

KEEN'S LONG-EARED MYOTIS

Myotis keenii

Original¹ prepared by Trudy A. Chatwin

Species Information

Taxonomy

The Keen's Long-eared Myotis (*Myotis keenii*) is one of three long-eared bat "sister species." Differentiation between *M. keenii*, *M. evotis*, and *M. septentrionalis* is problematic. *Myotis keenii* formerly included its eastern sister taxon, but a study by van Zyll de Jong (1979) concluded that *M. septentrionalis* should be classified as a separate species. The two taxa were formally recognized by van Zyll de Jong (1985) and Jones et al. (1986). Van Zyll de Jong and Nagorsen (1994) analyzed specimens of *M. keenii* and *M. evotis* and found some morphological intermediates. However, based on distributions it was determined that these likely represent intraspecific variation and therefore the two were considered separate species. There are no recognized subspecies of *Myotis keenii*.

Description

Medium-sized (63–94 mm; 4–5.9 g) dark bat with paler underside. Ears and wing membranes are brown (not black). This species, like several other myotis species, have long ears and tragus. The Keen's Long-eared Myotis may be confused with the Western Long-eared Myotis (*Myotis evotis*) whose range overlaps that of the Keen's Long-eared Myotis. The two species can be reliably differentiated by analysis of skull measurements but cannot be distinguished with certainty in the field (see Nagorsen and Brigham 1993).

Distribution

Global

Restricted to the Pacific northwest coast. British Columbia is the centre of distribution but records exist from southeast Alaska and western Washington.

British Columbia

Occurs on Vancouver Island, the Queen Charlotte Islands, and the mainland coast.

Forest region and districts

Coast: Campbell River, Chilliwack, North Coast, North Island, Queen Charlotte Islands, South Island, Squamish, Sunshine Coast

Ecoprovinces and ecosections

GED: FRL, LIM, NAL

COM: CPR, KIM, KIR, NIM, NPR, NWL, OUF, QCL, SBR, SKP, SPR, WIM, WQC

Biogeoclimatic units

CDF: mm

CWH: dm, mm1, mm2, vm1, vm2, vh1, vh2, wh1, wh2, wm, wm1, wm2, xm1, xm2

MH: mm1, mm2, wh1, wh2

Broad ecosystem units

CD, CH, CW, FR, MF, RO, SR, YM

Elevation

0–1100 m

¹ Volume 1 account prepared by P. Garcia and S. Rasheed.

Keen's Long-eared Myotis (*Myotis keenii*)



Note: This map represents a broad view of the distribution of potential habitat used by this species. The map is based on several ecosystem classifications (Ecoregion, Biogeoclimatic and Broad Ecosystem Inventory) as well as current knowledge of the species' habitat preferences. This species may or may not occur in all areas indicated.

Life History

Diet and foraging behaviour

Although foraging behaviour of this species is largely unknown, diet analysis from work in Gwaii Haanas National Park Reserve and southeast Alaska indicates that the main prey—in order of importance—are spiders, Tricoptera, moths, and flies (D. Burles, pers. comm.; Parker and Cook 1996). Parker and Cook (1996) suggest that this prey mixture of flying and non-flying arthropods points to a flexible feeding strategy of both pursuing prey in flight and gleaned and indicates that Keen's Long-eared Myotis is well adapted as an arthropod predator. Its small size, low wing-loading ratio, and very low intensity echolocation call makes it well adapted for flying and foraging within structurally complex old forest.

Reproduction

The Keen's Long-eared Myotis likely does not breed until its second summer. Mating occurs in the fall prior to hibernation. Fertilization is delayed until females leave the hibernacula in the following spring for maternity colonies. There is only one known maternity colony, consisting of at least 40 females, in British Columbia. It is located among geothermally heated boulders and crevices on Hotspring Island, Gwaii Haanas National Park. Females return to this colony in May. Young are born between early June to mid to late July (D. Burles, pers. comm.). Only one litter, usually a single pup, is produced per year.

