



# Townsend's Big-eared Bat

*This vulnerable  
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## Why are Townsend's Big-eared Bats at risk?

Townsend's Big-eared Bats are at risk because they are confined to small regions of suitable habitat at low elevations in the southern part of British Columbia – precisely the areas that humans prefer to occupy. Also known as the Lump-nosed Bat or Western Big-eared Bat, this species is sparsely distributed across its range. Townsend's Big-eared Bats are particularly vulnerable to disturbance by people. Like many other bat species, in summer they form maternity colonies, often in buildings, and in winter they gather together to hibernate in caves or mines. However, when roosting in these sites, Townsend's Big-eared Bats do not hide in crevices like many bats do and so are very susceptible to intrusions or vandalism. In British Columbia, no hibernation sites and only one maternity colony are protected from human entry. Disturbance of females with young can severely lower breeding success. Repeated disturbance at winter hibernacula can cause energy loss, abandonment of the caves and death.

Various land use or industrial activities near bat colonies or in their foraging areas can adversely affect Townsend's Big-eared Bat. Insecticide spraying on agricultural or forest lands is of particular concern, because it destroys the bat's food supply.

Like other bats, this species has a very low reproductive rate. Females bear only one young per year. Thus, even low rates of mortality caused by people, when added to natural losses can result in population declines and eventual elimination of local colonies.

In view of its apparently small provincial population size, vulnerability to disturbance and low reproductive rate, the future of this little-known bat in British Columbia is indeed uncertain.

## What is their status?

Townsend's Big-eared Bats have a broad distribution, including most of Mexico and the Western United States. However, populations are declining in many areas and the species has been designated as endangered, threatened or of special concern throughout most of its range. In California, for example, this bat was once common, but its numbers have declined sharply and the species is now considered uncommon. Many known maternity colonies in limestone caves in California have been abandoned, although other maternity sites exist in mines and buildings. At many former colony locations in Oregon, this species is no longer found or occurs in reduced numbers.

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In British Columbia, only a few maternity colonies, totalling about 350 bats, have been documented. About 16 coastal and interior hibernation sites have been discovered, but 14 of these had 6 or fewer bats when surveyed and the largest colony numbered only 48; our total known winter population is less than 100 bats. Although additional undiscovered colonies probably exist, the total provincial population of this bat is likely very small.

In view of the rarity and vulnerability of Townsend's Big-eared Bat, it has been placed on British Columbia's Blue List. Blue-listed species are considered vulnerable, in contrast to those

