# Got Bats?

## B.C. Community Bat Project
## FREQUENTLY ASKED QUESTIONS

Inside this handbook:

- Bat Basics
- Bats in Buildings
- Bat-Houses
- Public Health
- How to Help Bats

# ACKNOWLEDGMENTS

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*This version was updated in May 2014. Please see our website for updated versions.*

*www.bcbats.ca*

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# INTRODUCTION

The provincial “Got Bats?” network was established in 2014 with the goals to:

- Raise awareness about bat conservation in BC
- Identify bat roost sites in buildings
- Conserve and enhance bat habitat
- Provide support to landowners with bats in buildings
- Engage residents in citizen-science to monitor bat populations

This document answers common questions about bats in buildings – how do I get bats out of my house, what kind of bat-house works best, are bats dangerous? Originally designed as a website by the Ministry of Environment, the content has now been updated to reflect frequently asked questions of community bat projects in BC.

If you would like more information on bats on your property, please contact your local bat project at www.bcbats.ca or 1-855-9BC-BATS.

# QUICK BAT FACTS

- Bats are the only mammal that can truly fly.
- BC has the greatest diversity of bats of any province
- Bats use a lot of energy to fly with their heart rate reaching up to 1000 beats per minute.
- Bats rarely carry rabies and will sicken and die if they contract it, unlike some other animals that are unaffected carriers.
- Bats are not rodents and are protected under the *BC Wildlife Act*.
- Since the devastating introduced fungus causing “White Nose Syndrome” was introduced to eastern North America in 2006, an estimated 6 million bats have died.
- Half of the sixteen bat species in BC are listed as vulnerable or threatened.

# BAT BASICS

## *WHAT'S GOOD ABOUT BATS?*

Bats are important components of healthy ecosystems. Bats are huge consumers of many different groups of insects including moths, beetles, leafhoppers, and other flying insects that can be pests for agriculture and forestry. A lactating female bat may consume her own body weight or more in insects in one night. In a lab setting, one little brown bat ate 600 mosquitoes in an hour. Researchers believe that bats play an important role in nutrient cycles because of the movement of nitrogen from aquatic systems (insect prey) to upland forest communities (as guano is deposited). Bats may also serve as indicators of the health of a system due to their sensitivity to pollution and pesticides.

## *HOW BIG ARE BATS?*

The smallest bat in the province is the western small-footed bat weighing about 4.5 grams (their babies, called "pups", weigh about 1 gram at birth and are the size of a kidney bean with little rubbery wings). Adult wingspan for these little bats is 22 cm from wingtip to wingtip. In contrast, the largest bat in BC is the hoary bat, a high, fast flier weighing 28.5 grams and spreading a wingspan of 39 cm. The most common bat species that people encounter are the little brown myotis, Yuma myotis, and big brown bat. Little brown bats weigh 6 to 7 grams (about the same as a loonie) with wingspans of 25 cm. Big brown bats are over twice the size of a little brown bat with weights of 15 to 18 grams and wingspans of 33 cm.

## *HOW LONG DO BATS LIVE?*

There are few life span records for BC bats but in Canada there are records of big brown bats surviving to at least 19 years and little brown bats to more than 39 years. Recent work in the UK has found a male Brandt's bat (a type of Myotis) that is 41 years old. Such long life in a small mammal is unusual. Some researchers are examining this phenomenon of extended longevity in bats hoping to unlock the secret to the fountain of youth.

## *HOW MANY BABIES DO BATS HAVE?*

Most bat species in Canada produce a single pup per year with the exception of hoary, silver-haired, pallid and red bats and some populations of big brown bats which have twins.

## *WHAT DO BATS EAT IN BRITISH COLUMBIA?*

Bats in Canada (including BC) eat arthropods (insects and arachnids like spiders and scorpions). Small bats eat small insects such as mosquitoes, midges, lacewings, small moths, caddisflies and other small night flying bugs. Larger bats can handle larger insects such as large moths, and larger hard-bodied beetles. A number of these insects are considered pests to either agriculture

or forestry, especially moth and beetle species. Most bats consume flying insects although a few bat species have the ability to hover in flight and are capable of 'gleaning' or picking moths and other insects off leaves or grasses.

Bats are important predators of pest insects. Big brown bats specialize on beetles and true bugs, including cucumber beetles, June bugs, green and brown stinkbugs and leafhoppers. It is estimated that over one summer season, a colony of 150 big brown bats can eat 38,000 cucumber beetles, 16,000 June bugs, 19,000 stinkbugs, and 50,000 leafhoppers[1]. By eating 38,000 cucumber beetles, big brown bats control about 33 million cucumber beetle larvae, which are a significant agricultural pest in the US Midwest. June bugs, stinkbugs and leafhoppers are also considered agricultural and urban pests—and big brown bats love to eat them. Recent studies in the United States have valued the pest control services provided by bats to be about $74/acre[2] or $3.7 billion/year in the U.S.!

- Mass of an insect (e.g. mosquito) – 1-2 milligrams – Approx. 002 grams
- Average little brown myotis or Yuma myotis – about 7 grams
- Adult female at peak lactation – consumes own weight (or more in insects) – consumes about 7 grams/0.002 = 3500 insects per bat per night
- Calculate for a colony of 100 bats = 3500 x 100 = **350,000 insects per night per colony!**

## *WHERE DO BATS LIVE?*

Generally, bats in BC live wherever they can find suitable roosting (sleeping) and foraging (eating) habitat relatively close together. Warmer parts of the province (such as the Okanagan) have more species and higher abundance of bats, but all parts of the province (with the exception of high elevation, snowy, cold alpine sites) will have bats. Many of our BC bat species roost in trees, especially older trees that have peeling bark, crevices from lightning strikes or other damage, or in cavities such as those created by excavating birds such as woodpeckers. Two species (the hoary and red bat) prefer solitary roosts, hanging from branches. Hoary and red bats are heavily furred (including their tail membrane that they will wrap around themselves like a blanket) and their fur colour allows them to hide amongst the leaves. Some bat species prefer rock crevices in large rock faces on cliffs or in rock piles. And a few species exhibit flexibility in their roost preferences using cavities in trees or rock or suitable sites in buildings or bat-houses. In all cases, females with young are looking for warm summer roosts for their babies.

[1] Whitaker, J.O., Jr. 1995. Food of the big brown bat, *Eptesicus fuscus*, from maternity colonies in Indiana and Illinois. American Midland Naturalist, 134: 346-360.

[2] Boyles, J. G., P. M. Cryan, G. F. McCracken and T. H. Kunz. 2011. Economic Importance of Bats in Agriculture. Science, 332: 41 – 42.

## *WHAT SPECIES OF BATS LIVE IN BC?*

There are at least 16 species of bats in BC and and eight are considered "at risk" (Table 1).

**TABLE 1: BAT SPECIES FOUND IN EACH REGION OF BRITISH COLUMBIA[3]**

| | Scientific Name | Status | Community Bat Project or Ministry of Environment Region of BC | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Vancouver | Lower Mainland | Sunshine Coast | Thompson | Kootenay | Cariboo | Skeena | Omineca | Okanagan | Peace |
| **Big Brown Bat** | *Eptesicus fuscus* | Not at risk | x | x | x | x | x | x | x | x | x | x |
| **Silver-haired Bat** | *Lasionycteris noctivagans* | Not at risk | x | x | x | x | x | x | x | x | x | x |
| **Hoary Bat** | *Lasiurus cinereus* | Not at risk | x | x | x | x | x | x | x | x | x | x |
| **Californian Myotis** | *Myotis californicus* | Not at risk | x | x | x | x | x | x | x | | x | |
| **Long-eared Myotis** | *Myotis evotis* | Not at risk | x | x | x | x | x | x | x | x | x | x |
| **Little Brown Myotis** | *Myotis lucifugus* | E[1] | x | x | x | x | x | x | x | x | x | x |
| **Long-legged Myotis** | *Myotis volans* | Not at risk | x | x | x | x | x | x | x | x | x | x |
| **Yuma Myotis** | *Myotis yumanensis* | Not at risk | x | x | x | x | x | x | x | | x | |
| **Western Small-footed Myotis** | *Myotis ciliolabrum* | Blue (BC) | | | | x | x | x | | | x | |
| **Fringed Myotis** | *Myotis thysanodes* | Blue (BC) | ? | ? | ? | x | x | x | | | x | |
| **Keen's Myotis** | *Myotis keenii* | Red (BC) | x | x | x | | | x | x | | ? | |
| **Northern Myotis** | *Myotis septentrionalis* | E[1]; Blue (BC) | | | | | x | x | x | x | | x |
| **Eastern Red Bat** | *Lasiurus borealis* | Red (BC) | | x | x | | | | | | ? | x |
| **Townsend's Big-eared Bat** | *Corynorhinus townsendii* | Blue (BC) | x | x | x | x | x | x | | | x | |
| **Pallid Bat** | *Antrozous pallidus* | T[2] (COSEWIC) Red (BC) | | | | | | | | | x | |
| **Spotted Bat** | *Euderma maculatum* | SC[2]; Blue (BC) | | | | x | | x | | | x | |
| **Canyon bat** | *Parastrellus hesperus* | | | | | | | | | | (x)[3] | |

[1] Assessed as Endangered by COSEWIC during emergency assessment February 2012, and recommended for listing on Schedule 1 under SARA.
[2] T = Threatened, SC = Special Concern, listed by COSEWIC
[3] Recently recorded acoustically in the south Okanagan (Mike Sarell, pers. comm.). Thought to be an accidental species in BC.

[3] Modified from: Craig, V. J., and S. L. Holroyd. 2004. Bat Conservation Strategy for B.C. and Alberta. Draft. Prepared for B.C. Ministry of Water, Land and Air Protection. 112 pp.

## *WHAT DO BATS DO IN THE WINTER IN BC?*

Most bats in BC spend the winter hibernating (Table 2). Their body temperatures lower, their heart rates slow and their metabolism drops dramatically. Other species migrate to warmer southern climates to remain relatively active, or migrate to a spot to hibernate. For example, silver-haired bats are called 'migratory-hibernators' because they may move from northern locations to more southern areas before hibernating (although some silver-haired bats hibernate without migrating), while the hoary bat and the red bat, are completely migratory. In late August or early September, these species move south, traveling as far as Mexico or even Central America to spend the winter hunting in warmer southern climates before returning to breed in BC. Bats in buildings usually leave in autumn to hibernate in a cave or mine.

