Fringed Myotis

Myotis thysanodes

Original[1] prepared by Mike Sarell

Species Information

Taxonomy

The *Myotis* are the most widespread and diverse genus of vespertilionids in the world. They represent nine of the 16 bat species documented for British Columbia. Three subspecies of Fringed Bats are recognized. British Columbia's population (*M. thysanodes thysanodes*) belongs to the subspecies with the largest distribution (van Zyll de Jong 1985). There is a possibility that the Oregon coast subspecies (*M. thysanodes vespertinus*) may extend into southwestern British Columbia (Nagorsen and Brigham 1993) but there are no records to confirm.

Description

The Fringed Myotis is larger than most others in its genus in British Columbia, except for the Long-legged (*M. volans*) and Western Long-eared (*M. evotis*). They have a wingspan of about 28 cm and a forearm length of 42 mm (Nagorsen and Brigham 1993). The colouring of the dorsal fir is a tan brown, making it lighter coloured than many other Myotis species in British Columbia. The fringe of hairs on the outer edge of the tail membrane can be seen with the unaided eye and is a distinguishing feature of this species.

Distribution

Global

The Fringed Myotis occurs widely across western North America from southern British Columbia to Veracruz and Chiapas in Mexico (Nagorsen and Brigham 1993), with isolated populations in the Black Hills and southeastern Wyoming, South Dakota, and western Nebraska (O'Farrell and Studier 1980) and coastal Oregon (Orr 1956).

British Columbia

In British Columbia, the Fringed Myotis appears to be restricted to the dry interior. Most records are from intensive surveys in the south Okanagan (Collard 1991; Holroyd et al. 1994; Sarell and Haney 2000), but recent captures have extended their range to the Squilax area of the Shuswap (Milligan 1993), other parts of the Thompson (Firman 1994; Firman et al. 1995), the Kettle Valley (Sarell et al. 1997), and into the Cariboo up the Chilcotin River (Roberts and Roberts 1992) at Alkali Lake (Roberts and Roberts 1992; Holroyd et al. 1994). This bat may occur in other suitable areas in the dry interior of the province (e.g., Nicola, Lillooet, West Kootenays), but these areas have been less intensively inventoried.

Forest region and districts

Southern Interior: 100 Mile House, Arrow Boundary, Cascades, Central Cariboo, Chilcotin, Kamloops, Okanagan Shuswap

Ecoprovinces and ecosections

CEI: CAB(?), CHP(?[2]), FRB

SIM: SFH(?)

SOI: GUU, NIB, NOB, NOH, OKR, PAR(?), SHB, SOB, SOH, STU, THB

Biogeoclimatic units

BG: xh1, xh2, xh3, xw, xw1, xw2

ICH(?): dw(?), mw2(?), xw(?)

IDF: dk1(?), dk2(?), dk3(?), dk4(?), dm1(?), mw2(?), xh1, xh1a, xh1b, xh2, xh2a, xh2b, xm, xw

PP: dh1, dh2, xh1, xh2

1 Draft account for Volume 1 prepared by S. Rasheed.

2 (?) Indicates that the range extent has not been determined.