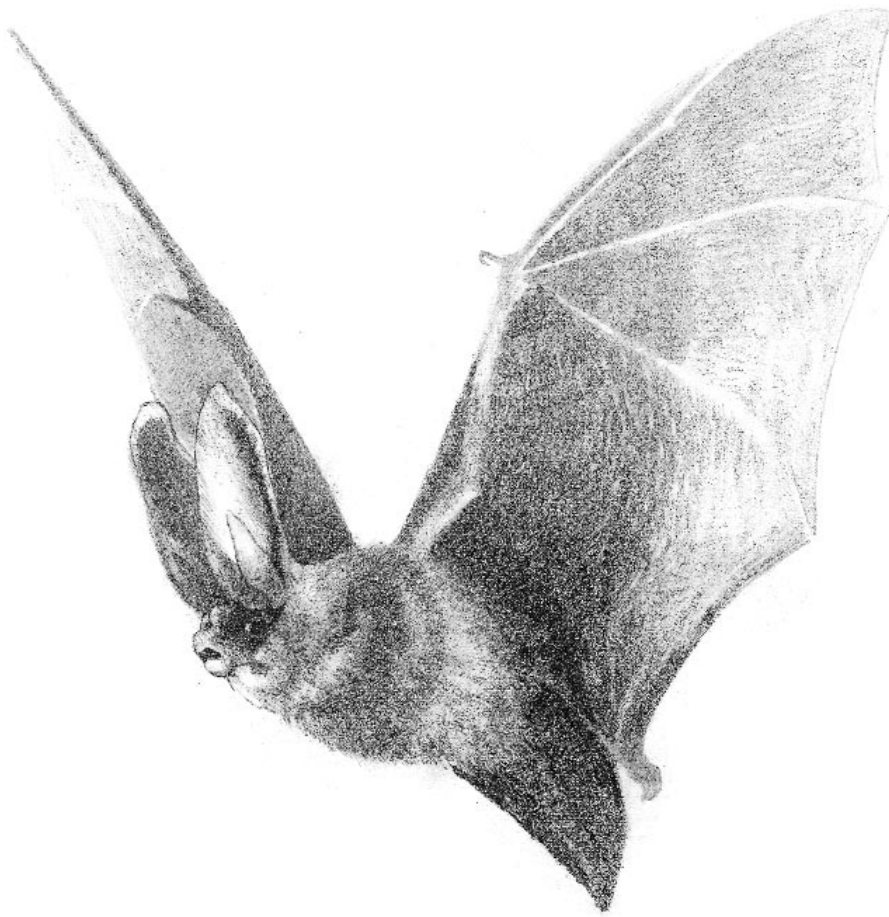
on the Red List, which are being considered for legal designation as Threatened or Endangered. Like other bats, this species receives general protection against harassment, killing or possession under the British Columbia Wildlife Act. However, most habitats used by these valuable animals do not currently receive any effective protection.

## What do they look like?

Townsend's Big-eared Bat – *Corynorhinus (Plecotus) townsendii* – is easily distinguished from other British Columbia bats by its enormous ears, which measure about half its body length, and the two fleshy protrusions on its muzzle. These account for its common names of “big-eared” or “lump-nosed” bat. The fleshy projections on the nose, known as pararhinal glands, may function as sexual scent glands. The large ears of this bat probably have several functions, the most important of which is to funnel sounds into the ear canal. The ears also have an abundant blood supply and assist in the regulation of body temperature. In flight, the ears are directed forward in plane with the body, leading some researchers to suggest that they may also provide lift during flight.

Two other British Columbia species, the Spotted and Pallid bats, also have very large ears. However, the Spotted Bat is readily distinguished by its prominent black and white markings, and the Pallid Bat by its lighter colour and ears that are not joined at their bases. In addition, the Spotted and Pallid bats are both larger than Townsend's Big-eared Bat.

The long fur on the back of Townsend's Big-eared Bat varies from pale brown to blackish-grey, while the hairs in the underfur are paler. Male and female big-eared bats have similar colouring. Bats from coastal areas tend to be darker than bats from the interior of the province. The tragus or earlet, an erect fleshy structure found at



the base of the ear in all bats, is about one-third of the ear length and pointed in this species.

Compared to other British Columbia bats – which have wing-spans ranging from about 22 centimetres in the diminutive California Myotis to 40 cm in the Hoary Bat – Townsend's Big-eared Bat is a medium-size species. It has a wing-span of about 30 cm, a total length of 10 cm and a weight of 8½ grams, only 1½ g more than a one-dollar coin. The surface area of a Townsend's Big-eared Bat's wings is large relative to its body weight. This gives these bats an exceptional capacity for manoeuvrable flight and the ability to fly at low speeds and to hover. Straight-line flight speeds of about 3 to 6 metres per second have been reported.

Like all bats, Townsend's Big-eared Bats have five claws on each hind foot, which they use to hang head-down when roosting. In maternity colonies, the females form one or more tight clusters to preserve body heat. In

hibernating colonies, which include both sexes, the bats usually hang singly or in small groups from cave walls or roofs. When in a state of hibernation or torpor (a short-term, hibernation-like state) the ears are coiled like a ram's horn, the wings are folded and the fur is erected to give maximum insulation.

How do they reproduce?