Keen's Long-eared Myotis has been found roosting in southwest facing rock crevices, geothermally heated rocks, tree cavities, bark crevices, and even in buildings (D. Burles, pers. comm.; Firman et al. 1993; Nagorsen and Brigham 1993; Parker and Cook 1996; Mather et al. 2000). Maternity roosts and summer feeding occur at elevations below 240 m, while known hibernation sites occur over 400 m elevation in caves over 100 m long.

Site fidelity

There is little information on site fidelity of Keen's Long-eared Myotis. However, information collected from banded *Myotis* species show that other species of *Myotis* do show high site fidelity to maternity roost and hibernation sites. At the Gandl'kin maternity colony, two individuals that were banded in 1991 were recaptured near the same maternity roost in 1998.

Home range

Very little is known regarding the home range of Keen's Long-eared Myotis. From the very scant data, it appears that they may not move great distances in summer and may have small home ranges. The longest movement away from the capture site for three radio-tagged Keen's Long-eared Myotis tracked for 2–4 days in August 1999 was 1 km (Mather et al. 2000). Burles (pers. comm.) only captured Keen's Long-eared Myotis up to 500 m from the maternity roost.

Movements and dispersal

Although little is known about long-range movements, it appears that they leave the hibernaculum in May (Mather et al. 2000). At the Gandl'kin maternity colony some females arrive in mid-May, but the majority arrive at the end of May and remain at the colony after that time (D. Burles, pers. comm.). They abandon this maternity colony in mid- to late August.

Studies in British Columbia show that females seem to feed and raise young at low-elevations (<250 m) in summer. Low elevation ponds and riparian forests are warmer and have higher insect productivity. Males begin to visit and “swarm” at the cave hibernation sites in August. Females join the “swarming” males at the cave sites in September. *Myotis keenii* appears to go into hibernation in October (Mather et al. 2000)

Habitat

Structural stage

- 6: mature forest
- 7: old forest

Important habitats and habitat features

Keen's Long-eared Myotis appear to be associated with cool wet coastal montane forests and karst features.

Caves >100 m in length and above 500 m elevation are known to be important winter hibernation sites for myotis bats (Davis et al. 2000). Caves with stable temperatures between 2.4 and 4°C with a 100% relative humidity were important on northern Vancouver Island for myotis bats (Davies et al. 2000). In summer, rock faces and knolls with crevices that are solar or geothermally heated are important maternity roosts. The only known maternity colony is situated within geothermally heated rocks associated with hot spring activity. Tree cavities in wildlife trees (decay class 2 or greater) and loose bark (on trees with decay class 4 or greater) are important natural roost sites and may be limiting in some parts of their range. Low elevation coastal forest and riparian areas are important foraging areas.

Conservation and Management

Status

The Keen's Long-eared Myotis is on the provincial *Red List* in British Columbia. It is designated as a species of *Special Concern* in Canada (COSEWIC 2002).

Summary of ABI status in BC and adjacent jurisdictions (NatureServe Explorer 2002)

BC	AK	WA	Canada	Global
S1S3	SH	SH	N1N3	G2G3

Trends

Population trends

Population size and trends are not known (Cannings et al. 1999). At least 18 occurrences are known in British Columbia but more are likely to exist (Cannings et al. 1999). The only known maternity colony contains at least 40 adults.

In an inventory at Clayoquot Sound, long-eared bats comprised <10% of the captures. In a study at Weymer Cave on the west side of Vancouver Island, long-eared bats comprised 14.5% of the captures. On the Queen Charlotte Islands, captures of Keen's Long-eared Myotis were rare away from the maternity colony (D. Burles, pers. comm.).

Burles captured banded adults at Gandl'kin and determined that these Keen's Long-eared Myotis were at least 8 years old. The age at first breeding is not known but all females are capable of becoming pregnant after their first winter. In most bat species, females typically produce one offspring per year. It is likely that Keen's Long-eared Myotis have an even lower reproductive rate because the species occurs at northern latitudes in coastal montane habitats which can experience severe weather fluctuations during the breeding season. This may affect prey availability and consequently productivity. In 1999 at the Weymer Creek study, only two females captured showed signs of reproduction. Burles found no evidence of successful fledging in 1998 during a dry warm summer. In 1999, during a cooler summer, there was some evidence of fledging (D. Burles, pers. comm.).