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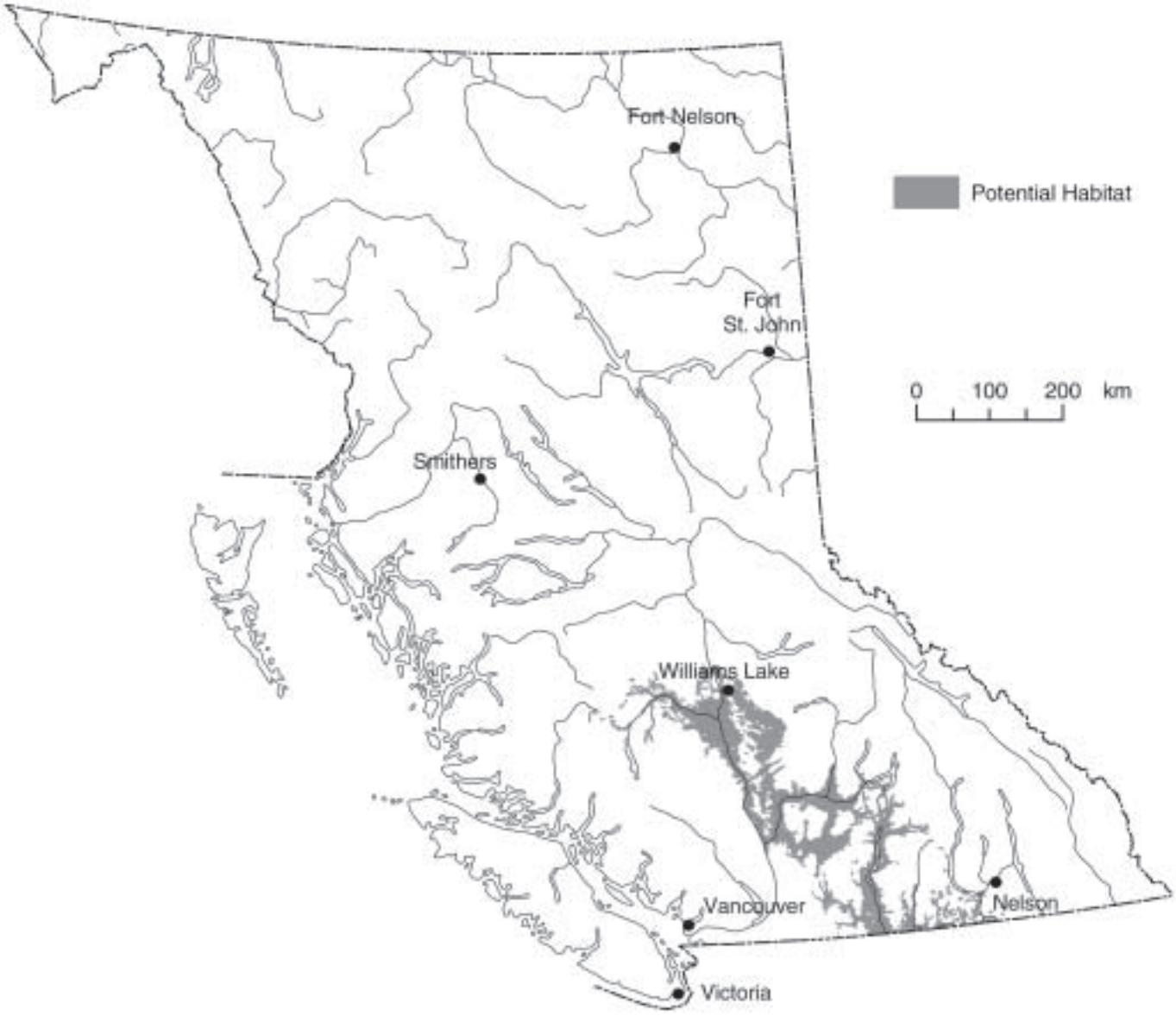
(Myotis thysanodes)



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.

Broad ecosystem units

Roosting: CL, DP(?), RO, PP(?)

Foraging: AB, AC, BS, CF, CR, DF, DP, LS, ME, OV, PP, RO, SP, SS, WL

Elevation

Fringed Myotis are usually captured between 300 and 854 m in British Columbia (Nagorsen and Brigham 1993). The capture reported for an elevation of 1400 m near Squilax (Milligan 1993) was actually ~380 m.

