northern Myotis, Eastern Small-footed Myotis and Tri-colored Bat rely on hibernation in undisturbed caves or old underground mine workings, as a primary strategy for winter survival. All five species are considered to be at risk from WNS. In November 2014, the Little Brown Myotis, Tri-colored bat and Northern Myotis were listed as Endangered under Schedule 1 of the Species at Risk Act (SARA)(Environment Canada, 2015). The Little Brown Myotis and Northern Myotis were listed as Endangered under Ontario's Endangered Species Act (ESA) in January 2013. The Eastern Small-footed Myotis was listed under the ESA in June 2014, and the Tri-colored Bat was listed in June 2016.

Bats are an integral component of Ontario's ecosystems. As primary predators of night time insects, a decline in their populations may lead to increased numbers of pests resulting in damage to forests and agriculture, and increased use of pesticides (Wildlife Section, Species Conservation Policy Branch, Ministry of Natural Resources and Forestry, 2015).

In 2017, with funding from the Ontario Species at Risk Stewardship Fund, the Haliburton Highlands Land Trust began a project to look at bat populations in Haliburton County. The public response to requests for bat observations was phenomenal and helped identify 88 sites for investigation. Recording devices were set up at 56 sites and 12,663 bat calls were recorded and analyzed. Seven of the eight bat species found in Ontario were identified in Haliburton County.

You can help protect vulnerable bat populations by following the guidelines in this brochure.

Best Management Practises



These guidelines have been taken from the final Haliburton Highlands Land Trust report entitled "Bats at Risk Assessment" generously funded by the 2017 Ontario Species at Risk Stewardship Fund.

Retention of Nursery Colonies and Suitable Sites

Nursery colonies, consisting of mothers and pups, are critical to maintaining bat populations as they often contain most of the breeding females and offspring for a large area. The most frequently observed and largest nursery colonies are found in attics, buildings and barns. Colony eradication is a recognized threat to bat populations (COSEWIC, 2013). Even exclusion may cause abandonment as it has been found that breeding females did not use available bat houses or move to other nearby maternity colony sites when their site was sealed (COSEWIC, 2013). Further, many people coexist with bats without problems and in fact, new bat house designs have been integrated into building construction, with openings in the side of the house to allow bats to enter (Bat Conservation Trust, 2017). Therefore exclusion is not always necessary and it is important for landowners to assess whether the bats pose a risk to their property or health prior to taking action. If exclusion is necessary, landowners should ensure that the exercise is conducted in a manner that minimizes the risk to the nursery colony.

Derelict buildings and bridges can also provide good nursery sites with very little potential for human conflict. If landowners are considering the removal of such structures from their property, the building should first be assessed to determine if a bat population is present. If so, it is helpful for the bat population if the building is left standing.

Habitat Management

Natural roost sites are also an important habitat feature. Woodpecker holes, rot holes, cracks, splits and loose bark are examples of known roosts. The potential for suitable roosts generally increases with the age of the forest. Woods that are large, semi-natural, deciduous and/or mixed with water features such as wetlands, lakes and rivers are optimal. Conifer plantations and young forests (<20cm dbh) provide minimal roosting opportunities (Forestry Commission for England and Wales, 2005). Many landowners in Haliburton County are actively managing their forests. The retention of natural snags and large mature trees may increase the suitability of forested habitat for most bat species.

The creation of small gaps and removal of single trees, to mimic natural gaps in younger pine forests will favour bat species that forage in more open habitats (Jung, Thompson, Titman, & Applejohn, 1999).

Wetlands and areas around waterbodies are important foraging habitat for many bat species and therefore activities that degrade or remove wetlands have the potential to have negative impacts on their foraging habitat (Environment Canada, 2015).