Winter hibernation sites represent a critical habitat type for bats. Not only are bats vulnerable to predation in hibernacula because they are in a torpid, inert state, but bats roused from this state use up valuable fat reserves. Relatively few bat hibernacula are known in BC and sites that are known have relatively few bats hibernating in them. The fact that the majority of hibernacula are unknown increases the risk of loss of populations or individuals due to development activities or other human disturbance. Dr. Cori Lausen is currently researching winter bat activity. She has confirmed that a number of bat species are active in winter in BC including big brown bats, Yuma myotis, Townsend's big-eared bats, silver-haired bats, and California myotis, and suspects other species as well. Bats may be active in winter to forage on insects that hibernate in mines, to mate, to drink water, or to stretch and use their muscles.

HIBERNATING SILVER-HAIRED BAT (LEFT) AND DR. CORI LAUSEN CONDUCTING RESEARCH ON WINTER BAT ACTIVITY (RIGHT). PHOTOS COURTESY OF CORI LAUSEN.

**TABLE 2: BATS OF BRITISH COLUMBIA INCLUDING ROOSTING SITES IN SUMMER AND WINTER[4]**

| COMMON NAME<br>SCIENTIFIC NAME | SUMMER ROOSTS | | | WINTER ROOSTS |
|---|---|---|---|---|
| | Buildings | Bat House User | Natural roosts | |
| Little brown myotis<br>*Myotis lucifugus* | Common | Yes | Snags, rock crevices, cliffs, mines | Mines, caves, rock crevices |
| Yuma myotis<br>*Myotis yumanensis* | Common | Yes | Snags, rock crevices, mines | Mines |
| Long-legged myotis<br>*Myotis volans* | Occasional | | Cliffs, rock crevices, snags, stumps | Mines, caves, rock crevices |
| Western small-footed myotis<br>*Myotis ciliolabrum* | Occasional | | Cliffs, rock crevices, mines, | Mines, cliff crevices |
| California myotis<br>*Myotis californicus* | Occasional | Yes | Snags, mines, bridges, rock outcrops & crevices | Buildings, mines, caves, rock crevices |
| Fringed myotis<br>*Myotis thysanodes* | Occasional | | Mines cliffs, rock crevices, snags | Mines |
| Long-eared myotis<br>*Myotis evotis* | Occasional | Yes | Cliffs, snags, stumps, talus slopes, rock outcrops, crevices, mines | Mines, buildings |
| Keen's long-eared myotis<br>*Myotis keenii* | | | Mines, cliffs, snags, rock crevices | Snags, rock crevices? |
| Northern myotis<br>*Myotis septentrionalis* | Rarely | | Snags | Mines |
| Townsend's big-eared bat<br>*Corynorhinus townsendii* | Common | Yes but big ones! | Cliffs, caves, buildings, mines | Mines, caves, rock crevices |
| Western red bat<br>*Lasiurus blossevillii* | | | Trees | Migrates? |
| Hoary bat<br>*Lasiurus cinereus* | | | Snags, trees | Migrates |
| Silver-haired bat[1]<br>*Lasionycteris noctivagans* | | | Trees, snags (cottonwoods) | Snags, mines, buildings |
| Big brown bat<br>*Eptesicus fuscus* | Common | Yes | Snags, cliffs, rock crevices | Buildings, mines |
| Pallid bat<br>*Antrozous pallidus* | Potentially | | Cliffs, rock outcrops, snags, buildings, mines, orchard | Rock crevices? |
| Spotted bat<br>*Euderma maculatum* | | | Cliffs | Cliffs, mines |
| **Total species** | **16** | | | |

[4] Modified from: Craig, V. J., and S. L. Holroyd. 2004. Bat Conservation Strategy for B.C. and Alberta. Draft. Prepared for B.C. Ministry of Water, Land and Air Protection. 112 pp.

## *DO BATS FLY INTO YOUR HAIR?*

Bats do not fly into your hair. They may, however, fly haphazardly over your head if you happen to be walking in an area with lots of flying insects at dusk. People give off heat and carbon dioxide in the evening which attracts flying insects. Also, walking may stir up resting insects. Bats attempt to eat these insects and may appear to be diving for your hair. Bats have exceptional flight abilities allowing them to easily avoid collisions, except for the juveniles when they are learning to fly. There is NO attraction whatsoever to a human hair.

## *ARE BATS RELATED TO MICE?*

Bats are only very distantly related to mice. Mice and rats are mammals like bats but belong to the Order *Rodentia* (rodents). Bats have their own Order, *Chiroptera*, which means "hand" "wing". There are over 1000 different species of bats worldwide and *Chiroptera* is the second largest Order of mammals.

## *WHAT IS GUANO?*

Guano is another name for bat poop. Guano may be confused with mouse droppings but is easily identified by simply crushing a pellet between your fingers (use of latex gloves or a very thorough washing afterwards is recommended as mouse droppings can contain Hantavirus, a serious health concern). Bat guano will crush into tiny, dry flecks and contain shiny bits (the result of sharp teeth crushing tough insect exoskeletons into bits). Mouse guano is sticky and hard and will not crush easily. High nitrogen content in bat guano makes it an excellent fertilizer for blooming plants. In many parts of the world it is bagged and sold as a specialty fertilizer.


GUANO FROM BARN (LEFT) AND GUANO FOR SALE IN STORE (RIGHT).

# BATS IN BUILDINGS

## *WHICH BATS USE BUILDINGS OR BAT HOUSES?*

While several species of bats can use buildings or bat houses, only a few are regular inhabitants. The most common species using buildings in BC are the little brown myotis, Yuma myotis, and the big brown bat. The rare Townsend's big-eared bat is also found in buildings and is easy to identify because of its long ears and tendency to roost in clusters on rafters in very open spaces. This habit also makes them vulnerable to human disturbance or injury, either by intentional or accidental means. Long-eared myotis, long-legged myotis, California myotis, pallid bats, and northern myotis will also use buildings but are not found as often in such roost types.

## *WHERE DO BATS ROOST IN BUILDINGS?*

Bats may roost in many parts of a building structure including under roofing, siding, fascia boards, flashing and rafters, in cracks of the chimney or walls, behind shutters or under a porch roof.

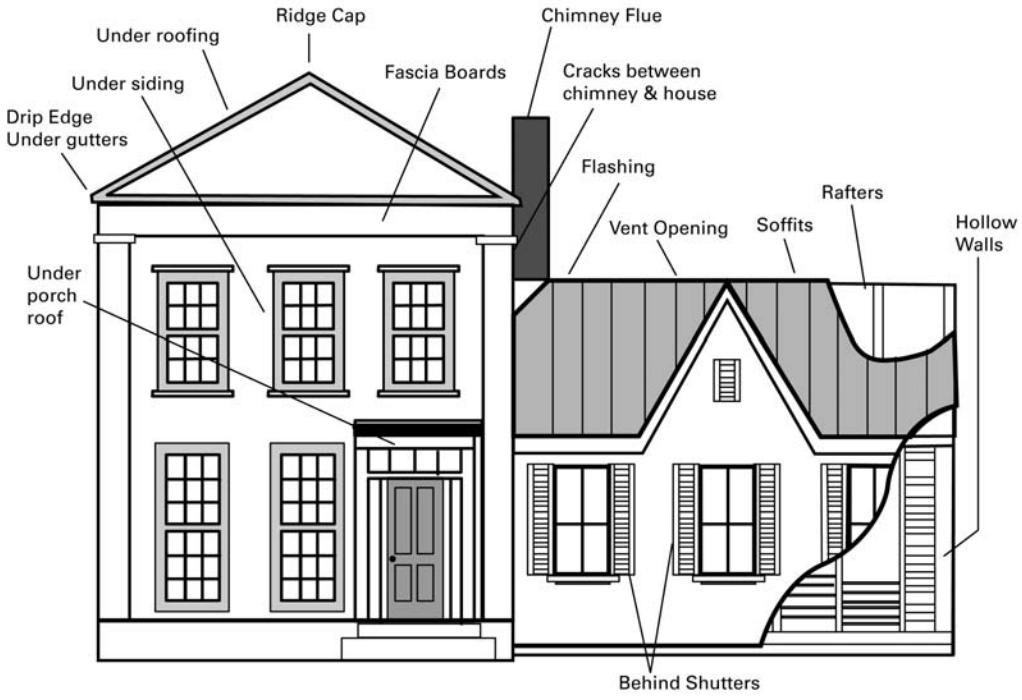



DIAGRAM OF HOUSE SHOWING POSSIBLE ROOST SITES FOR BATS[5].

[5] Drawn for the Kootenay Community Bat Project based on original drawing by Dr. Stephen C. Frantz, Global Environmental Options, LLC.

## *WHAT SHOULD I DO IF I HAVE BATS IN A BUILDING?*

There is no need to panic if you find bats in a building. Bats are simply small animals that are trying to find a suitable home. Some bat colonies can remain safely in buildings without creating a risk for humans. Assess your situation. Are the bats causing a problem? If so, is it the bats themselves, or the side effects of the bats (such as noise, smell or guano) that are the issue? Leaving bats where they are is usually the best option for bat conservation but may not be an appropriate option for the homeowner.

If the bats are using an outbuilding, such as a barn or storage shed, you may be able to avoid contact with them and co-exist. Some people have lived with bats in their attic for decades since they do not come into contact with them and there are no issues of noise or smell. In other cases, where bats persistently find ways into the human living spaces or guano cannot be regularly cleaned out, exclusion may be the best option. The primary issue (after not having contact with bats) is usually containment of droppings (guano). Containment can often be achieved at relatively low cost. It is also often the best option when exclusion from drafty outbuildings is virtually impossible.

RARE TOWNSEND'S BIG-EARED BATS IN BUILDING.

