

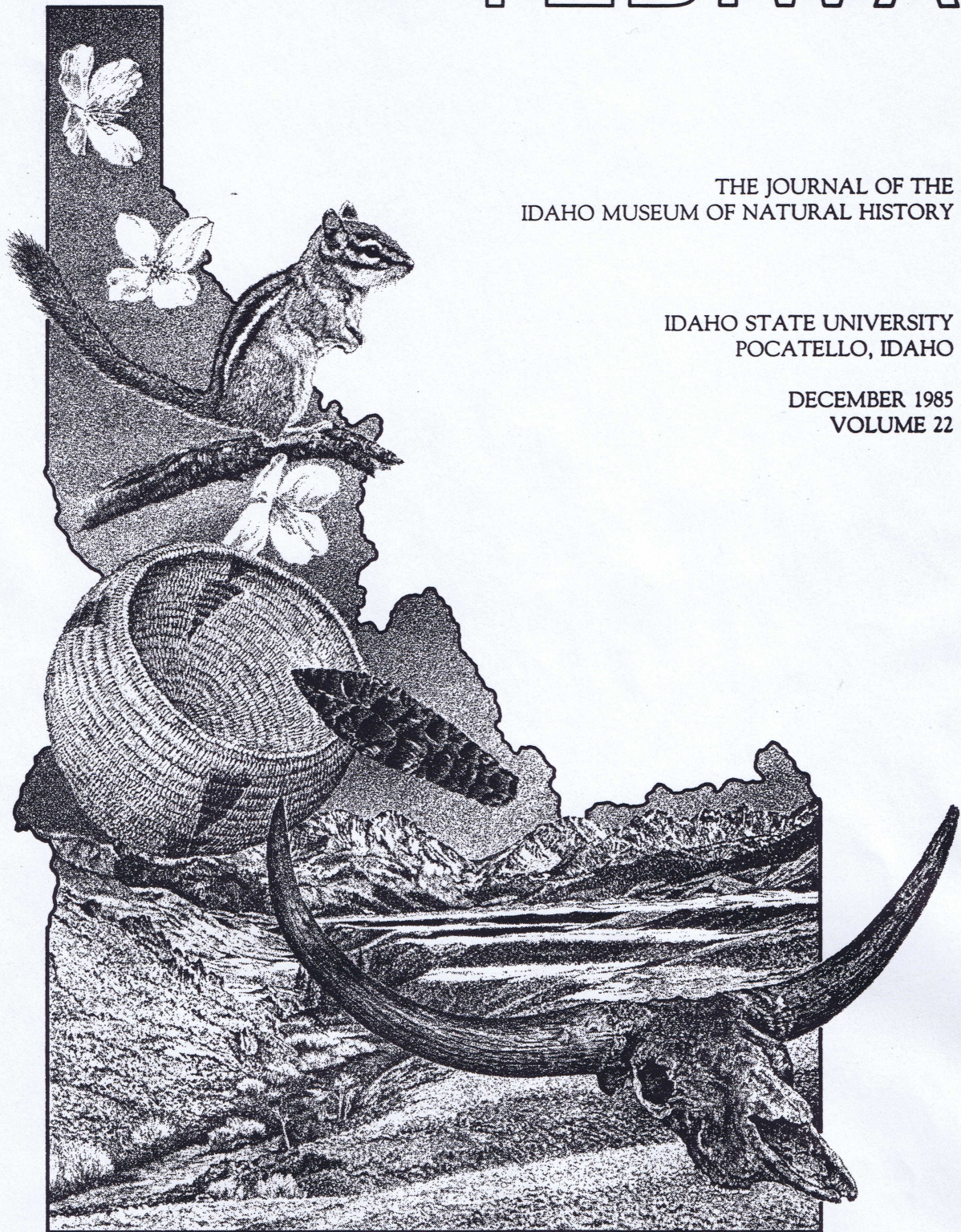
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A Simplified Key for Idaho Bats

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Fourteen species of bats occur in Idaho, but almost no data are available on the distribution of individual populations. A simplified key is presented that affords both lay person and technician a high probability of correctly identifying individual specimens to the species level. The importance of developing locality data for all bats is emphasized with special attention to the spotted bat.