**T**ownsend's Big-eared Bats mate in autumn and early winter at their hibernation sites, the only place where the two sexes commonly occur together. Breeding is accompanied by ritualistic vocalisations and head nuzzling. Sperm is stored all winter in the female reproductive tract, and ovulation and fertilisation do not occur until spring. With this unusual strategy, called delayed fertilisation, mating takes place when the adults are in peak physical condition, but pups are not born until early the next summer when foraging conditions

are good for mother bats and their young. Delayed fertilisation occurs in most bats that live in north-temperate areas. Bats are the only mammals that employ this reproductive strategy.

In spring, the pregnant females move to summer maternity colonies that are usually within a few kilometres of the hibernaculum. They show great site fidelity, returning to the same location each year. Here, the young bats, naked at birth, are born and nursed. During summer, the males do not associate with the maternity colonies and are believed to roost singly in scattered locations. They play no part in raising the young.

In the United States, nursery colonies typically contain 50 to 150 bats and are found in mine shafts, caves or buildings. The known maternity sites in British Columbia – located in attics, barns and a military bunker – house 25 to 100 bats. Buildings may be preferred in British Columbia because bats need warm sites to promote development of their young and caves here may be too cold.

The gestation period of Townsend's

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Big-eared Bat is a variable 56 to 100 days, depending on the temperature in the maternity site. Cold temperatures cause torpor in pregnant females, which slows foetal development. Only a single offspring is produced by each female, but usually 90 to 100 percent

of the females produce young. Births in British Columbia are believed to occur from late June to mid July. The young bats are large at birth: 25 percent of the weight of the adults! They grow extremely fast and are capable of flight at a remarkable 2½ to 3 weeks of

age. They reach adult size in one month and are weaned at about 6 weeks. After the maternity colonies break up around August and the newly independent pups begin learning to forage for themselves, natural mortality of young bats is high. Hibernation is another challenge; probably only 40 to 50 percent survive their first winter. Natural death rates among adults are relatively low, with some living at least 16 years. Young females of Townsend's Big-eared Bat breed in their first autumn; males not until the following year.



### What do they eat?

The diet of Townsend's Big-eared Bat has not been studied in British Columbia, but it is likely to be similar to the diet in the United States, where small moths about 3 to 10 millimetres long are the major prey. Other insects eaten include lacewings, dung beetles, flies and sawflies. A late flyer, this bat emerges just after dark, feeds several times during the night and returns to its day roost just before dawn. Temporary night-roosts are used between bouts of foraging. Nursing females leave their young in the maternity colony when they are foraging.

This species has a sophisticated echolocation system and an exceptional ability to detect and avoid objects, including mist nets used by researchers to catch bats alive. This sonar is also

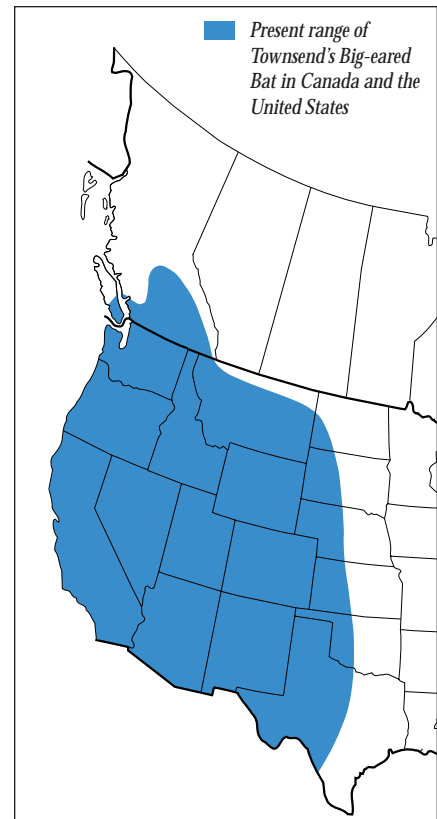
used to locate the insects on which it feeds. It is able to emit echolocation pulses through its nose almost as well as from its mouth, an unusual trait in bats. The low intensity sounds this bat produces enable it to locate and "glean" insects from vegetation or other surfaces, although most insects are probably captured in the air. Gleaning behaviour may allow Townsend's Big-eared Bat to take advantage of forest habitats that are not used by some less manoeuvrable species.