## *WHAT DO I DO IF A BAT FLIES INTO MY BUILDING?*

Occasionally, bats fly into homes and other buildings. Often, these bats are juveniles who are learning to fly. Frequent incidents of bats flying into your home may indicate that a maternity roost is nearby. If a bat flies into your building, it will usually find its own way out. Open all the windows and doors leading to the outside and watch the bat to make sure it leaves. If it does not, wait until it has landed on something. Wear gloves (such as oven mitts or thick gardening gloves), and place a small can or box over the bat, while gently sliding thin cardboard under the

container to “trap” the bat. Take the container, cardboard, and enclosed bat outside to release it. A bat should be placed on a wall or tree, high enough to avoid contact with children or pets. For sleeping or injured bats, put them in a pillow case and pin the pillow case high on a wall or tree with the open end up. Bats will crawl up and fly out when they are ready.

If someone is bitten or scratched by a bat, contact your local health authority immediately. If there is any uncertainty whether a bat has come into contact with a child or mentally incapacitated individual, also contact your local health authority.

### *WHAT SHOULD I DO IF I FIND AN INJURED OR DEAD BAT?*

If possible, injured or dead bats should be left where they are. If they are at risk of coming into contact with people or pets, they should be removed and put somewhere else. Dead bats may be buried or burned by wearing gloves to put them in a bag or box. For sick or injured bats, use leather gloves and a box or butterfly net to capture them, then place them carefully in a pillowcase and pin it to an outside wall with the open end up. This way, the bat can climb up and fly away at night if it is able. Never touch a bat with bare hands. Bats should not be placed in jars or boxes where they cannot fly away (unless there has been risk of a rabies exposure and the bat is being submitted for testing). Note that juvenile bats roost in odd places such as low on walls or exposed areas of buildings (usually in August). They should be left where they are if possible. *If more than three dead bats are found in one place with no sign of obvious trauma (e.g. torn wings, attacked by a cat), please contact your local bat project to submit them so they can be tested for White Nose Syndrome and other diseases.*

### *I SEE BAT DROPPINGS BUT NEVER SEE BATS. HOW DO I KNOW IF THEY ARE THERE?*

Bats use several types of roost sites during the year. Day roosts (including maternity roosts) are where bats gather to sleep and live during the day. Day roosts are usually fairly obvious, with signs of noise, smell, or guano and include attics, barns, sheds, siding, and other enclosed spaces. Night roosts are where bats rest between foraging bouts to digest before flying again. Night roosts are often open spaces, including under bridges, archways above doors, covered patios, and carports. Residents rarely see bats at night roosts but instead observe droppings every morning.

### *I DON’T MIND A FEW BATS BUT WILL THEY BREED LIKE MICE UNTIL THERE ARE HUNDREDS?*

Bats are not rodents and will not reproduce like mice. Most colonies are very stable with numbers remaining the same. Most bat species produce a single pup per year and only about half of these young survive their first winter. Colonies in buildings are almost always maternity colonies – female bats with their offspring. Adult males require cooler day roosts during the summer and will roost singly or in small groups away from breeding females. Females in maternity roosts tend to be very faithful to a roost site such as a building, usually because buildings provide ideal temperatures and protection from disturbance or predators. A stable

colony in a building will be composed of many related female individuals of many generations, meaning that a colony will have great-grandmothers, grandmothers, aunts, mothers and sisters. The size of the colony is often related to the species of bats. For example, big brown bats often have small colonies of less than 20 individuals in BC while Yuma myotis may have colonies of hundreds up to a few thousand.

LARGE YUMA COLONY INSIDE OF THE ATTIC OF A HOUSE.

MATERNITY COLONY OF LITTLE BROWN MYOTIS IN ATTIC WITH PUP TUCKED UNDER ITS MOTHER'S WING ON THE LEFT.

## *WHAT ARE THE BENEFITS OF HAVING BATS IN MY BUILDING?*

There are many reasons why you may decide to maintain your colony of bats rather than try to get rid of them:

- Bats consume abundant insects such as mosquitoes, agricultural pests and forest pests.
- The roost site may be providing critical habitat for the bats and the chance of losing the colony will be reduced if they can stay where they are.
- Bats are fascinating and provide a learning opportunity, especially for children. Some landowners have even installed a viewing chamber to watch the bats without disturbing them.
- Bats are long-lived (more than 40 years) unlike rodents and usually only have a single pup, making them more vulnerable to population decline.
- Most colonies in houses are maternity colonies, used year-after-year.
- Bat guano is an excellent fertilizer.

## *DO YOU HAVE ANY SUGGESTIONS AS TO HOW TO KEEP BATS SAFELY IN BUILDINGS?*

Many people think that the only way to avoid the discomforts that bat colonies can create is to rid themselves of the bats. In fact, many problems associated with bats are often a by-product of bats and not the bats themselves. Keeping a bat colony in a building ensures the optimum roost habitat is maintained, compensates for the decrease in natural roosts (e.g. few snags), and reduces the chances of losing the colony. In BC, many residents choose to keep their bats right where they are. The following steps are critical for assessing and promoting the maintenance of building roosts:

### STEP 1. IDENTIFY THE PROBLEMS THAT THE BATS ARE CREATING.

Identify any issues such as noise, smell or guano. There are strategies to address these issues without excluding the bats.

- **Remove accumulated guano**. Use appropriate respiratory protection in dusty enclosed areas. Guano can be used as a garden fertilizer since it is rich in nitrogen.
- **Replace stained insulation** and install a pre-sealed plywood floor along human access routes and under roost(s) to catch guano and facilitate annual removal.
- **If necessary, make an easier access into the attic.** If access into the attic is challenging, consider making a large entry hole, installing pull-down stairs, providing access from the outside of the house, or other modifications to make it easy to get inside to clean when necessary.

- **Ensure that all openings between the bats roost site and human living quarters have been properly sealed**. Seal gaps where guano (and bats) can enter living quarters, particularly around chimneys. This will reduce the movement of smell and guano, and prevent bats from entering the house. As well, identifying entry and exit points of the bats for leaving the roost site will help ensure that modifications do not interrupt bat access to the roost.

- If droppings are a problem in barns or outbuildings, **string tarps below the bat roost sites** to catch falling guano before it lands on hay, equipment or the ground. If the droppings are unsightly in a front entrance or deck, consider **installing shelves or rain gutters below the roost site** to catch guano.

- **Follow safety precautions.** Never handle bats, keep your pet's rabies vaccinations up to date, and ensure that all residents know not to disturb or handle bats.

### STEP 2. DETERMINE IF BATS CAN STAY IN THE BUILDING.

If problems with bats can be mitigated using the steps above, or the bats are not causing any problems at all, they can potentially stay where they are. If so, see the next step to determine if the roost site can be enhanced to provide better habitat for the bats. If bats need to be removed, see the next section *Evicting Bats from Buildings*.

### STEP 2. CONSIDER POTENTIAL ROOST ENHANCEMENTS

You may not only consider leaving bats in a building but also enhancing the roost so that it is more attractive for them. Ideally, roost sites should be safe, dry, and dark. To enhance a roost, consider putting up additional plywood over wall joists to create more crevice space. If development of an attic is a possibility, consider allocating a portion of the attic to the bats and creating a well-sealed room with outdoor access only. Where light is coming through, windows can be covered with curtains or wood. There are many examples in BC of landowners who live safely with bats for decades, leaving some parts of their attic or outbuilding as an undisturbed bat roost.

MODIFICATIONS FOR BAT ROOST SITES INCLUDING PLASTIC IN ATTIC TO FACILITATE GUANO REMOVAL AND REDUCE SMELL (TOP) AND A TARP TO PREVENT GUANO FROM FALLING HAY (BOTTOM).

# EVICTING BATS FROM BUILDINGS

## *HOW DO I GET BATS OUT OF MY BUILDING?*

In BC, it is illegal to exterminate bats under the *BC Wildlife Act*. However, excluding bats from their roost site so that they move to an alternative roost is a viable way of removing bats from a building. One difficulty is that bats are extremely small, and can squeeze through spaces as small as 5 mm (¼"). Bats may be very persistent in finding alternate routes into buildings once their primary routes are blocked off, so exclusion can be extremely difficult[6].The following steps are recommended for excluding bats.

### STEP 1. IF POSSIBLE, INSTALL A BAT-HOUSE.

Some bats have been using the same roost site for decades and they will be persistent in their attempts to re-enter it even after their main access is blocked off. Since bats can squeeze into very small spaces, the most effective tactic is to provide them with an alternative roost site. They will be much less persistent in trying to re-enter their roost if they have another attractive roost site nearby. Occasionally bats will voluntarily move into a bat-house even without active exclusion from the primary roost site.

### STEP 2. ASSESS YOUR PROPERTY.

Where are the bats roosting? Are they inside the building or under roofing or another structure on the outside of the building? Sometimes bats appear to be roosting inside a house, when in fact they are simply under roofing or fascia, and may not cause a problem for the homeowner. How 'tight' is your building? Are their lots of cracks and crevices allowing entrance to the building space or just a few? In some cases, such as cedar shake roofs, log houses, and A-frame houses, exclusion is extremely difficult. It may be more appropriate to exclude bats from a certain portion of the building and let them remain in another section.

### STEP 3. IDENTIFY ENTRY AND EXIT POINTS.

During summer when bats are active, observe at dusk where the bats are coming out and try to get a count of the number of bats exiting the building. You might do this on a number of nights to get a better estimate of the colony size and all the entry and exit points that will need to be sealed. Also assess *potential* entry and exit points that bats may use if the current openings are sealed.

### STEP 4. ASSESS WINTER USE OF THE BUILDING.

In general, bats leave building structures during winter months to hibernate in mines or caves. Usually, buildings are not occupied between November and April and this is a good time to seal

[6] An excellent guide called "Simple Bat Eviction" can be ordered from www.BatHouseGuy.com.

a roost site. *However, some buildings may have bat colonies during winter months.* Use a flashlight to look into any crevices, corners, and cracks to see if bats are present. If there are no bats present, see Step 6. If there are, contact a bat professional to report winter bat use of buildings and see "What if I need to get bats out immediately and can't wait until winter months".

