NAME: Myotis thysanodes Miller
COMMON NAME: Fringed Myotis
SYNONYMS: None
FAMILY: Vespertilionidae


TYPE LOCALITY: Old Fort Tejon, Tehachapi Mountains, Kern County, California, USA.

TAXONOMIC UNIQUENESS: There are 88 species of Myotis worldwide and 9 species in Arizona. There are 3 recognized subspecies of M. thysanodes including: M. t. aztecus Miller and G. M. Allen 1928; M. t. pahasapensis Jones and Genoways, 1967; and M. t. vespertinus Manning and Jones, 1988. Based on research conducted by Ruedi and Mayer (2001), M. thysanodes is apparently closely related to M. lucifugus. (Wilson and Reeder, 2005).

DESCRIPTION: The Fringed Myotis is part of the long eared Myotis group. Females have longer heads, bodies, and forearms than males. Total length ranges from 8.0-9.9 cm (3.15-3.90 in), length of forearm 4.03-4.53 cm (1.59-1.78 in), wingspread 26.5-30.0 cm (10.43-11.81 in), length of tail 3.5-4.5 cm (1.38-1.77 in), and weight 6.0-11.8 g (0.21-0.42 oz). ear 16.0-20.0 mm. Their long ears measure 16-20 mm and project 3-5 mm beyond the muzzle when laid forward; the ears and membranes are glossy black. The fur ranges in color from yellowish brown to darker olivaceous tones, with little difference between ventral and dorsal surfaces. Color varies geographically with tendency toward darker colors in the northwestern populations. They have a well-developed fringe of hairs on the posterior edge of the membrane, hence the reference to the common name given to this species. The robust calcar is not distinctly keeled. The wing membranes are moderately thick and elastic, making them resistant to puncture. This is a characteristic of bats that forage by gleaning from the ground or in areas of thick or thorny vegetation and is consistent with their short and broad wings and highly maneuverable flight (O'Farrell and Studier 1980). (Hall, 1981; Wilson and Ruff, 1999).

AIDS TO IDENTIFICATION: Although similar to M. evotis in overall appearance, this bat is larger, except in ear size. Forearm length is generally larger than 4.0 cm, while forearm length of M. evotis is typically shorter than 4.0 cm. They have a well-developed fringe of hair on the posterior edge of the uropatagium. This feature distinguishes them from all other North American Myotis species, though some M. evotis individuals also have a relatively
inconspicuous fringe. The metaloph, protoconule, and paraloph are usually absent on the first and second molars. This dental simplification is not observed in other American species of *Myotis*.

**ILLUSTRATIONS:**
- B&W photo (Hoffmeister 1986:81, Fig. 5.24)
- Color photo (Atlenbach in Wilson and Ruff, 1999)
- Color photo (Atlenbach in Harvey, 1999)

**TOTAL RANGE:** Western North America from British Columbia, Canada, to Veracruz and Chiapas in southern Mexico. A disjunct population occurs in the Black Hills of Wyoming and South Dakota.

**RANGE WITHIN ARIZONA:** Throughout much of the state, though not known from northeast or southwest corners. Their winter range in Arizona shifts to the southernmost counties, and Mohave County.

**SPECIES BIOLOGY AND POPULATION TRENDS**

**BIOLOGY:** Fringed *Myotis* tend to roost in the open in tightly packed groups. They roost in rock crevices, caves, mines, large snags, under exfoliating bark, and in buildings. In buildings, the sides of ceiling joints are preferred, although cracks between beams may also be used. Roost trees used were large diameter snags in early to medium stages of decay and were more likely to be near water sources than random trees. Thermoregulation of *M. thysanodes* in roosts is highly variable, with individuals shifting between regulating body temperatures and conforming to ambient temperatures. Lactating females tend to maintain lower body temperatures in day roosts than do post-lactating and pregnant females. Clusters of individuals tend to shift sites within the roost periodically in response to temperature changes or disturbance. Human disturbance can cause abandonment of the roost site.

Fringed *Myotis* are known to migrate, although little is known about migration patterns or destinations. Thought that fall migrations are short distances to lower elevation sites or more southern areas where bats could be periodically active in winter. Physiological studies indicate that *Myotis thysanodes* have a great deal of control over body temperature regulation and can fly at low ambient and body temperatures. Spring migration into a maternity roost is rapid, occurring from mid to late April. This migration takes place in less than a month. They are most active 1-2 hours after sunset. They fly at about 8.6 mph, with nearly vertical flight observed. According to Cockrum (1973), the greatest longevity recorded is 11 years, though most Fringed *Myotis* probably live for less than this.
**REPRODUCTION**: The only detailed description of reproduction is from O'Farrell and Studier (1973) for the region of northeastern New Mexico. According to this report, females do not copulate until after leaving the maternity roost in the fall. Copulation may occur at hibernacula, as in most other temperate Vespertilionids. Ovulation, fertilization, and implantation occurs from late April to mid-May, with gestation lasting 50-60 days; births late June to mid-July. Evidence from other areas suggests similar reproductive timing throughout this species’ range. Birth occurs in a head-down posture. The litter size is one, and the sex ratio at birth is equal. Young have open eyes and erect pinnae shortly after birth and are pink in color for approximately one week, after which the skin pigmentation process commences, followed by hair growth in the pigmented areas. During lactation two to ten adults are always present in the roost to care for the young. The neonate is huge in proportion to the mother, at 22% of her body mass and 54% of her total length. Females deposit newborns in a separate roost site and only visit them to nurse or to assist young in distress. Young are capable of limited flight at 16-17 days, and are indistinguishable from adults in both flight and form after 21 days. Colony size ranges up to several hundred. The colonies begin to disperse by October. (NatureServe 2010).