Life History

Diet and foraging behaviour

Little is known of the foraging behaviour of these bats. They are often caught near watercourses and tend to fly close to the canopy (Rasheed et al. 1995), as well as in open grassland habitats. Maternity colonies have been discovered in rural/agricultural settings in British Columbia, and although foraging behaviours were not determined, extensive orchards surrounding the roosts may have been used as foraging habitat. The possibility of varied forging habitat preferences is reflected in their diverse diet of beetles (Black 1974), moths, leafhoppers, harvestmen, and crickets (Whitaker et al. 1977), and lacewings and flies (Nagorsen and Brigham 1993). Many of these insects are fully terrestrial, suggesting that gleaning is employed as a predatory technique. One hypothesis is that the "fringe" is used to strip insects from vegetation. The likelihood that they glean their prey is also supported by their slow and manoeuvrable flight and their wings have high puncture strength, typical of other gleaning bat species that could otherwise tear wings against branches and thorns (O'Farrell and Studier 1980).

Reproduction

Copulation is thought to occur in the fall, and fertilization delayed until spring (O'Farrell and Studier 1980). Adult females form maternity colonies, numbering up to 300 in parts of their range (Rasheed et al. 1995), although both colonies observed in British Columbia were <40 (Maslin 1938; Sarell, unpubl. obs.). These two colonies were in attics of occupied houses although two other maternity colonies are suspected to occur in small cliffs (Sarell and Haney 2000). Typically, a single young is born each year, presumably in early July (Nagorsen and Brigham 1993). The low birth rate is offset by the longevity of this bat, recorded to live up to 18 years (Tuttle and Stevenson 1982).

Site fidelity

Site fidelity to roosts has been demonstrated to be high. A Fringed Myotis was captured at the same mine near Oliver 8 years after being banded (Nagorsen and Brigham 1993). Two maternity roosts in buildings have been identified in the province, and they all showed long periods of occupations (Maslin 1938; Sarell, unpubl. obs.).

Home range

There is no information on the home range of the Fringed Myotis throughout its range.

Movements and dispersal

Anecdotal evidence suggests that in the southern portion of this species' range, they travel short distances from summer to wintering ranges (Studier and O'Farrell 1972). Spring return to maternity colonies is rapid and synchronous. As well, parturition occurs within a narrow timespan, suggesting that the individuals are behaving synchronously for much of the year (O'Farrell and Studier 1976). There have been no observations made of seasonal movements or dispersal in British Columbia.

Habitat

Structural stage

Structural stage may be an important factor in foraging habitats but there have been no studies to document this. Foraging and roosting habitats often are found in interior dry forests (Nagorsen and Brigham 1993).

Important habitats and habitat features

Roosting

Caves, rock crevices, mine tunnels, and buildings have been well documented as providing day, night, and maternity roosts. Because this species roosts in colonies, suitable roosts may need to accommodate a number of individuals. It was recently discovered that Fringed Myotis in Arizona also form maternity roosts under loose bark in ponderosa pine (*Pinus ponderosa*) snags (Rabe et al. 1998). The wildlife tree classification would be described as class 4. Roosting in trees has not yet been documented in British Columbia. Maternity roosts typically have warm aspects, presumably to facilitate the thermoregulatory needs of pups and females.

The winter ecology of this species is poorly known throughout its range, although late summer fat accumulation in places other than British Columbia suggests that these bats hibernate (Ewing et al. 1970; O'Farrell and Studier 1980). The only observations of hibernation have been in caves, consisting of a few individuals in the Black Hills of South Dakota and of solitary individuals in Oregon (Martin and Hawkes 1972; Rasheed et al. 1995). There are no winter records for this species in British Columbia (Nagorsen et al. 1993).