Hibernacula Protection and Management

In Ontario, bat species that hibernate are at risk because most of the populations overwinter in only a few sites (COSEWIC, 2013). Natural caves, abandoned mines and dug wells can provide important hibernation sites for many bats. Landowners with such features should maintain access for the bats through the removal of overgrown vegetation that can block the entrance. Limiting human access is also critical as humans are a vector for P. destructans (White Nose Syndrome, WNS) which, when introduced into a hibernaculum, poses a serious threat to the bat populations. Landowners should avoid visiting sites where WNS has been identified or where bats may be present. This includes refraining from entering all non-commercial caves and old underground mine sites. In the event, refrainment is not possible then visitors must strictly adhere to decontamination protocols (http://www.cwhc-rcsf.ca/docs/WNS_Decontamination_Protocol-Mar2017.pdf) immediately after accessing the site. Human visitation can also arouse bats from torpor causing bats to consume vital fat reserves. Multiple visits over several days can have severe impacts (COSEWIC, 2013) (Wildlife Section, Species Conservation Policy Branch, Ministry of Natural Resources and Forestry, 2015).

Participants at the 2017 bat box workshop at Abbey Gardens, Haliburton.

Alternative Roost Sites

Bat boxes are easy for landowners to install and provide bats with alternative roost sites in areas where roost sites are limited, or in situations where bats have been excluded from an historical site (i.e. house sealing). There are a wide variety of bat box designs available; however, bats have very specific preferences that need to be met before a bat box will be utilized. The following provides a summary of recommendations by bat conservation organizations (Bat Conservation International, 2017) (Bat Conservation Trust, 2017).

Design

Size is important with the most successful bat boxes having roost chambers of at least 35cm wide by 50cm tall. Taller and wider boxes with more roosting chambers are even better. Bat boxes with at least three chambers provide a range of conditions and can accommodate nursery colonies.

Landing areas below the chamber are required for access and these vertical surfaces should be roughened to allow bats to grip the surface and climb into the chamber. Natural wood materials are preferable and pressure treated lumber should be avoided as it can be toxic to the bats.

Temperature is also of importance with dark exterior surfaces providing a more preferable temperature. The entrance slit should be no more than 15-20mm wide and there should be no gaps where the sides and top join to ensure draughts are minimal. A bat box that cannot be opened is the best.

A completed bat box, ready for hanging.

Location

There are many variables to consider when selecting a site for the installation of a bat box. Specifically, the surrounding area should provide a good mixture of foraging habitat, including trees and a source of water (stream, wetland, river or lake). Bats tend to fly along linear features such as forest and water edges and therefore a bat box placed along these features is more likely to be detected. The bat box should be placed 6-9m from branches or other structures to minimize flight line obstacles and perches for predators. Artificial light sources should not be directed onto the bat box or surrounding area as these can disturb the bats (Bat Conservation International, 2017) (Bat Conservation Trust, 2017).

Thermoregulation is another important consideration particularly in northern areas such as Haliburton. Bat boxes should be positioned where they are sheltered from the wind and receive 6-8 hours of direct sunlight. This is best achieved by orienting the bat box to face south-easterly to south-westerly (Bat Conservation International, 2017).

In regard to mounting a bat box, sides of buildings, poles and posts are optimal. Bat boxes mounted under the eaves on the side of a building are often successful. Mounting bat boxes on trees is not recommended as they tend to receive less light, are impeded by branches, are more vulnerable to predators, and require more time to be found by bats. As bat boxes mounted on poles and posts are exposed in all directions only multi-chambered bat boxes should be used as these are more thermally stable (Bat Conservation International, 2017).

Bat boxes should be placed approximately 4-6m above the ground and if placing multiple bat boxes, alter orientation and height slightly to allow bats to select the box that best meets their needs.

Photos by Barbara Muenchau (left) and Phil Meyers (right); retrieved from batwatch.ca

Determining Use

To determine if a bat box is in use, investigate the area for droppings and/or urine staining on the vertical bat ladder or below. It also may be possible to hear chattering during the day. Watch the bat box at dusk to observe any bats leaving to feed.