Introduction

As a result of development of nongame programs funded by private donations and voluntary state income tax check-offs, a number of state fish and game departments have prepared lists of vertebrates known to occur within limited geographical areas. Our knowledge of the actual geographical distribution of non-hunted vertebrates is fragmentary, especially for Idaho. By contrast, eight states—California, Florida, Illinois, Kansas, North Carolina, New York, Ohio, and Texas—support biological surveys to conduct faunal analyses, and a number of foreign nations have long-standing comprehensive survey programs for mapping local distributions of individual species. A proposal to create a Biological Survey of the United States (BISUS) has been presented to Congress (Kosztarab 1984), but remains unfunded. Until funding is available, many state agencies will continue to manage habitat for familiar species with the fond hope of preserving smaller cryptic species, believed to be of limited economic importance, that are presumed to occur in these managed areas.

Davis (1939) published a scientific treatment of mammalian species found in Idaho, but this work is now taxonomically inadequate. Larrison and Johnson (1981) presented an updated popularized treatment, whereas Groves and Marks (1985) developed a distributional listing based upon Idaho Department of Fish and Game regions. Specific maps detailing exact distributions within these regions are not available. To rectify this situation, the Nature Conservancy initiated an Idaho Natural Heritage Program in conjunction with the Idaho Department of Fish and Game. The distributional information, currently being mapped, will be of enormous value to our ultimate understanding of-

man's impact on species found in natural habitats of Idaho. But the data to generate these maps are limited. Comprehensive studies are needed on groups of species, especially bats and rodents, that occur in the Gem State.

Key Use and Species Emphasis

To help produce more information, I have developed a simplified key for Idaho bats. Without doubt, subsequent collections or observations will produce data suggesting that additional species occur in Idaho, and the key will require modification. I suspect that the Brazilian free-tailed bat (*Tadarida brasiliensis*) yet may be collected in Idaho; further collection of small-footed bats of the *Myotis leibii* group may also produce further taxonomic subdivision of California myotis (*Myotis californicus*) and small-footed myotis (*Myotis leibii*) (Van Zyll de Jong 1984), a condition not considered in my key.

Taxonomic keys usually contain an overwhelming number of technical terms familiar only to trained biologists. Keys, similar to those provided by Hall (1981), permit biologists to identify specimens to the species level, especially if these specialists have comparative specimens available. Such specimens are usually housed in natural history collections of state-supported museums. A simplified key has not been published for Idaho bats that allows laypersons or technically trained individuals to provide information on sightings to professionals interested in documenting the identity and locality for local bat populations. Such data are needed to develop adequate management decisions for species residing in Idaho. Bats, commonly unobserved unless they become pests in human habitation, appear to be declining in numbers in the United States. Lack of understanding of the impor-

tance of these voracious insect eaters has led to their deliberate destruction at roosting sites. Insecticides also are suspected to be decimating species found in areas of intensive agricultural activity (Geluso *et al.* 1976). Hopefully, the key I have developed will encourage individuals to participate in the collection of locality data, and will stimulate interest in the preservation of habitat occupied by bats. Conservation-minded individuals will find the general book by Fenton (1983) very valuable. A more technical treatment of bat biology is available in Kunz (1982).