Foraging

The Fringed Myotis occurs in a variety of habitats including mid-elevation grasslands, deserts, and woodlands. In British Columbia, this species is most closely associated with arid grassland and Ponderosa Pine–Douglas-fir (*Pseudotsuga menziesii*) forest (Rasheed et al. 1995). Fringed Myotis are reputed to have strong preferences for foraging over watercourses and close to the vegetative canopy, primarily in ponderosa pine and Douglas-fir forests (Rasheed et al. 1995). However, Fringed Myotis also are captured in grassland habitats (Williams 1968; O'Farrell and Studier 1980; Sarell and Haney 2000). These observations were always within an hour's flight of forested habitat (O'Farrell and Studier 1980). This apparent preference may be an artefact of surveyor preference for trapping where bats are most abundant (e.g., wetlands) and due to low capture rates in open landscapes. Foraging also may occur in orchards where roosts are provided (Maslin 1938; Sarell, unpubl. obs.) but this needs direct testing. There is some evidence of higher activity in old growth and mature stands (age class 5–9; stage 6–7) in Oregon (Thomas and West 1991).

Conservation and Management

Status

The Fringed Myotis is on the provincial *Blue List* in British Columbia (CDC 2002). In Canada, it is designated as a species of *Special Concern* (COSEWIC 2002).

Summary of status in British Columbia and adjacent jurisdictions (NatureServe Explorer 2002)

BC	ID	MT	WA	Canada	Global
S2S3	S1?	S3	S3?	N2N3	G4G5

Trends

Population trends

There have been few studies on population trends of Fringed Myotis throughout their range. In the 1960s, populations in the United States appeared to be quite stable (O'Farrell and Studier 1980). Populations are probably most vulnerable at maternity colonies and at hibernacula. Population trends have not been studied in British Columbia.

Habitat trends

Loss of habitat has been rapid and extensive throughout much of the Fringed Myotis' range in British Columbia. The habitats most prone to development are in the Okanagan and the least prone are in the Cariboo. The impacts of veteran tree and snag removal from forests may have a significant impact throughout their range in British Columbia, but this cannot be determined for certain until it is known how dependent Fringed Myotis are on tree roosts.

Threats

Population threats

Maternity colonies may be prone to disturbance, although abandonment has not been documented (O'Farrell and Studier 1980). Furthermore, maternity colonies could be readily disrupted if the roost structure is destroyed. Colonies in rock crevice roosts are susceptible to destruction through road construction and other activities requiring blasting. It is not known whether recreation activities, such as rock climbing or spelunking, may disrupt colonies, causing mortality, especially to young. No studies have examined the effects of pesticides on population performance.

Habitat threats

Urbanization, road construction, and possibly logging of old growth and/or the removal of snags may be some of the greatest threats to Fringed Myotis habitat. The eradication or exclusion of bats from attics also may be significantly impacting habitat availability. Roosts in caves, mines, and fractures are susceptible to modifications to accommodate recreation and to destruction from road construction and quarrying. Livestock excrement may contaminate surface water to the extent that it becomes unusable or unhealthy.

Legal Protection and Habitat Conservation

The Fringed Myotis is protected, in that it cannot be killed, collected, or held in captivity without special permits, under the provincial *Wildlife Act.*

There are no known roosts within conservation holdings, although two are suspected to be on lands controlled by the Canadian Wildlife Service and The Nature Trust of BC.

Identified Wildlife Provisions

Sustainable resource management and planning recommendations

- Provide adequate representation of foraging and roosting habitat in the landscape by either establishing WHAs when necessary or applying forest practices to ensure habitat representation.
- Maintain a variety of seral stages to ensure long-term provisions of foraging and roost requirements.

Wildlife habitat area

Goal

Maintain roosting, hibernating, or breeding sites.

Feature

Establish WHAs at known hibernacula and maternity roosts. Locating these features may be difficult without conducting radio-telemetry so areas with multiple individuals near suitable roosting features can also be designated as WHAs. These roosts may occur in rock outcrops and wildlife trees.

Size

Generally 12 ha but will depend on site-specific factors, including the proximity of alternate roosts. Further observations may determine whether this area is adequate.