Habitat selection by foraging big-eared bats has not been studied in British Columbia. Elsewhere, however, the most important foraging habitats for this species include insect-rich riparian zones, as well as wetlands, forest edges and open woodland.

### What makes them unique?

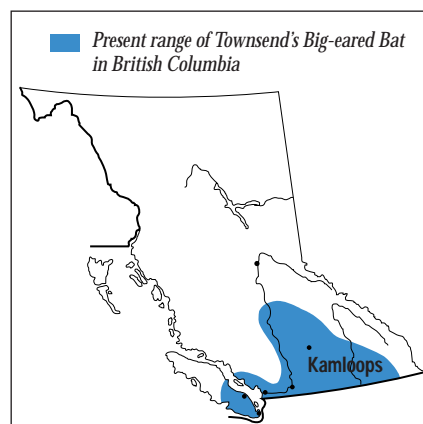
As a group, bats are among the most unusual of all mammals. Although they suckle their young and have hair, the similarity to bears, moose or whales ends there. An ancient but successful group, over 1000 species of bats have evolved over the past 60 million years and they inhabit all continents except Antarctica. The only mammals to have mastered true flight, they vary in size from the two-gram Hog-nosed Bat of Thailand to the Gigantic Flying Foxes of southeast Asia with wingspans up to two metres. Bats occupy almost every kind of tropical, subtropical and temperate habitat and have evolved strategies to feed on insects, frogs, fish,

fruit, pollen, nectar and even on other mammals and blood. Some are important pollinators of flowers. British Columbia is fortunate to have



16 species of this remarkable group, more than any other province in Canada.

Since Townsend's Big-eared Bat is a relatively sedentary species, staying year-round within a radius of about 20 to 30 kilometres, British Columbia's small populations are resident here year round. Although it is a social species and forms colonies, these groups are small compared to



those of most other colonial bats. This bat is primarily a cave and mine dweller throughout its range, but also occupies buildings and likely uses large trees as well.

At the latitude of British Columbia, the ability to hibernate is crucial for resident bats, because insects are not active in winter. Before entering hibernation

these bats accumulate an additional 40 percent of their summer weight in the form of fat to use as energy through the winter. Hibernation sites are carefully selected on the basis of their temperature and humidity. The best hibernacula for Townsend's Big-eared Bats are caves or mines with a relatively constant temperature of 4 to 10°C, although studies in British Columbia have shown that temperatures down to -7°C may be tolerated for short periods. During hibernation, body temperature drops to near that of the cave and heart rate drops from over 100 to around 5 beats per minute. Buildings here are not suitable for hibernation because they do not have constant, cool temperatures.

During hibernation, Townsend's Big-eared Bats may lose more than half their autumn weight, a more extreme loss than in most other bats. This species rouses readily from hibernation in response to temperature change or disturbance and will change its location in the cave or even move to another cave in mid-winter. Hibernating individuals can fly with-in 20 to 30 minutes of arousal, at a body temperature of 28 to 30°C. Arousal and movement during winter consumes a lot of stored energy and contributes to weight loss, making it more difficult for bats to survive the winter.

In British Columbia, Townsend's Big-eared Bats have been found in winter roosts between late September and May. They may also enter a state of temporary torpor during cool summer nights, showing a

remarkable ability to change their body temperature within minutes.

Where do they live?