#### STEP 5. SEAL OFF THE ROOST WHEN BATS ARE NOT PRESENT.

Clean out all guano and stained insulation if there are issues with odour. Be sure to wear a well-fitted mask to avoid inhaling guano and dust particles (not because the guano is poisonous but because inhaling small particles of any kind should be avoided). Seal all entry and exit points using "materials for bat-proofing your building". Consult a building professional to ensure that all modifications follow the BC Building Code. **Ensure that no bats are inside before sealing the roost**. If there is any question that bats may be using the building (e.g., you cannot see completely inside the roost), use a one-way trap door system (see "What if I need to get bats out immediately").

## *CAN I PHYSICALLY REMOVE BATS FROM MY BUILDING?*

No, under the Wildlife Act of BC it is illegal to physically remove bats. Since bats can travel many kilometers in a night, they would likely find their way back to the roost site again. Eviction, combined with the installation of a bat-house, is the most effective method of "removing" bats from buildings.

## *WHAT MATERIALS SHOULD I USE FOR BAT-PROOFING MY BUILDING*

Bats are not equipped with teeth that allow them to gnaw through building materials the way rodents can. Soft insulation materials attached with a heavy-duty staple gun provide an effective barrier to entry by bats. Long cracks and crevices can effectively be filled with expansion foam caulking, stainless steel wool, rust-proof scouring pads or covered with weather stripping, flashing, screening or insulation.

#### CAULKING

Caulking is used to seal cracks and openings. Since wood expands and contracts with changing environmental conditions, the best time to fill cracks is when they are at their widest. In other words, renovations should be conducted during periods of dry weather. Cracks may need to be filled before applying caulking. Types of fillers that can be used include: quick-setting putty, glass fibre, rubber, sponge, cotton, caulking or oakum.

Caulking materials come in a variety of types, some for general applications and others for more specialized uses. Elastomeric caulkings, including silicone, latex and acrylics, will remain flexible over time and are preferred over the older oil-based caulkings. Be sure to check labels carefully to ensure that the type of caulk you select is suitable to your intended application. Professionals recommend using a good grade of siliconized, paintable caulking in most cases. Clear silicone

caulking has the advantage of appearing almost invisible, thus matching any décor. Today's improved caulking materials are designed to last for 20 years or longer and to retain their flexibility to provide a tight seal under a wide range of conditions.

### AEROSOL FOAM

Aerosol foam sealants can be used for sealing larger cracks and openings at points where pipes and wires enter the building, and at the foundation sill joint. These foams expand to fill the opening and provide a tight seal. Be sure to follow the manufacturer's instructions when using this type of product. Foams can be messy and difficult to clean but after it cures and hardens, it can be trimmed, sanded and then treated with any kind of paint or stain. Because this product will weather, it is best to limit its use to deep crevices and interiors. At points where foam may be exposed, it may be advisable to treat the area with a layer of caulking as well (after the foam has cured and hardened). **Aerosol foams should not be used when bats are still present since it can result in the death of bats that come into contact with it.**

### WEATHER-STRIPPING

Although bats can crawl under a door to access a structure, they very rarely do. If this is your problem, weather-stripping may provide a solution. The gap between the bottom of the door and the floor can be sealed with weather-stripping, a draft shield or a gap stopper. Weather-stripping can be made of natural fibres, aluminum, fine wire, felt, hard rubber, vinyl or nylon. If you have an uneven floor surface under the door such as a carpet, you might want to look into a nylon strip brush barrier that is set in a galvanized steel channel and housed in aluminum or vinyl. The flexible nylon brush filaments move easily in any direction allowing it to conform to the floor, especially on uneven surfaces such as carpet. This seals gaps, stops drafts, reduces heat loss and is supposed to resist rodents and insects as well. A simple gap stopper for the bottom of doors that are not used often is a long, flexible sausage-shaped cloth tube filled with sand that you simply push against the bottom of the door to stop the gap.

BAT ROOST UNDER SHAKES (LEFT) OR FLASHING (RIGHT). BATS MAY USE GAPS WITH SPACES LARGER THAN A FINGER WIDTH.

### SCREENING

Bats can enter vents, ventilators or louvers that are not properly screened. Where screening is necessary, mesh size should be fine enough to prevent access for bats. Insect screening for windows should be 18" x14" mesh. Steel hardware cloth should have 0.63 cm (1/4" mesh) with three meshes or more to the inch. Hardware cloth for vents should be 8" x 8" mesh. All vents should be properly installed. Soffits can come in a variety of materials and styles and may also allow access for bats. Regardless of the soffit type, the slots should not exceed 0.63 x 2.5 cm (1 ¼ "). Screening can also be used to fill very large crevices. Strips of fiberglass screening can be pushed into holes and finished with a coat of sealant.

Bats will almost never use the inside of an active chimney but old or unused chimneys may be attractive because of the rough surfaces of chimney walls offering good places to roost. To prevent bat access to chimneys, spark arresters or bird screens can be installed. Materials should be rust resistant and carefully and securely installed. Dampers should be always kept closed except when the fireplace is in use.

When bats are accessing metal roofs, ensure that the ridge cap has been screened so bats cannot access there. If it has not, the ridge cap will need to be removed to install the ridge cap screening.

### FOAM CLOSURES

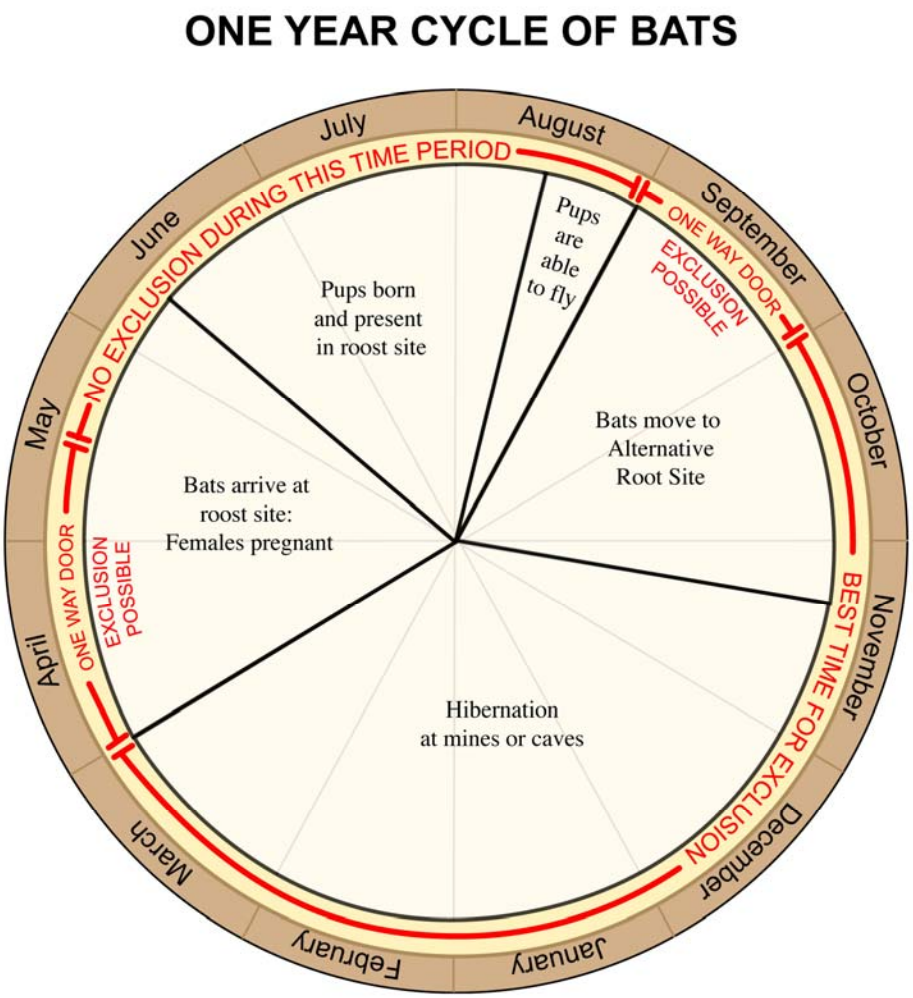
Bats can access spaces under a metal roof, including the profiled gaps in the metal. Foam closures are long strips of foam that are shaped with the same profile as the roof shape. One design is for the edge of the roof and the other is for the ridge cap. Foam closures usually have to be special-ordered into the hardware store. To maintain airflow in the roof, ensure that the soffits have ventilation.

### FLASHING

Wherever joints occur in a building (e.g., walls meeting the roof or a chimney), flashing may be installed to keep the building watertight. 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. Flashing should be firmly affixed since gaps under flashing can provide spots for bats to roost. If old flashing has bubbled and provides a roost site for bats, the space can be filled with expandable foam.

## *WHEN IS THE BEST TIME TO GET BATS OUT OF MY BUILDING?*

In BC, generally bats can be excluded from buildings any time after November and before April since that is when bats have usually left buildings to hibernate. Usually, bats do not use buildings for hibernation but instead select natural roosts such as caves or mines so the building roost site should be empty during the winter months. **However, bats may use some buildings throughout the winter months in BC so it is critical to check for bat presence before sealing a roost.**

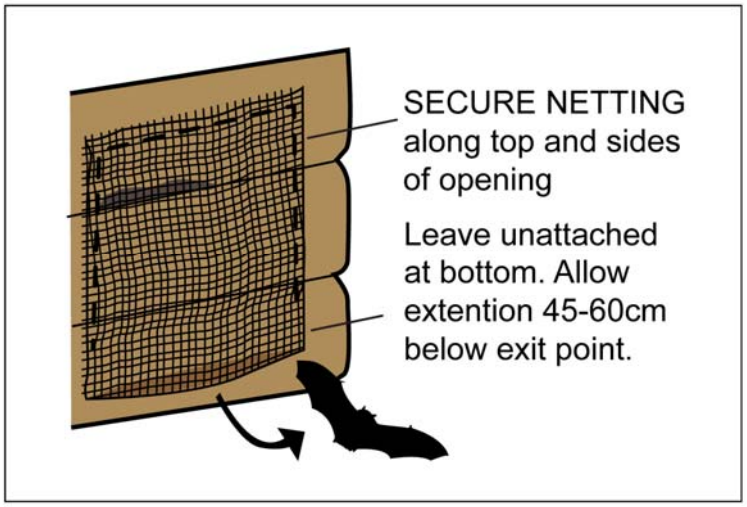



CALENDAR FOR TIMING OF EXCLUDING BATS FROM BUILDINGS IN BC.