Design

The WHA should include a 100 m radius core area and a 100 m radius management zone. When drafting boundaries consider bat movements between roosts during the breeding season, and the fact that bats may require several maternity trees per year for suitable roosting habitat. A similar design will be required for hibernacula, except the feature will be isolated and likely will not require connectivity.

General wildlife measures

Goals

1. Maintain all known roosting sites, including wildlife tree recruits for future roosting.
2. Maintain foraging habitat and prey abundance.
3. Minimize disturbance during critical times.
4. Minimize access.
5. Maintain riparian areas in a properly functioning condition.
6. Maintain hibernacula (if discovered).

Measures

Access

- Do not develop roads.
- Do not disturb rocky outcrops, loose boulders, or talus.

Harvesting and silviculture

- Retain some large trees (30–50 cm dbh) and all large (>50 cm dbh) ponderosa pine.
- Retain all large diameter (>30 cm dbh) wildlife trees (class 3–8).
- Prescribe logging in the lower diameter classes at a level that ensures future recruitment of large diameter stems and mimics a fire maintained stand (NTD4).
- Do not harvest or salvage between 1 May and 31 August if WHA includes a maternity colony.

Pesticides

- Do not use pesticides.

Range

- Plan grazing to meet GWM goals.

Recreation

- Do not establish recreation sites or trails, especially where trails would require the felling of wildlife trees.

Additional Management Considerations

Install bat-friendly gates to the entrance of caves and mines that have bat use. Install and maintain bat houses as part of the rehabilitation program. Bat Conservation International provides information regarding installation procedures of both gates and bat houses (www.batcon.org).

Information Needs

1. Specific roost requirements, especially tree roosts, in different biogeoclimatic zones, as well as effects of different silvicultural systems on roost and foraging habitat availability.
2. Seasonal roosting behaviours of maternity colonies, especially the strategies and spatial distribution of these roosts.
3. Hibernation sites need to be determined, as well as the distance travelled between hibernation sites and summer roosts.

Cross References

Bighorn Sheep, Spotted Bat, White-headed Woodpecker

References Cited

Black, H.L. 1974. A north temperate bat community: structure prey populations. J. Mamm. 43:138–157.

B.C. Conservation Data Centre (CDC). 2002. Rare vertebrate tracking lists. Available from: http:\srmwww.gov.bc.ca/cdc/tracking.htm

Collard, T.S. 1991. Identification of the status and critical habitats of the Fringed Bat (*Myotis thysanodes*), in the South Okanagan Valley, British Columbia. B.C. Min. Environ., Victoria, B.C. Unpubl.

Committee on the Status of Endangered Wildlife in Canada (COSEWIC). 2002. Canadian species at risk. Available from: http://www.speciesatrisk.gc.ca

Ewing, W.G., E.H. Studier, and M.J. O'Farrell. 1970. Autumn fat deposition and gross body composition in three species of *Myotis*. Comp. Biochem. Physiol. 36:119–129.

Firman, M. 1994. Thompson Region bat survey. B.C. Min. Environ., Kamloops, B.C. Unpubl.

Firman, M.C., C. Godwin, and R.M.R. Barclay. 1995. Bat fauna survey of the West Shuswap and South Thompson River region, British Columbia. Prepared for the B.C Min. Environ., Lands and Parks, Wildl. Br., Victoria, B.C. 94 p.

Holroyd, S.L., R.M.R. Barclay, L.M. Merk, and R.M. Brigham. 1994. A survey of the bat fauna of the dry interior of British Columbia: a summary by species with recommendations for future work. B.C. Min. Environ., Victoria, B.C. Wildl. Work. Rep. No. WR-63.

Martin, R.A. and B.G. Hawkes. 1972. Hibernating bats of the Black Hills of South Dakota. I. Distribution and habitat selection. Bull. New Jersey Acad. Sci. 17:24–30.

Maslin, T.P. 1938. Fringed-tailed Bat in British Columbia. J. Mammol. 19:373.