Fourteen species of bats are known to occur in Idaho. Eleven are easily identified to the species level by external characteristics. Members of the genus *Myotis* are easily confused however, especially little brown myotis (*M. lucifugus*), Yuma myotis (*M. yumanensis*), and California myotis (*M. californicus*). Dentition aids identification of seven bat species found in Idaho. These species are indicated with an asterisk placed adjacent to the total number of teeth, as listed on the left side of the key for each species. Preparation of a skull is a time-intensive task and requires destruction of a specimen, a procedure I do not encourage unless essential. Additionally, all members of the genus *Myotis* have 38 teeth, although skulls of individual species in this genus usually can be identified by morphological characteristics not reported in my simplified key. The dental formula for each species is listed from the front to the rear of the skull in order of the number of incisors, canines, premolars, and molars, the latter have characteristic "W" patterns, for one-half of the upper and lower jaw. Thus, the upper jaw of the spotted bat (*Euderma maculatum*) contains two incisors, one canine, two premolars, and three molars on each side; the lower jaw contains three incisors, one canine, two premolars, and three molars on each side.

I wish to focus special attention to the spotted (=pinto) bat, although locality data for all species are needed. Until 1964, approximately 40 specimens of spotted bats had been collected and reported in scientific literature. Subsequently, collected individuals usually have been released by investigators, but an exact count of all spotted bats ever handled probably does not exceed 500. Individuals have been collected mainly in the mountains of the southwestern United States and British

Columbia (Woodsworth *et al.* 1981), including all states surrounding Idaho. Only one specimen of spotted bat has been collected in the Gem State (Tucker 1957).

Because of the limited national collection of specimens, *E. maculatum* was initially listed as rare on the Bureau of Sports Fisheries and Wildlife Rare and Endangered Species List of 1968, and in the Red Data Book (IUCN 1969). Although the species is considered rare, because its distribution and abundance are largely conjectural, its suitability for listing under the Endangered Species Act of 1973 has been considered only recently (Fenton *et al.* 1983). In 1977, the Director of the Idaho Department of Fish and Game and the State Director of the Bureau of Land Management signed a Sensitive Species Supplement List to a Master Memorandum of Understanding between the two agencies that listed the spotted bat as a species of special concern in Idaho.

Euderma maculatum has been collected most often in desert terrain that is rough and dry (Watkins 1977). Although Vorhies (1935) and Hardy (1941) suggest that the species might be found in caves, recent investigators agree that the species is solitary, normally roosting in deep rocky crevices of canyon and cliff walls. This conclusion is based upon Easterla's (1965) personal visit to Crocodile Cave, Kane County, Utah, where four spotted bats were reported seen in February 1930. His visit and repeated visits by other investigators have failed to yield other sightings. Therefore, since no voucher specimens are available from any caves, it seems probable that the initial published observation was in error.

Specimens obtained prior to collections made by Easterla (1965, 1970, 1973, 1976), Finley (see Fig. 2, Snow, no date), or Poche and Bailie (1974) suggested that investigators have collected solitary wanderers (Handley 1959). In general, this bat has been collected in desert pinon-juniper woodlands near sandstone cliffs or over streams and water holes in coniferous forest with rock cliffs nearby. At present, it is not clear whether individuals that have been collected in Idaho, Oregon, Wyoming, and Montana are members of resident breeding populations, or are post-breeding wanderers. The single Idaho specimen reported by Tucker (1957) was collected 24 km (15 miles) southwest of Caldwell, Canyon County, where it had landed, apparently

exhausted, on a driveway. Tucker suggested that the individual may have been "carried beyond its more southern habitat" following 2 days of high winds. Keller (1980, 1981) failed to locate spotted bats during limited net and sonar samplings at 21 localities in southcentral Idaho. Fenton *et al.* (1983), who sampled 94 localities in five areas in western and northern Idaho by means of listening for audible echolocation calls (the sonar repertoire for this species being unique) failed to locate any spotted bats. Their short-interval samples were obtained during the same season that Tucker's (1957) collection occurred. Although the periods that sampling occurred are relatively similar, it is not clear whether the spotted bat is never resident in western Idaho as suggested by Tucker (1957), is no longer present in western Idaho, was missed as a result of specific migratory habits that affect return to the location, or was missed as a result of sampling too few localities. Perusal of the data collected by Fenton *et al.* (1983) indicates lack of positive relocation of spotted bats at known collection sites in several states. Known populations should not be disturbed.