## *WHAT IF I NEED TO GET BATS OUT IMMEDIATELY AND CAN'T WAIT UNTIL WINTER?*

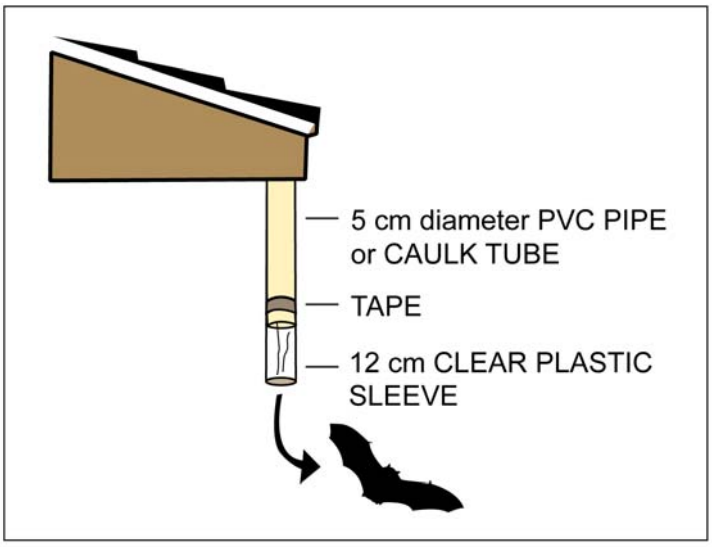
Occasionally, waiting until winter months to seal the roost site is not possible. In this situation, every effort should be made to carry out exclusions before pups are born (mid-May), or after they can fly (mid-August). **Never perform exclusions during summer months when pups have been born and are not yet able to fly.**

To exclude bats when they are present, follow the first four steps in "*How do I get bats out of my building?"* Rather than sealing off your roost site, install a one-way trap door. These devices can be made from a number of materials. Light weight polypropylene netting (with less than 1 cm mesh) or plastic sheeting can be affixed to the entry point and attached on three edges. The fourth edge (bottom) remains open. When bats fly out of the roost site, they will push against the plastic or mesh, and slip through the crack on the bottom edge. However, when they try to fly back inside, they will push against the mesh/plastic, and not be able to enter the space.




ONE WAY DOOR FOR VERTICAL SURFACE USING FIBERGLASS DOOR SCREEN.

Another system, particularly for vertical entry points, is to suspend a plastic tube (PVC pipe or flexible tubing) at least 5 cm wide and 25 cm long at the mouth of the hole. An optional clear plastic sleeve can be added to the end of the pipe. Bats will be able to exit through the tube by sliding down it. However, they will not be able to re-enter since the tube is too narrow to fly through and too slippery to climb up. After five to seven days, the device can be removed, and the hole permanently sealed. Before removing the device, check that no bats remain inside the roost site. Commercial "bat cones" can be purchased for this purpose also (http://www.batcone.com/).




ONE WAY DOOR FOR HORIZONTAL SURFACE USING PVC PIPE.

## *HOW DO I PREVENT BATS FROM USING A NIGHT ROOST?*

Night roosts, which often include carports, archways over doors, and covered patios, are roosts that bats use temporarily during the night to rest between feeding. The biggest nuisance with night roosts is cleaning up the guano every morning. However, since guano makes an excellent fertilizer, it can be used on the garden. Alternatively, place a plant pot where the guano usually falls to avoid having to clean up the droppings, or place a shelf or gutter along the wall below the night roost to catch guano before it falls. Night roosts do not indicate that bats are inside the building and the limited use is not usually a problem.

There are several methods to try to deter bats from using a night roost. These include:

- Leaving the area brightly lit.
- Installing a fan that blows on the wall where the bats are roosting (can be set-up with a timer).
- Hanging mylar balloons or strips of tin foil that are able to move in the breeze.
- Lining a slippery material (such as plastic sheeting) on the wall where bats come to roost. This surface may limit their ability to cling easily and can deter them from the site.
- Using aerosol dog and cat repellents on a particular spot (e.g. Critter Ridder©). Be sure to apply the spray when bats are not present. It will need to be re-applied regularly.

# PUBLIC HEALTH

## *ARE BATS PESTS?*

Bats are not pests. All bats are protected under the *BC Wildlife Act* and cannot be intentionally exterminated. Bats belong to their own group, *Chiroptera*, and are not rodents like mice and rats. Many bat species are considered vulnerable or threatened in BC. The Center for Disease Control (CDC) states that "*some bats live in buildings, and there's no reason to evict them if there is little chance for contact with people*"[7].

## *ARE BATS DANGEROUS?*

Bats are not aggressive creatures and will not intentionally attack people or other animals. Like all wild animals, bats should be left alone and not handled. Situations where bats are encountered in places where they are not welcome (e.g., inside a dwelling) or acting oddly (e.g., on the ground near people) should be managed very carefully. Bats flying inside homes will often exit on their own if doors and windows are opened (for more information, see "What do I do if a bat flies into my building?"). Bats on the ground are more likely to be sick, although in late summer, young newly flying juveniles may end up in odd places. Generally, a bat on the ground should be treated with caution.

## *IS BAT GUANO POISONOUS?*

Bat guano is not poisonous. As a general rule, you should avoid inhalation of dust associated with animal feces of any kind, including bird or cat droppings. Bat guano is simply chewed and digested insect parts and does not contain toxins. However, under warm and humid conditions, a fungus called *Histoplasma capsulatum* can thrive in the droppings of animals (including bats) and this organism can be transmitted to humans under ideal circumstances. In BC, wet bird droppings such as found in chicken or pigeon coops provide more favourable conditions for fungal growth than do dry guano piles found at bat colonies. Infection is caused by inhalation of air-borne spores in dust enriched by animal droppings. The disease can be avoided by not breathing dust suspected of being enriched by animal feces. Cleaning up large accumulations of guano should be done with appropriate respiratory protection (using a filter that will remove particles as small as two microns) used as a precaution, not because the guano is poisonous but because inhaling small particles of any kind should be avoided. For further caution, guano may be sprayed down lightly with water or a 10% bleach solution in a spray bottle prior to sweeping it up to reduce the number of particles that may become airborne. **There has <u>never</u> been a documented case of histoplasmosis from bat droppings in BC.**

[7] Center for Disease Control. http://www.cdc.gov/rabies/bats/management/

## *What is the risk of getting rabies if I have bats in a building?*

Bats are the only mammal in BC that normally can carry the rabies virus. Scientists estimate that the incidence of rabies in the free flying bat population is less than 1% and this rate varies between species[8]. This risk is low and negligible if proper precautions are taken (i.e., never handle bats, keep pet vaccinations up to date and keep human living areas sealed tightly from areas where there are bats). There is no link between having a bat-house or bats in a building and a higher incidence of rabies. Since 1950, there have been only six cases of bat-related rabies mortality in Canada[9].

## *How can I get rabies?*

To contract rabies you must come into direct contact with an animal carrying the virus. Direct contact means that you must have contact with infected blood or saliva and exposure means contact through a break in your skin. This could be a very small (almost invisible) break in the skin or internally (mouth or nose). **Avoid direct contact with bats. In all cases where there has been potential exposure (i.e., contact with bat saliva or blood) to humans, contact your local health authority immediately**. If possible, collect the bat that has come into direct contact with a person so it can be submitted for rabies testing. Live bats should be placed in a sealable container (equipped with air holes) and kept in a cool, dry place away from pets or humans until testing can be arranged. Use leather gloves to collect the bat, whether it is dead or alive. For more information, see http://www.healthlinkbc.ca/healthfiles/hfile07.stm. Note that Interior Health has changed its policy and no longer requires post-exposure rabies vaccinations if a bat is simply found in a bedroom.

Pet owners should make sure that rabies vaccinations are up-to-date for all pets. Local veterinarians should be consulted whenever pets have been exposed to a bat or any other potentially rabid animal.

## *Can BC bats transmit Hantavirus or West Nile virus?*

No. Deer mice are the only animals known to spread hantavirus in BC. The virus is acquired when people breathe in the virus present in the urine, saliva or droppings of infected rodents. Bats do not transmit West Nile Virus to people or to other animals. Infected mosquitoes transmit the virus to people. The virus has been found in two bat species and, like most other mammals, bats are "dead-end hosts" - they do not transmit the virus back to mosquitoes as birds do.

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[8] Klug, B. J., A. S. Turmelle, J. A. Ellison, E. F. Baerwald, and R. M. R. Barclay.2011. Journal of Wildlife Management, 47 (1): 64 – 77.

[9] http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/09vol35/acs-dcc-7/

# BAT-HOUSES

## *WHAT IS A BAT-HOUSE?*

A bat-house is a human-made structure designed to provide bats with a warm, dry and safe roost site. Similar to birdhouses, they are often wooden "boxes" that can be installed in a garden, on a building, on a post in an agricultural field, or in another opening. The style of bat-house depends on the species of bat, where it will be mounted, and the characteristics of the property. For example, little brown bats and Yuma bats (common bats in buildings) use small crevices while Townsend's big-eared bats used large open chambers. Rocket boxes must be installed on a post or pole whereas nursery boxes can also be mounted on the side of a building.

## *WHY PUT UP A BAT-HOUSE?*

A bat-house is a great way to enhance habitat for bats in your backyard. Many people want bats because they want to promote backyard biodiversity or help control insects (particularly mosquitoes). Some people install bat-houses in coordination with evicting bats from a building so that the bats will have an alternative roost site and the eviction will be more successful.

NURSERY BAT BOXES (LEFT) WITH OVER 500 LITTLE BROWN MYOTIS INSIDE (VIEW LOOKING UP INTO HOUSE FROM BELOW) (RIGHT).

## *WHAT FACTORS SHOULD I CONSIDER WHEN I BUY OR BUILD A BAT-HOUSE?*

There are several factors to consider when building or purchasing a bat-house including the number of chambers it has, the style, and the size.