Milligan, B.N. 1993. A range extension for the Fringe-Tailed Bat, *Myotis thysanodes*, in British Columbia. Can. Field-Nat. 107:106–107.

Nagorsen, D.W. and R.M. Brigham. 1993. The bats of British Columbia. Univ. B.C. Press, Vancouver, B.C. 164 p.

Nagorsen, D.W., A.A. Bryant, D. Kerridge, G. Roberts, A. Roberts, and M.J. Sarell. 1993. Winter bat records for British Columbia. Northwest Nat. 74:61–66.

NatureServe Explorer. 2002. An online encyclopedia of life [Web application]. Version 1.6. Arlington, Va. Available from: http://www.natureserve.org/explorer

O'Farrell, M.J. and E.H. Studier. 1973. Reproduction, growth, and development in *Myotis thysanodes* and *M. lucifugus* (Chiroptera: Vespertilionidae). Ecology 54:18–30.

_____. 1976. Seasonal changes in wing loading, body composition, and organ weights in *Myotis thysanodes* and *M. lucifugus*. Bull. Soc. Calif. Acad. Sci. 75:258–266.

_____. 1980. *Myotis thysanodes*. Mammalian Species No. 137. 5 p.

Orr, R.T. 1956. The distribution of *Myotis thysanodes* in California. J. Mamm. 37:545–546.

Rabe, M.J., T.E. Morrell, H. Green, J.C. deVos, Jr., and C.R. Miller. 1998. Characteristics of ponderosa pine snag roosts used by reproductive bats in northern Arizona. J. Wildl. Manage. 62(2):612–621.

Rasheed, S.A., P.F.J. Garcia, and S.L. Holroyd. 1995. Status of the fringed myotis in British Columbia. B.C. Min. Environ., Lands and Parks, Wildl. Br., Victoria, B.C. Wildl. Work. Rep. No. WR-73.

Roberts, G. and A. Roberts. 1992. Grassland biodiversity in the Chilcotin Bunchgrass subzones and adjacent Douglas-fir subzone. B.C. Environ. and the B.C. Habitat Conserv. Fund, Victoria, B.C. 63 p. Unpubl.

Sarell, M.J. and A. Haney. 2000. South Okanagan rare bat survey 2000. Prepared for B.C. Environ., Penticton, B.C. 79 p.

Sarell, M.J., S. Robertson, and A. Haney. 1997. Inventory of Red- and Blue-listed wildlife within the Southern Boundary Forest District: Year One of Two. Prepared for Forest Renewal BC and B.C. Environ., Penticton, B.C.

Studier, E.H. and M.J. O'Farrell. 1972. Biology of *Myotis thysanodes* and *M. lucifugus* (Chiroptera: Vespertilionidae) – I. Thermoregulation. Comp. Biochem. Physiol. 41A:567–595.

Thomas, D.W. and S.D. West. 1991. Forest age associations of bats in the southern Washington Cascade and Oregon Coast Ranges. *In* Wildlife and vegetation of unmanaged Douglas-fir forests. L.F. Ruggiero, K.B. Aubry, A.B. Carey, and M.H. Huff (technical editors). U.S. Dep. Agric. For. Serv., Portland, Oreg., Gen. Tech. Rep. PNW-GTR-285, pp. 295–303.

Tuttle, M.D. and D. Stevenson. 1982. Growth and survival of bats. *In* Ecology of bats. T.H. Kunz (technical editor). Plenum Press, New York, N.Y., pp. 105–150.

van Zyll de Jong, C.G. 1985. Handbook of Canadian mammals. 2. Bats. Natl. Mus. Nat. Sci. (Canada), Ottawa, Ont. 212 p.

Whitaker, J.O., Jr., C. Maser, and L.E. Keller. 1977. Food habits of bats of western Oregon. Northwest Sci. 51(1):46–55.

Williams, D.F. 1968. A new record of *Myotis thysanodes* from Washington. Murrelet 49:26–27.