Three terms appear in the key that require definition. The interfemoral membrane is located between the hind legs of a bat. The calcar, a car-

tilaginous process arising from each ankle, extends along the outer margin of the tail membrane. The calcar is keeled if a segment of membrane occurs between the calcar and the outer margin of the tail membrane. It is not keeled if it extends adjacent to the outer margin. The tragus is a thin fleshy projection just inside the ear. It is easily visible and projects upward from the base of the ear. Illustrations depicting these structures, as well as several bats found in Idaho, are reproduced from Schwartz and Schwartz (1981) in Fig. 1.

In my key, characteristics that are especially useful appear in bold face. Beneath the Latin and common name (after Jones *et al.* 1982), I have indicated approximate metric measurements, in millimeters, reported by biologists for bats. These include, in order: length from tip of nose to tip of tail; tail length only; left hind foot length to the end of the nail; ear length from the notch of the ear at the base of the skull to the top of the ear. In obtaining measurements, living bats should always be handled with gloved hands as a precaution against bites as occasionally rabid individuals are encountered. It is untrue that most bats have rabies, a myth perpetuated by many uninformed health professionals.

Bat Key

To key a specimen, compare the bat sequentially to the paired alternatives until a terminal identification is reached.

- 1a Body yellowish to brownish with white tipped hairs producing a frosted appearance; **tan throat patch; ears with black rims; upper surface of interfemoral membrane furred to tip of tail**
 $1/3 \ 1/1 \ 2/2 \ 3/3 = 32^*$ (see Fig. 1) *Lasiurus cinereus*
 Hoary Bat
 124-54-12-16
- 1b Body not yellowish to dark brownish with a frosted appearance; ears without black rims; upper surface of tail membrane not furred to tip of tail
 Go to 2
- 2a Ears 19 mm (over 3/4") or more in length
 Go to 3
- 2b Ears less than 19 mm in length
 Go to 6
- 3a **Ears, in living individuals pinkish, translucent**, or in dead individuals, brown and translucent; ears long (about 46 mm), and wide; **upper fur blackish with patches of white over each shoulder and at base of tail**; underparts whitish. Rare. Sightings of this bat should be reported im-