### CHAMBERS

Chambers are the cavities that bats actually roost within. Chambers should be carefully spaced to ¾" or 1" apart. All areas where bats will be hanging (including the landing strip and one side of each chamber) should be built of rough wood (such as rough cedar), scored wood (such as plywood that has grooves cut at 13 mm or ½" intervals), or wood covered in fiberglass mesh, so that bats have something to grip onto. Plywood on its own is usually too slippery to be an effective roost site for bats.

### STYLE

There are numerous styles of bat-houses on the market. Some factors influencing the success of these designs are related to factors like size, vents, landing strip, etc. Other factors to consider when selecting a style are cost, space available on your property, size of the bat colony (if bats are already present), and location options. The primary designs on the market are bat boxes, rocket boxes and bat condos.

### MATERIALS

For wood bat-houses, a combination of cedar and exterior-grade plywood is best. Plywood for the exterior of the bat-house should be at least ¾" thick with at least four plies. Pressure-treated wood is not recommended due to the chemicals it may contain. Also, it can warp over time preventing use off the chambers. Be sure to use exterior-grade screws (not nails), staples and hardware. Caulk any cracks and seams to ensure that water does not enter the house and to provide a good thermal habitat for the bats.

### SIZE

Many bat-houses sold in BC are too small for our temperate climate. Bat-boxes should be at least 60 cm tall and 60 cm wide and have a landing strip of at least 10 cm. Rocket boxes should be at least 1 m tall and have at least 30 cm of linear roost space. Ideally, bat-houses should have multiple chambers.

### VENTS

Although not absolutely necessary in BC, vents can provide air movement and a better roost sites. Vents are approximately 1.5 cm wide, and can be placed approximately 15 cm from the bottom of 60 cm tall houses, and 30 cm from the bottom of 90 cm tall houses. The vent should be as long as the house is wide. In hot areas of BC, including the Kootenays, Okanagan and Lytton, vents are strongly recommended.

### LANDING STRIP

A place for bats to land is a key feature of a bat-house. Bat-houses that do not have a landing strip or that have a slippery surface are usually ineffective. Landing strips should be at least 10 cm tall and be made of roughened or grooved wood or covered with fiberglass mesh for grip.

### COLOUR

Warmth is a key feature of effective bat-houses. In most parts of BC, bat-houses should be stained black or a similarly dark colour which helps absorb heat for BC temperatures. In hotter areas of the province, including parts of the Kootenays, Lytton and south Okanagan, bat-houses should be stained chocolate brown. Some people choose not to stain their bat-house, instead leaving it as natural wood and these bat-houses can also be successful. If the interior of the bat-house is going to be stained, be sure to use a non-toxic product and to maintain the grip for the bats (grooves or mesh). Staining the interior is important if the bat-house is going to be installed near a house window since it prevents urine soaking into the wood and the associated odour which results.

### EXPERIMENT

There is still much to learn about successful bats houses in BC. Try experimenting by putting bat-houses in different locations or staining one and not the other. Monitor occupancy by bats by looking for guano under the bat-house during the summer or observing the bat-house at dusk to see if any bats fly out. Report your results to your local bat project!

## *WHAT ARE THE BEST BAT-HOUSE DESIGNS?*

There are several designs of bat-houses that are effective in BC. Most bat houses have one to four roosting chambers. Multiple chambered bat-houses not only provide added roosting space but also give bats the opportunity to select an appropriate temperature by moving between chambers and they are generally more successful than single-chambered designs. Links to bat-house designs can be found at the end of this booklet or downloaded from www.bcbats.ca.

### BAT-BOX

The most common bat-house that is effective in BC is a bat-box. Bat-boxes are tall, rectangular compartments with at least one chamber, a landing strip, and an open bottom. They can be installed on a post or pole or the side of a building.

The **multiple-chambered (nursery) boxes** offer good roosting space and provide the bats with the opportunity to move between chambers with changes in temperature. Multiple-chambered bat boxes can hold hundreds of bats and are much more successful than single-chambered bat-houses. Bat boxes can be installed on buildings or posts. An ideal set-up is to put two multi-chambered bat boxes back to back on a post.

**Large bat boxes** are the same as the smaller ones in every way but height. Large bat houses are 130 cm high (double the height of the small ones) by 60 cm wide. They can be built as a single chamber or multiple-chambered style with the potential to hold hundreds of bats. Large multi-chambered bat boxes are an excellent design for extremely large bat colonies in BC, such as colonies of over 2000 Yuma bats. To build one, adapt the designs above to make the bat-house taller.

**Single-chamber (small) bat-boxes** are usually 40 cm wide and 60 cm high. They have only one chamber, providing a roost space for up to 50 bats. *They must be installed on the side of a heated building to be effective*. Generally, single-chambered bat boxes are used by a lone male or non-reproductive female bat because they are usually cooler in temperature.

NURSERY BAT BOX ON SHED (LEFT) AND TWO-CHAMBERED ROCKET BOX ON POST (RIGHT)

### ROCKET BOX

Another form of bat-house is the rocket box. Two-chambered rocket boxes have been extremely successful on the coast of BC, especially for Yuma myotis, a common urban bat species. There are two styles of rocket boxes.

**Two-chambered rocket boxes** are usually 1 m tall and contain concentric roosting chambers around a 4" by 4" post. By increasing the number of square roosting chambers, the rocket box becomes wider and can house more bats. This bat-house style is usually built around a post, so installation simply requires fixing the post in the ground and putting the bat-house on as a "cap". These bat-houses are extremely effective.

**Simple rocket boxes** are made from a 4" by 4" post that has had wedges cut into it and is then covered by an outer plywood box. They are cheap for materials and easy to construct. However, their success rate has not yet been determined.

### BAT CAN

**Bat can houses** are multi-chambered dwellings that are made from a PVC pipe with roughened plywood inside. Since they are contained in plastic, they are low maintenance. They are available to order through "Bat Conservation and Management". More information can be found at: http://batmanagement.com/Ordering/batboxes/batcan/batcan.html.

## *DO ALL BAT SPECIES USE BAT-HOUSES?*

No, many species of bats in BC roost in trees or natural cliffs and caves, including the hoary bat, red bat and silver-haired bat (Table 2). However most of the bat species that use buildings will also use bat-houses. One exception is the Townsend's big-eared bat, a rare species in BC that roosts in buildings but does not use typical bat-houses.

## *WHERE CAN I GET A BAT-HOUSE?*

Check with your local bat project to find a list of where to buy a bat-house. Look at your local garden, nature, or hardware store to ask if they sell them but ensure that they meet the criteria of good bat-house designs in BC. Most bat-houses for sale in stores in BC are not of adequate size or design. Another option is to build your own bat-house or have someone handy build it for you. Bat-house plans are found at the end of this document or on the website www.bcbats.ca. The "*Bat-house Builders Handbook*"[10] is an excellent reference and is available through bookstores in Canada.

STUDENT VOLUNTEERS BUILDING BAT-HOUSES TO GIVE TO RESIDENTS WITH BAT ISSUES.

[10] Tuttle, M. D., M. Kiser, and S. Kiser. 2004. *The Bat-House Builder's Handbook: Second Edition*. Bat Conservation International, Austin, Texas.

## *IS IT TRUE THAT SOME BAT PROJECTS WILL PAY FOR MATERIALS?*

Yes! Some bat projects in BC either reimburse the cost of materials for building a bat-house or even donate them to landowners. To find out what your local bat project offers, visit the website www.bcbats.ca and go your local region's list.

The location of a bat-house is critical to its success. There are many factors to consider when selecting a site including solar exposure, habitat, mounting, obstacles, protection from predators, and wasps.

### SOLAR EXPOSURE

The most important criteria for bat-houses is solar exposure. In the temperate climate of BC, it is usually important for the bat-house to be installed in a location to absorb a maximum amount of sun. In most of BC, bat-houses should be placed in direct sun, facing south or southeast, to receive at least 10 hours of direct exposure each day (and more is better). In areas where the average high temperature in July is higher than 27$^{o}$ C (including the south Okanagan, Kootenay, and Lytton areas), the amount of sun can be reduced to a minimum of 6 hours. Experiment with placing the bat-house facing east or west (rather than south) in these climates. If you have several possible sites to choose from, monitor them for a few days before you install your bat-house to determine which sites receive more hours of sun each day. Also try to set up your bat-house out of the wind, if possible. Paint bat houses a dark colour to maximize heat absorption.

### HABITAT

Ideally, bat-houses should be situated near good foraging and drinking habitat such as streams, rivers, lakes or ponds. Bat-houses less than 400 m from a water source are ideal. However, it is still worth installing a bat-house in areas away from water since bats can travel many kilometers each night to drink and forage. Natural openings, such as open fields, forest clearings, golf courses, green spaces or agricultural land are also appropriate areas to install bat-houses.

If a bat-house is being installed in combination with exclusion, you may wish to try several bat-houses in different locations including one near the current roost site. However, placing a bat-house where bats are exiting and entering the building is not always the best strategy. It is more important for the bat-house to be in a high, uncluttered and warm location than it is to be near the current roost site.

### MOUNTING

Bat-houses can be successfully placed on poles or posts or on the sides of buildings or outbuildings. Bat-houses mounted on 20' (6 m) poles are often the most successful since they can be mounted high, face any direction, and be free of clutter. The ideal scenario for bat-boxes is to mount two multi-chambered bat-houses back to back on a pole, so that one faces north and the other faces south. Bat-houses mounted on wood, brick, or stone buildings with good solar exposure are also good choices since the building helps radiate heat into the bat-house

during the evenings. Mounting on a heated building is important for single-chambered bat-houses. Houses mounted on trees are more difficult for bats to find, more vulnerable to predators, and usually receive less solar exposure. Avoid mounting bat-houses close to bright lights, if possible.

### OBSTACLES

Bats like a clear path to fly out of their house so that they can detect predators and easily avoid obstacles. Bat-houses should be placed in open areas where there is no or little clutter such as on a post in the middle of a field or on the side of a building with no obstructions for at least 5 m. If a bat-house is mounted on a tree, the branches should be de-limbed below and around the bat-house to create an open, uncluttered area.