Despite best intentions it may take several years for bats to find a new box, and so it is important to be patient. Bats may never utilize a new bat box if there is another more suitable roost nearby. If the bat box has not been utilized after 3 – 4 years consider moving the bat box to a new location.

Rabies

Rabies is an infectious disease that affects the nerves and brain of warm blooded mammals, which can alter their behavior and eventually cause death. In Ontario, the Big Brown Bat, Silver-haired Bat, Red Bat and Hoary Bat have their own strain of rabies. The Big Brown Bat strain is the most common and can occasionally be found in the smaller bat species such as the Little Brown Myotis, Northern Myotis, Small-footed Myotis and Tri-colored Bat (Simcoe Muskoka District Health Unit, 2007). In Ontario 29 rabid bats were reported in 2016 with one of the locations being in the County of Haliburton (Azad, 2017). This is a very small number relative to the other common carriers of rabies in the same year. Just in southwestern Ontario there were 171 rabid raccoons, 84 rabid skunks and 1 rabid fox reported (Ontario Ministry of Natural Resources and Forestry, 2017). Regardless of the relatively rare occurrences of rabies in bats, general precautions should be taken to minimize the risk of exposure.

Although strange behavior, such as wandering around in daylight or crawling around on the ground, can be indicative of rabies, rabies in a bat can be confirmed only in a laboratory. As it is impossible to ensure that an observed bat is not infected, it is best never to handle a bat. Children should be warned to stay away from any bats. If bitten by a bat, wash the affected area thoroughly with soap and water and get medical advice immediately (Bat Conservation International). Unlike other rabies carriers, bats are small and can bite a human without the person knowing. Therefore if a bat is found in a room with a sleeping or incapacitated person, or unattended child, it is possible a bite may have occurred and therefore contacting the nearest health unit is recommended (Ontaro Ministry of Natural Resources, 2006).

In regard to prevention, some bats roost in buildings and there may be no reason to evict them if there is little chance for contact with people. However, bats should always be prevented from accessing the rooms of a home and therefore "bat-proofing" may be required.

It is important to remember that attacks on humans by rabid bats are rare, and colonies do not experience rabies outbreaks (Gerson, 1984)

Bat Exclusion

The following is a compilation of bat exclusion guidelines provided by Bat Conservation International, the Ontario Ministry of Natural Resources and Forestry and the BC Community Bat Project (Bat Conservation International, 2017) (Craig, 2016) (Ontario Ministry of Natural Resources and Forestry, 2013).

Buildings and other structures can offer warm safe shelters for some species of bats. A few of the bat species found in the County of Haliburton typically roost in attics, soffits, chimneys and porches, and under siding, eaves, shingles and/or shutters. Bats do not gnaw into buildings but enter buildings through holes as small as 1.3cm. Typical entry points include broken or poorly fitted screens, open soffits, loose or missing shingles, places where flashing or boards have come loose, and where pipes and wires enter the building. Openings often occur at points of intersection such as where the walls meet the eaves, or dormers meet the roof. The presence of guano or black or brown stains are indicative of bat roosting activity.

In many cases, there is no reason to evict bats from the building if there is little chance of human contact. Small bat colonies (i.e. night roosts or small maternity colonies) can usually be left alone with minimal management of the bat guano, as an excellent alternative. In these instances sweeping up or containing the guano, or a well-placed potted plant to catch the guano below the site, will easily address these concerns.

If a landowner has deemed it necessary to exclude bats from a building then it is very important to ensure that precautions are taken to protect the bats. Under the ESA 2007 endangered and threatened species cannot be harassed, captured or killed unless property owners enter into an agreement with the Ontario Ministry of Natural Resources and Forestry (OMNRF).

Timing is one of the most critical components to effectively and humanely exclude bats from a residence. The timing schedule as detailed below is recommended by the OMNRF (Ontario Ministry of Natural Resources and Forestry, 2013).