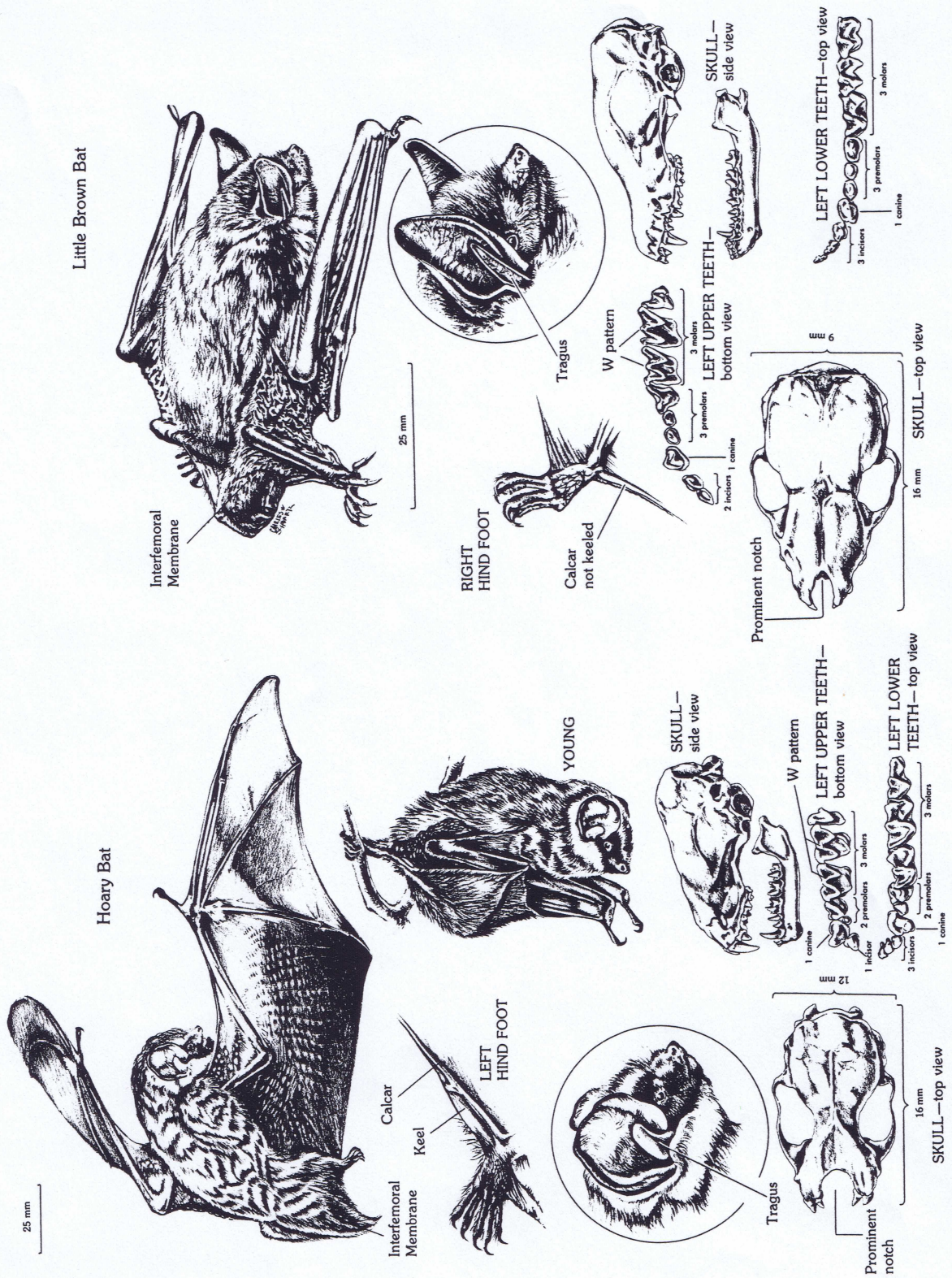


Fig. 1. Structures for two species of Idaho bats. (*Lasiurus cinereus*—left; *Myotis lucifugus*—right) that aid identification.

mediately to the Curator of Mammals, Idaho Museum of Natural History, Pocatello. Photograph specimen prior to release, if possible.

$2/3 \ 1/1 \ 2/2 \ 3/3 = 34^*$

Euderma maculatum

Spotted Bat

110-50-11-46

3b Ears not pinkish or translucent brown and less than 40 mm long;

. . . . Go to 4

4a **Glandular lumps on face between nostrils and eyes;** upper fur brownish to grayish-brown, underparts sooty; **ears**, brown and **may be folded against body**

$2/3 \ 1/1 \ 2/3 \ 3/3 = 36^*$

Plecotus townsendii

Townsend's Big-eared Bat

95-46-9-35

4b No glandular lumps on face between nostrils and eyes

. . . . Go to 5

5a **Upper fur yellowish to pale-creamish brownish**, underparts buffy to buffy white; **ears up to 15 mm across at widest point;** tragus less than $1/2$ the length of ear

$1/2 \ 1/1 \ 1/2 \ 3/3 = 28^*$

Antrozous pallidus

Pallid Bat

110-43-11-30

5b Upper fur brownish, dark at base, underparts buffy; **black ears 9-10 mm across at widest point; tragus more than $1/2$ in length at ear**

$2/3 \ 1/1 \ 3/3 \ 3/3 = 38$

Myotis evotis

Long-eared Myotis

88-41-8-20

6a **Tip of tail extends up to 4 mm beyond interfemoral membrane;** upper fur chocolate brown or reddish-brown, underparts paler; size relatively large, forearm more than 45 mm; wing span may exceed 32 cm