Habitat

There is no information on habitat trends. However, it is generally accepted that wildlife trees, and summer and winter roosts are affected by logging and roadbuilding due to loss of habitat and disturbance. Therefore it may be assumed that habitat quality and quantity is generally declining.

Threats

Population trends

This species has a limited distribution and is considered sparsely distributed, which could increase its risk of extirpation or extinction.

Habitat

The main threat to the habitat of this species is forest harvesting and mineral extraction. Disturbance during hibernation and while raising young is a major concern. Disturbance may result from recreational activities (e.g., caving) or industrial activities (e.g., blasting for road construction).

Legal Protection and Habitat Conservation

Under the provincial *Wildlife Act*, the Keen's Long-eared Myotis is protected from killing, wounding, hunting or trapping, taking, and transporting including exporting and importing.

The only known maternity colony is protected within Gwaii Haanas National Park Reserve. One other known female and young roost site is managed within an existing WHA. Cave hibernation sites are also protected in Weymer Creek Provincial Park (305 ha). The Vancouver Island Land Use Plan increased the percentage of protected areas on Vancouver Island from 10.3 to 13%. At least one of these parks (White Ridge Provincial Park) may include suitable hibernacula, and Artlish Caves Provincial Park contains karst.

Results based code provisions that may provide habitat include old growth management areas and riparian provisions. Karst management guidelines under the results based code are under development.

Identified Wildlife Provisions

Wildlife habitat area

Goal

Protect known colonies (maternity or hibernacula) and roosting sites as well as their adjacent foraging areas and movement corridors (e.g., riparian areas).

Feature

Establish a WHA at known hibernacula, maternity colonies, and roosting sites.

Size

Typically between 30 and 50 ha but will depend on site-specific factors including the type of feature (cave vs. tree), location of roosting trees, presence of wetlands or lakes, and potential movement corridors.

Design

The WHA should include a 100 m radius core area and a 200 m radius management zone (total 300 m). When cave habitat is the focus of the WHA, the core area and management zone should be centred on the cave entrance(s). The WHA should also include a minimum 20 m core area on either side of any stream, wetland, or lake within 500 m of the site that is considered by MWLAP to be valuable bat habitat to include within the WHA.

General wildlife measures

Goals

1. Maintain microclimate conditions of the colony or roosting site.
2. Minimize disturbance during critical times (maternity sites: 15 May to 30 September; hibernaculum sites: 1 October to 31 May).
3. Maintain forage opportunities and night roosting habitat near colonies.
4. Maintain important structural features of the forest and karst ecosystem.

Measures

Access

- No road construction should be carried out within the core area.
- Do not remove rock or talus within core area or management zone.
- Do not blast within core area or management zone.

Harvesting and silviculture

- Do not harvest or salvage in core areas.

- Within maternity WHAs, do not harvest within the management zone from mid-May through September.
- Within hibernation WHAs, do not harvest within the management zone from October through May.
- Where harvesting is planned within the management zone, use partial harvesting systems that maintain a minimum of 70% basal area.
- When harvesting within the management zone, retain important structural elements specifically wildlife trees (decay classes 2–7) with cracks, peeling bark, cavities and hollow interiors, canopy gaps, and older green trees that have either cracks or crevices in thick bark, bark pulling away from the trunk forming crevices, or holes in the bole where limbs have been shed.

Pesticides

- Do not use pesticides.

Recreation

- Do not develop recreation facilities, sites, or trails.

Additional Management Recommendations

Any blasting within 1 km from the WHA cave entrance or maternity colony, should ensure that the peak particle velocity does not exceed 15 mm/sec. Sound concussion should be <150 decibels and the shock wave should be <1.5 p.s.i. (McQuarrie, pers. comm.).

Since karst areas, including limestone cliffs and caves, are important for this species they should be inventoried before development.

Restrict recreational use of caves during critical times.

Information Needs

1. Maternity roost characteristics and summer habitat use.
2. Measures of disturbance from blasting.
3. Location of hibernacula.

Cross References

Bull Trout, Coastal Tailed Frog, Fisher, Marbled Murrelet, Quatsino Cave Amphipod, “Queen Charlotte” Goshawk, Spotted Owl, “Vancouver Island” Common Water Shrew

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