### PROTECTION FROM PREDATORS

House cats are one of the largest predators of bats in BC, although raptors, weasels, and other animals may attack bats. Predation can be avoided by mounting a bat-house high on a metal pole or building. A slippery sheet-metal guard can be wrapped on the bottom of a wooden post or tree to deter predators at these sites. To reduce predation by raptors, try to mount the bat-house at least 8 m from the nearest tree branches, wires or other potential perches for aerial predators.

### WASPS

Wasp nests can be a problem for bats. Limiting the width of chambers to ¾" helps reduce occupation by wasps. During winter months, check the bat-house and remove wasp nests.

In summary, bat-houses should be placed:

- As high as possible (at least 12' high = 3 ½ m)
- South, east or west facing to ensure high solar exposure – ideally bat-houses should receive at least 6 to 10 hours of sun.
- In an uncluttered location that does not have branches, buildings, or poles in front of it.

## *WHEN SHOULD I PUT UP A BAT-HOUSE?*

A bat-house can be installed at any time of year. However, bats are likely to move into a bat-house when they first return from winter hibernation in April or May. If the bat-house is being installed in combination with exclusion, install the bat-house at least two to six weeks before the actual eviction if possible.

## HOW LONG UNTIL BATS MOVE INTO MY BAT-HOUSE?

The success of a bat-house depends on the design and location of the bat-house and whether or not there are bats in the neighborhood looking for a roost site. When a bat-house is installed in combination with exclusion of a colony from a building, it has a high chance of being successful. In other situations, it may take time before the bat-house is used.

## *I'VE HAD A BAT-HOUSE FOR YEARS BUT NEVER HAD ANY BATS. WHY NOT?*

First, check the bat-house design. Does it have a landing strip, multiple chambers, and some sort of "grip" for the bats inside? Is it painted dark and placed in a high, open, sunny location? Is it a good design for this region, meaning that it has multiple narrow chambers and is quite large? If the bat-house is a good design and in a good location, then it could be that there isn't currently will likely be occupied by bats that have been "evicted" from their previous roost site. It might be that a large tree falls down, neighbours renovate their attic, or a rock feature is disturbed and a colony of bats is seeking a new roost site. Leave the bat-house for at least three years before moving it to an alternative location. Since bat populations don't expand rapidly, the bat-house

## *ARE THERE TRICKS TO ATTRACTING BATS TO BAT-HOUSES?*

Besides ensuring a good design and location for the bat-house, there are few other attractants. Some people paint the bat house using a mixture of bat guano and water but there is little evidence to support this technique. If possible during exclusion, leave the bat-house inside the current roost site for several weeks before installing it so that is absorbs their smell.

## *HOW CAN I TELL IF BATS ARE USING MY BAT-HOUSE?*

If bats are using the bat-house as a day or maternity roost, they can usually be observed departing within 30 minutes of dusk in good weather. Watch the bat-house for at least fifteen minutes before sunset and 30 minutes after for signs of use. However, if bats are using the bat-house as a night roost between feeding bouts, it may be difficult to see them. Look under the bat-house for guano after several days of dry weather. If it is difficult to see, lay a light plastic sheet or piece of cardboard under the bat-house for several days to catch any falling guano. Never place a bucket or any other container that bats cannot get out of under a bat-house.

## *WILL HAVING BAT HOUSES IN MY YARD INTERFERE WITH ATTRACTING BIRDS?*

Bats and birds use different habitats for food and shelter so they do not compete. Installing a bat-house does not affect attracting birds to your yard and often swallow boxes and bat-houses are used in combination for insect reduction.

# HOW TO HELP BATS

## *WHY DO BATS NEED MY HELP?*

Of the sixteen species of bats in BC, half are red or blue-listed, meaning that they are vulnerable or threatened to becoming endangered. Threats to bats include habitat loss, intentional extermination (which is illegal under the *BC Wildlife Act*), insecticides, wind farm development, and White Nose Syndrome which is a devastating introduced fungus that has already killed approximately 6 million bats in North America. Given these factors as well as the negative attitude that many people have towards bats, conservation efforts are critical.

## *HOW CAN I BE SENSITIVE TO BATS IN BC?*

Do not disturb them, especially when roosting. Never handle a bat – for your own protection as well as the bat's. Especially in urban areas, modify habitat to enhance safe, suitable roosting areas, plant shrubs and other plants that will support bat insect prey, and think of bats when installing water features that may be used as drinking habitat. Participate in the BC Bat Count to assist with citizen science efforts to monitor bat populations. Investigate bat conservation groups to see if you can volunteer or support them with a donation.

## *HOW CAN I CREATE OR PROTECT BAT HABITAT?*

Bats need three things: food, clean water and safe roosting spots. By offering any of these things, you are enhancing bat habitat.

### PONDS AND WETLANDS

Bats use aquatic features such as wetlands, ponds, channels, and rivers for drinking and foraging. Drinking habitat consists of any water body, small or large, with clean water, open space above and open flight path to access the water surface. Algae and surface plant material (such as duckweed) reduces the suitability of a pond as a drinking water source for bats. Water troughs, such as those used by livestock, should have a way for bat to climb out such as a stick or ramp.

Maintaining water quality for consumption and insect productivity is key in maintaining high quality foraging habitat for bats. Even small ponds created by humans as a part of landscaping plans can provide an important source of drinking water, especially during summer in the drier parts of the province. Plant material at the edge of artificial ponds will enhance insect productivity, but leaving gaps for bats to 'enter' and 'exit' the space may enhance its attractiveness to bats. Artificial ponds should have good water quality (without pesticides added) and they should offer some way for bats to get out if they accidentally 'crash' into the water (e.g. grate or stick leading out of one side of the pond). The accidental drowning of bats has been an issue at watering troughs for cattle since bats that fall into them cannot climb out.

*WETLAND HABITAT WITH BAT-HOUSE PROVIDING FOOD, WATER AND SHELTER FOR BATS.*

### SUPPORTING INSECT DIVERSITY

Since bat food in Canada consists of insects and other arthropods, having plants in your garden or other features that support insects will enhance bat habitat. Deciduous trees (such as birch, alder or maple) are important to bats not only as potential roost habitat, but also because of their role in production of invertebrate prey for bats. Deciduous forests have fewer defenses against insects and therefore support greater insect populations than do conifers. A wide range of insects use deciduous trees including lepidopterans (butterflies and moths) and coleopteran (beetle) defoliators. For example, over 300 species of insects live in aspen stands, including moths and beetles, which represent an important part of the diet of a number of our bat species.

Moths are important prey for many species of bats. Moths generally feed on plant material ranging (depending on the species) from decaying fruit and plant matter to grasses, shrubs and trees. Generally, BC Sphingid moths rely on native shrubs (such as willow (*Salix* spp.), cherry (*Prunus* spp.), plus various deciduous tree species along with a number of common wildflowers. For a list of horticultural species that support moths, see www.bcbats.ca.

### ENHANCING AND PROTECTING NATURAL ROOSTING HABITAT

Roosting habitat can be artificial or natural. Natural roosting structures include rock structures and old trees and snags. Generally, bats prefer tall, old, dead, large diameter trees with peeling bark, cracks and crevices. They will use other trees in varying stages of decay as long as the tree provides a suitable crevice, hole or crack for roosting with appropriate thermal characteristics and suitable access. Managing tree roosts usually entails trying to balance the needs of bats with the safety of humans. Older trees often are seen as a hazard since shedding bark, falling limbs or falling trees represent a danger to people below. Certified trained assessors can determine if a 'wildlife tree' is safe to leave up. This kind of assessment may also be suitable in urban settings such as parks, recreational areas or residential areas. Maintaining wildlife trees not only provides roosting habitat for bats, but also habitat for a variety of other wildlife.

Rock features, such as cliffs and crevices, also support bats, particularly if they face south. To avoid disturbing roosting bats in such rock features, avoid shining bright lights on cliff faces, climbing rock features during summer months when bats might be present and spraying pesticides in the area of roosts.

### ENHANCING ARTIFICIAL ROOSTING HABITAT

With the decline of large trees and other natural roost sites in the wild, some bat species are adapted to using human-made structures, including bridges, buildings, and bat-houses. See "Bat-House" section of this document for more details.

RESIDENT, MARLENE HEBERT, ENHANCING BAT HABITAT BY INSTALLING BAT-HOUSES.

### CONSIDERING BATS IN LANDSCAPE DESIGN

Bats may move great distances across the landscape from their summer day-roosts to their night foraging areas. High, fast-flying species such as silver-haired bats and hoary bats may cover 20 km or more (one-way) from their day roost on a given night, with most bats returning by morning back to the same roost or somewhere nearby. Linking green spaces across the landscape between potential roost habitat and potential foraging habitat may be important for bats and other wildlife species. Bats like forest edges for commuting because the open habitat makes flight quick and direct, while shadows and foliage from the nearby trees provide cover from nocturnal and dusk-flying predators such as owls and hawks. Hedgerows along field edges have been shown to be important to bats commuting between roosting and foraging habitats.

## *HOW CAN I PREVENT THE SPREAD OF WHITE-NOSE SYNDROME?*

White-Nose syndrome (WNS) is a devastating disease that is decimating bats in eastern North America. Caused by an introduced fungus, *Pseudogymnoascus destructans*, the disease causes bats to wake up during hibernation to fight off the fungal infection. This rousal uses up valuable fat reserves and bats essentially starve to death. Luckily, WNS is not currently in BC. The fungus can be carried from cave to cave by contaminated gear and equipment. Spelunkers and bat biologists are advised to follow decontamination procedures between sites. For more information, see www.whitenosesyndrome.org.

## *HOW CAN I PARTICIPATE IN THE BC BAT COUNT?*

The BC Bat Count was initiated in 2012 to collect information on bat populations over time. Anyone can volunteer to participate. The Count involves watching a roost site at dusk to count bats as they fly out. For large colonies, a hand counter can be used to keep track of the number of bats (ask your local bat project if they can lend one to you) or the roost site can be video'ed. Volunteers are asked to commit four nights over the summer to count bats during specific time periods. For more information on the BC Bat Count and to sign up to volunteer, see www.bcbats.ca. Volunteers from all parts of BC are encouraged to participate!