$2/3 \ 1/1 \ 1/2 \ 3/3 = 32^*$

Eptesicus fuscus

Big Brown Bat

115-46-12-14

6b Tip of tail does not extend much beyond interfemoral membrane; color variable; forearm less than 45 mm

. . . . Go to 7

7a Color of upper fur, neither pale buff to pale smoky gray nor blackish brownish, with some silver-tipped hairs

. . . . Go to 9

7b Color of upper fur either blackish with some silver-tipped hairs or bat small and upper fur pale buff to pale smoky gray

. . . . Go to 8

8a Tail membrane heavily furred outward from body for slightly more than $1/2$ of its length; **body very dark brown or blackish with silvery-white tips to the hairs giving frosted appearance**

$2/3 \ 1/1 \ 2/3 \ 3/3 = 36^*$

Lasionycteris noctivagans

Silver-haired Bat

93-39-8-16

8b **Tail membrane sparsely furred outward from body for about $1/3$ rd of length;** wing membrane and ears blackish, body pale buffy brown to **pale smoky gray**, fur distinctly darker at base; **a small**

- bat; tragus blunt and bent forward**
 $2/3 \ 1/1 \ 2/2 \ 3/3 = 34^*$
- Pipistrellus hesperus*
 Western Pipistrelle
 70-26-6-11
- 9a **Fringe of stiff hairs along free edge of interfemoral membrane especially near tail;** ears, laid forward, extend less than 5 mm beyond nose
 $2/3 \ 1/1 \ 3/3 \ 3/3 = 38$
- Myotis thysanodes*
 Fringed Myotis
 85-37-8-17
- 9b No fringe of stiff hairs along free edge of interfemoral membrane; ears laid forward reach nose or only very slightly beyond
 Go to 10
- 10a **Fur on underside of wing membrane extending from the body to a line joining the elbow and knee;** body cinnamon to brownish above and buffy to light brown below; membranes and short rounded ears dark
 $2/3 \ 1/1 \ 3/3 \ 3/3 = 38$
- Myotis volans*
 Long-legged Myotis
 91-42-9-14
- 10b Fur on underside of wing membrane not extending from the body to a line joining the elbow and knee
 Go to 11
- 11a Distinct black mask across muzzle and face to ears; ears blackish; upper fur color variable brown
 $2/3 \ 1/1 \ 3/3 \ 3/3 = 38$
- Myotis leibii*¹
 Small-footed Myotis
 79-36-7-13
- 11b No distinct black mask across muzzle and face to ears; ears blackish or brownish; upper fur color variable brown
 Go to 12
- 12a **Tips of hairs imparting inconspicuous bronze tone,** especially when fur ruffled; yellowish to olive-brown fur on back appears long and glossy; calcar not keeled
 $2/3 \ 1/1 \ 3/3 \ 3/3 = 38$
- (see Fig. 1)
- Myotis lucifugus*
 Little Brown Myotis
 85-36-11-13
- 12b Tips of hairs not imparting inconspicuous bronze tone; color variable, but dull
 Go to 13
- 13a Interfemoral membrane, above and below with hair extending to slightly beyond a line joining the knees; **calcar not keeled;** fur pale brown; **foot relatively large, 9-10 mm**
 $2/3 \ 1/1 \ 3/3 \ 3/3 = 38$
- Myotis yumanensis*
 Yuma Myotis
 85-35-9-13
- 13b Interfemoral membrane, above and below, with hair not extending to slightly beyond a line joining the knees; **calcar keeled;** fur yellowish chestnut or brown above, paler below; **foot relatively small, 6-7 mm**
 $2/3 \ 1/1 \ 3/3 \ 3/3 = 38$
- Myotis californicus*
 California Myotis
 82-38-6-11

¹Van Zyll de Jong (1984) considers *Myotis leibii melanorhinus* a distinct species, and applies the name *Myotis ciliolabrum* (Western Small-footed Bat).

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