Townsend's Big-eared Bat occurs only in North America, where it ranges from southern Mexico to southern British Columbia in the west, and eastward to South Dakota, Kansas and Texas. Isolated populations occur in limestone regions in the



THIS BAT HAS VERY LARGE EARS. *Maarten Vonhof photo*

eastern states. It tolerates environmental conditions that vary from moist coastal forest to semi-desert scrublands, but its distribution in North America is probably determined more by the presence of cave-rich terrain than by the kind of vegetation in the area. Locally, riparian habitats, wetlands and other moist places are important foraging sites for Townsend's Big-eared Bat.

In British Columbia, the species has been found from Vancouver Island east to Cranbrook, and north to Williams Lake. On the coast it is most common along the east coast of Vancouver Island south of Campbell River, but records also exist for the lower Fraser

Valley. In the Interior, most records of this bat are from the Okanagan, Shuswap, Kamloops, Williams Lake and Kootenay areas. Its general preference seems to be for regions that are relatively warm and dry in summer and not extremely cold in winter. This includes the Coastal Douglas-fir, Bunchgrass, Ponderosa Pine and Interior Douglas-fir zones.

Wintering big-eared bats have been found in caves or mines in the Gulf Islands, in the South Okanagan Valley, at Kamloops Lake and along the Fraser River near Williams Lake. The summer nursery sites of bats from these locations remain unknown. Likewise, hibernation sites of the few known maternity colonies have not been discovered. Much more research is needed to find out where these bats live.

What can we do?

In British Columbia, Townsend's Big-eared Bat is rare and poorly known. There is a major need for more

complete inventory information so that sites used by these vulnerable bats, particularly hibernation and maternity colonies, can be adequately protected. Although inventory of some caves and mines in southern British Columbia has been carried out, many others have not been searched. Local naturalists and cavers can be a great help during this kind of inventory work.

Heightened awareness of the characteristics and status of Townsend's Big-eared Bat, and bats in general, is needed so that more observations of them by the public are accurately reported. Greater awareness would also reduce the fear that many people have of bats.



FLESHY LUMPS ON THE NOSE ARE CHARACTERISTIC OF THIS SPECIES. *William Rainey photo*



CAVES SUCH AS THIS ARE USED FOR ROOST SITES. *Mitchell Firman photo*



OLD BUILDINGS CAN BE USED FOR NURSERY ROOSTS. *Mitchell Firman photo*




TOWNSEND'S BIG-EARED BATS FORM CLUSTERS IN MATERNITY COLONIES. *Mitchell Firman photo*

Government agencies, universities and conservation groups have already taken some steps to promote the conservation of Townsend's Big-eared Bat. These include summer mist-netting surveys, preliminary cave and mine inventories, research at one bat cave and the preparation of a status report for the species in British Columbia. In the Gulf Islands, where the largest known British Columbia wintering colony occurs, land surrounding the cave has been purchased by the British Columbia Nature Trust and assigned to the Ministry of Environment, Lands and Parks for management purposes. The Ministry has prepared a management plan that includes provisions for control of public access to this relatively well-known site. Similar approaches are needed at other colonies. The entrances of many California bat caves have been gated so that bats can pass through but people cannot. In British Columbia, this approach is being considered for known bat caves and has been successfully instituted at one maternity colony in a military bunker. **People are urged not to enter known hibernation caves between September and May**

**and not to disturb maternity colonies.**

Placement of Townsend's Big-eared Bat on the provincial Blue List ensures that this species will get increased attention in wildlife conservation programs. Nevertheless, much remains to be done.

Members of the public are encouraged to become more tolerant of bats, which are generally harmless, and to

learn more about these fascinating members of British Columbia's fauna. People with bats on their premises should report this information to the nearest BC Wildlife Branch office. For many bat species, including Townsend's Big-eared Bat, there are few provincial locality records and any new records are a valuable scientific contribution. 

FOR MORE INFORMATION ON TOWNSEND'S BIG-EARED BAT, CONTACT:  
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