CITIZEN SCIENTISTS PARTICIPATING IN BC BAT COUNT.

# BAT-HOUSE PLANS

## BAT-HOUSE PLANS CAN BE FOUND AT THE FOLLOWING LINKS:

- Four-chambered nursery bat box: http://www.batcon.org/pdfs/bathouses/FourChamberNurseryHousePlans.pdf
- Single-chambered bat house: http://www.batcon.org/pdfs/bathouses/SingleChamberBHPlans.pdf
- Two-chambered rocket box: http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1001&context=icwdmother
- Simple rocket box: http://www.batsnorthwest.org/rocketbox_plans.pdf
- Bat Can (for purchase): http://batmanagement.com/Ordering/batboxes/batcan/batcan.html

# BAT COUNT INFORMATION AND FORMS

# BAT WATCH: Participate in the BC Bat Count

***WHAT:*** A citizen-science program in B.C. to annually monitor bat roost sites.

***WHY:*** Half the bat species in BC are considered to be of conservation concern. Even the common little brown bat is being proposed for designation as an "endangered" species because of high mortality rates from the disease, White Nose Syndrome. The disease is not yet in BC but is predicted to arrive in the next decade. To be able to effectively manage and conserve bats in the face of the many threats, we need to know how their population numbers are doing year to year. The BC Bat Count will contribute towards gathering this important information.

***WHO:*** Anyone who is interested in collecting valuable information to help monitor our bat populations.

***WHERE:*** A roost site (such as abandoned houses, attic, barns, church steeples, bridges, bat-houses and other structures) on your property or somewhere else.

***WHEN:*** Ideally, participants conduct four bat counts per summer - **two between June 1 and 21** (before pups can fly) and **two more between July 21 and August 15** (when pups are flying and exiting the roost). Doing all four bat counts will allow us to best compare data from year to year and between sites. If it is difficult to do four counts, consider the following options:

- Level 1: ***Bat Reporter*** - 1 count over the summer (try between July 21 – August 15)
- Level 2: ***Bat Tracker*** - 1 count between June 1 – 21 and one count between July 21 - August 15
- Level 3: ***Bat Enthusiast*** – 2 counts between June 1 – 21 and 2 counts between July 21 – August 15

***WHAT TO BRING:***

- ✓ A current Bat Count data form (can be downloaded from: www.bcbats.ca)
- ✓ A calendar of sunset and civil twilight for your area (can be downloaded from www.sunrisesunset.com/Canada/)
- ✓ Pen or pencil
- ✓ A tally counter (hand clicker) or piece of paper to tally the number of bats
- ✓ *Optional:*
    - o Video camera if you have one. That way you can film the emergence of bats but count them later (and be able to rewind) for more accuracy.
    - o Chair or mat to sit on
    - o Thermometer. Otherwise try to get the temperature from another source.
    - o "DNA Collecting Kit" to collect guano if this is the first time the site is being counted and bats species have not been identified. This kit includes a pair of disposable gloves and a small (e.g. coin) envelope. See "DNA Collecting Protocol for Residents" at www.bcbats.ca

***HOW:***

- Give your site a name if it doesn't already have one (e.g. "Jenny's garage" or "Sanca Cabin")
- Arrive at your bat roost by sunset. Bats may begin to emerge around sunset and so don't be late! Some species may emerge closer to civil twilight so don't worry if it takes a little while to see the first one.
- Count bats for one hour or until it is too dark to see, whichever comes first.
- The air temperature should be at least 12$^{o}$C with low wind speed. Some bats will not fly if the weather is too cold, windy or drizzly, and roost emergence counts under non-ideal weather conditions will underestimate population size.
- Sit or stand outside so that the bats' exit point is visible from a comfortable distance. More than one person might be needed if bats are exiting from multiple points. Try to have the light sky behind the bats exit point, to make it easier to count.
- Tally the bats as they fly out for their nightly insect-eating. You may wish to use a hand "clicker" to make counting easier, or video the emergence to count later on your screen. Try to consider bats flying back inside but don't worry if there are too many to keep track of. Just count them as they leave if that's the case. Record your observations on the data form.
- Mail or scan and email your data sheet at the end of the summer.
- ***Do not*** enter bat roosts or handle the animals.
- Remember, no data (zero bats) is valuable data too!

**Send or email forms to:**

BC Ministry of Environment
c/o Aaron Reid, Wildlife Biologist
#401 – 333 Victoria S., Nelson, BC, V1L 4K3
Aaron.reid@gov.bc.ca

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*** Please return forms by August 30 ***

**For more information: www.bcbats.ca or 1-855-9BC-BATS**

# BAT WATCH: BC Bat Count Form 2014

**Site Name**: _____

Name of Bat Counter(s): _____

**Primary Bat Counter's contact information:**

Address: _____

Phone: _____ Email: _____

**Name of roost site property owner** (check here __ if same as above)

Name: _____

Address: _____

Phone: _____ Email: _____

**By signing this form you agree to allow bat counts to take place on your property and for the data to be submitted to the BC Ministry of Environment to ensure long-term data management. Data will be considered sensitive and no personal information will be stored.**

Landowner(s) sign here: _____Date: _____

_____ Date: _____

## ROOST INFORMATION

**Structure Type** *(circle one)*:
1 – **Barn** 2 – **Unoccupied House** 3 – **Occupied House** 4 – **Church** 5 – **Out building** 6 – **Bridge** 7 – **Tree** 8 – **Bat box/condo**
9 – **Other structure** *(describe)*:_____

Is the structure used on a regular basis by people? ___YES ___NO Is a bat eviction planned? ___YES ___NO

Is the structure scheduled for renovation or demolition? ___YES ___NO

Are you monitoring more than one roost site on this property? ___ YES ___NO
If YES, please fill out a new form for the other roost(s)

If this is the first Bat Count at this site, please describe exactly where the site is or attach a map:
Comments/details: _____
_____
_____
_____

***Please submit photos (digitally) of the roost site if possible***
***Please submit a small envelope of guano if your bats have not been identified. See www.bcbats.ca for details***

**[THIS BOX WILL BE COMPLETED BY THE BAT PROJECT]**
**UTM (E): _____ (N)): _____**DATUM (circle): WGS84 (preferred) – NAD83 – NAD27
**UTM Precision (circle)**: GPS – From Map – Previous site visit – Not Mapped – Other (specify) _____
**Primary Species within Roost**: _____or Unknown (circle if unknown) (list only 1 if known)
**Guano sample number: _____**

**Please Mail To:** Ministry of Environment, Attn: Aaron Reid, Wildlife Biologist, #401- 333 Victoria Street, Nelson, BC, V1L 4K3 or scan and email to aaron.reid@gov.bc.ca. Please complete both sides (2 pages) of this form.

# BAT WATCH: BC Bat Count Form 2014

Site Name:_____ Primary Bat Counter Name:_____

Please do your best to conduct FOUR bat counts this season (*two* between June 1 - 21 and *two* between July 21 – August 15). Avoid surveying if it is raining or if wind speed is greater than ~20 km/hr. Note that instructions can be found at www.bcbats.ca

| **COUNT #1** DATE (between June 1 - 21) | SKY CODE (see bottom) | WIND CODE (see bottom) | START TEMP °C | START TIME (sunset) | TIME FIRST BAT When first bat emerges | END TIME (~1 hr after start time) | TOTAL BATS COUNTED | TECHNIQUE USED (visual or video) |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | **COMMENTS, name of bat counter(s):** | | | | | | | |

| **COUNT #2** DATE (between June 1 – 21) | SKY CODE (see bottom) | WIND CODE (see bottom) | START TEMP °C | START TIME (sunset) | TIME FIRST BAT When first bat emerges | END TIME (~1 hr after start time) | TOTAL BATS COUNTED | TECHNIQUE USED (visual or video) |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | **COMMENTS, name of bat counter(s):** | | | | | | | |

| **COUNT #3** DATE (between July 21 – August 15) | SKY CODE (see bottom) | WIND CODE (see bottom) | START TEMP °C | START TIME (sunset) | TIME FIRST BAT When first bat emerges | END TIME (~1 hr after start time) | TOTAL BATS COUNTED | TECHNIQUE USED (visual or video) |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | COMMENTS, name of bat counter(s): | | | | | | | |

| **COUNT #4** DATE (between July 21 and August 15) | SKY CODE (see bottom) | WIND CODE (see bottom) | START TEMP °C | START TIME (sunset) | TIME FIRST BAT When first bat emerges | END TIME (~1 hr after start time) | TOTAL BATS COUNTED | TECHNIQUE USED (visual or video) |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | COMMENTS, name of bat counter(s): | | | | | | | |

*Sky and wind codes of 1 – 3 are best. Code of 4 is marginal. Avoid surveying if code is higher than 4.*

| CODE | SKY |
|---|---|
| 1 | Clear-Clear to a few clouds |
| 2 | Scattered clouds – cloud cover less than half sky (< 50%) |
| 3 | Mostly Cloudy or overcast-Cloud cover > 50% |
| 4 | Drizzle – Light intermittent rain |
| 5 | Showers-Steady soaking rain |
| 6 | Thunderstorms-Rain with thunderstorms |
| 7 | Not recorded |

| CODE | WIND DESCRIPTION | Speed |
|---|---|---|
| 1 | Calm-Leaves Still | 0 km/hr |
| 2 | Slight Breeze-Leaves slightly Rustling | 1-11 km/hr |
| 3 | Gentle Breeze-Leaves and twigs in motion | 13-19 km/hr |
| 4 | Mod. Breeze-Small branches begin to move | 20-29 km/hr |
| 5 | Windy-Small Trees or more in canopy sway | 30+ km/hr |
| 6 | Not Recorded | Not Recorded |

**Please Mail To:** Ministry of Environment, Attn: Aaron Reid, Wildlife Biologist, #401- 333 Victoria Street, Nelson, BC, V1L 4K3 or scan and email to aaron.reid@gov.bc.ca. Please complete both sides (2 pages) of this form.

www.bcbats.ca

1-855-9BC-BATS