**FOOD HABITS**: *M. thysanodes* eat mostly small beetles (73% frequency), but moths are also taken. Observations indicated slow, highly maneuverable flight with foraging occurring in and around vegetation. These observations are consistent with their wing morphology. This bat may land to pick up prey from the ground.

**HABITAT**: Fringed *Myotis* occur primarily in middle elevation habitats ranging from deserts, grasslands, and woodlands. They occupy the lowest elevational range of all of the long-eared *Myotis* species (*M. auriculus, M. evotis, M. keenii, M. milleri, and M. septentrionalis*), and are most frequently captured in oak-pinyon woodlands and other open, coniferous, middle-elevation forests. They also have been captured in high-elevation habitats and at sea level in coastal areas. Roost sites found in caves, mine tunnels, in large snags, under exfoliating bark, and in buildings. These sites may be day or night roosts. Thought that Fringed *Myotis* use lower elevation caves and mines, as hibernation sites, but not much is known about their wintering whereabouts. All desert and steppe areas within the range of *M. thysanodes* are within an hour flight from forested or riparian areas.

**ELEVATION**: 4,000 - 8,437 feet (1,219-2,572 m).

**PLANT COMMUNITY**: Found from low desert scrub associations to higher elevation fir-pine associations. Oak and pinyon woodlands appear to be most commonly used vegetative association.

**POPULATION TRENDS**: Appears to be stable in Arizona, though they are rare in other areas.
AGFD Animal Abstract  -4-  Myotis thysanodes

SPECIES PROTECTION AND CONSERVATION

ENDANGERED SPECIES ACT STATUS: None (USDI, FWS 1996)
[C2 USDI, FWS 1994]
STATE STATUS: None
OTHER STATUS: Not BLM Sensitive (USDI, BLM AZ 2008)
[Bureau of Land Management Sensitive (USDI, BLM AZ 2000, 2005)]

MANAGEMENT FACTORS: This species greatest threat is being disturbed by humans; mostly through recreational caving, mine exploration and vandals. Other threats include: closure of abandoned mines, renewed mining at historic sites, toxic material impoundments, pesticide spraying, vegetation conversion, livestock grazing, timber harvest, destruction if buildings and bridges used as roosts and destruction or disturbance of water sources and riparian habitat. Prior to parturition, females become very secretive and virtually impossible to approach. The lack of understanding of intra-specific variation within this species compromises the effectiveness of current management policy.

PROTECTIVE MEASURES TAKEN: None known.

SUGGESTED PROJECTS: The hibernation and migratory habits of this species, as well as many Myotis species, are unknown. It is important to understand more about the habitat requirements of this species throughout the year. The presence of appropriate roost sites may be the most critical factor determining M. thysanodes presence in an area. Throughout the range of this species, it is important for research on roosting and foraging habits to be conducted.

LAND MANAGEMENT/OWNERSHIP: BLM - Arizona Strip, Kingman and Safford Field Offices; DOD - Fort Huachuca Military Reservation; NPS-Pipe Springs National Monument; USFS – Apache-Sitgreaves, Coconino, Coronado, Kaibab, Prescott and Tonto National Forests; Private.

SOURCES OF FURTHER INFORMATION

REFERENCES:
Bat Conservation International. Species profile – Myotis thysanodes. 2011 Bat Conservation
Academy of Science. 8:108-110.
37.
Pp. 80-81.
(Accessed: November 14, 2002).
Mammalogists. 137:1-5.
ponderosa pine snag roosts used by reproductive bats in northern Arizona. Journal of 
Memorandum No. AZ-2000-018.
Animal Candidate Review for Listing as Endangered or Threatened Species; Proposed 
USDI, Fish and Wildlife Service. 1996. Endangered and Threatened Wildlife and Plants: 
Review of Plant and Animal Taxa that are Candidates for Listing as Endangered or 
Weller, T.J. and C.J. Zabel. 2001. Characteristics of Fringed Myotis day roosts in northern 
Wilson, D. E. and D. M. Reeder, eds. 2005. Mammal species of the World: A taxonomic and 
Geographic Reference, Third edition, Volume 1. The Johns Hopkins University Press, 
Baltimore, Maryland. 517.
Smithsonian Institution Press, Washington in Association with the American Society of 
MAJOR KNOWLEDGEABLE INDIVIDUALS:
Ted Weller – Redwood Sciences Laboratory, Eureka, California.

ADDITIONAL INFORMATION:
An analysis of genetic variation within *M. thysanodes* and among the six species of long-eared *Myotis* (*M. auriculus, M. evotis, M. keenii, M. milleri, M. septentrionalis,* and *M. thysanodes*) is currently underway. This research will provide managers with the information they need to understand the identity of unique populations within *M. thysanodes* and the boundaries among the long-eared *Myotis* species.

Revised: 1992-01-06 (JSP)
1994-04-04 (DBI)
1995-06-08 (DBI)
1994-04-07 (DCN)
1997-03-04 (SMS)
2002-06-02 (TD)
2002-11-15 (AMS)
2003-01-19 (AMS)
2011-01-21 (SMS)

To the user of this abstract: you may use the entire abstract or any part of it. We do request, however, that if you make use of this abstract in plans, reports, publications, etc. that you credit the Arizona Game and Fish Department. Please use the following citation:

Arizona Game and Fish Department. 20XX (= year of last revision as indicated at end of abstract). X...X (= taxon of animal or plant). Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, AZ. 6 pp.