Timing Window	Bat Activity	Exclusion Activity
April – Early May	Bats may be present but no pups at this time	Installing one-way doors in identified openings to evict or exclude bats from the building will let bats exit the building but not re-enter
Mid-May to mid-August	Bats and flightless pups present	Immobile pups may be present so any action to evict bats or prevent access (e.g. through the use of one way doors or sealing entrances) could present a risk to the pups. Flightless pups will die if they are separated from their mothers. This is a good time to watch the bats exit at dusk to identify the openings for exclusion activities at a later date once pups are able to fly
Late August until November	Some bats may remain	Some bats may remain in an attic or basement. Installing one-way doors in identified openings to evict or exclude bats from the building will let bats exit the building but not re-enter
December until the end of March	Some overwintering bats (e.g. big brown bat) might still be present	This is a good time to seal entrances completely **IF** you are sure that all bats have left to hibernate elsewhere and no bats remain. Taking action to evict or exclude any remaining bats during winter months would likely result in their death as they are highly vulnerable to the cold.

It is important to prevent human contact with bats and therefore sealing the interior of the building should be a priority. Interior sealing can be done at any time as long as the bats can still exit their roosts. Locate openings into the living space from attics, garages or any other space where bats may be roosting, and seal the gaps with caulking, spray foam, weather stripping or screening.

Following the interior sealing of the house, an evening survey during the summer months is required to identify entry and exit points. This should be conducted from dusk until full dark and will identify the location of exit points as well as provide an approximate number of bats in the roost. As bats can exit a house from many points at one time it is important to have multiple observers to ensure the entire house perimeter can be observed at all times. Once exit points have been identified a more thorough visual inspection for guano and staining and to pinpoint the location and hole, is recommended.

Each year bats tend to return to the same roost locations. The installation of a bat house may provide an alternative roost site to bats that have been evicted, and bats may be less likely to attempt to re-enter the building.

Although numerous methods have been used to evict bats most are either ineffective, illegal or inhumane:

Bats have powerful homing abilities and therefore trapping and relocating bats is ineffective.
Ultrasonic devices are also ineffective;
Other deterrents such as moth balls would require concentrations that pose risk to human health;
Pesticides can be inhumane;
Sealing a building without properly evicting bats can strand pups and starve trapped bats;
Harassing, capturing or killing endangered or threatened bat species is illegal.

The only effective means of evicting bats is to create one-way valves that allow bats to leave but not re-enter the building. This should only be done in late summer and fall months, after the pups are able to fly or early spring prior to pupping. One way valves can be constructed out of tubes and/or netting. The tube method involves placing a 5cm by 25cm plastic tube (PVC pipe, caulk tube or other flexible plastic tubing) 6mm into the exit hole and sealing around the tube. The tubes must be hanging downwards in order to allow the bats to exit via the tube. Although bats can easily exit via the tube, bats cannot cling to the smooth interior surface of the tube and therefore are unable to climb back in.

The net method involves securing the sides and top of flexible plastic netting over the opening. The netting should have a mesh diameter of 0.4cm or less and extend 45-60 cm blow the hole. Bats are able to exit the hole and move down the wall to free themselves of the net but are unable to navigate back up under the net to access the whole.

Both the tube and netting should be left in place for a minimum of 5 to 7 days to ensure that all of the bats have left the building, at which point the hole can be permanently sealed. Some landowners may prefer to hire a bat management professional to assist them with evicting bats from their building and sealing the building.

Bat Conservation International (BCI) recommends the following specific guidelines for selecting a professional:

- Ensure the company and individual have verifiable bat exclusion experience
- Demonstrate a knowledge and familiarity of local bat species
- Use BCI approved materials and methods

BCI also advises landowners to be wary of professionals who do the following:

- Use scare tactics to convince the landowner that they are in danger from roosting bats and that they must act immediately
- Advise or use ineffective methods such as ultrasonic repellents or materials that degrade quickly to seal the house (foam, paper, steel wool etc.)
- Advise or use fatal methods such as chemical pesticides
- Agree to exclude bats during the maternity season