

Cave myotis, *Myotis velifer*
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Description: *Myotis velifer* is a large *Myotis*, with a forearm of 37-47 mm, and an adult weight of ca. 12 g. The subspecies found in California has a forearm of 40-45 mm (Stager 1939). This species has a large skull with a pronounced sagittal crest, a conspicuous bare patch on the back between the scapulae, large feet, and medium length ears (Fitch et al. 1981, Hoffmeister 1986). It can be distinguished from most other *Myotis* species on the basis of size. The only other *Myotis* in the same size range are *M. thysanodes* and *M. volans*. *M. thysanodes* has a fringe of hair on the interfemoral membrane, and *M. volans* has a distinct keel on the calcar.

Taxonomic Remarks: *M. velifer* is in the Family Vespertilionidae. This species was first described as *Vespertilio velifer* from a specimen collected in Guadalajara, Mexico (Allen 1890). The first use of the current name combination was by Miller (1897). Vaughan (1954) argued that the form found in southeastern California and Arizona belonged in a separate subspecies, which he named *M. v. brevis*. This subspecies is retained by Hall (1981). Hayward (1970) and Fitch et al. (1981) synonymize *M. v. brevis* with *M. v. velifer*, and recognize a total of three subspecies, *M. v. grandis*, *M. v. incautus*, and *M. v. velifer*. Under this arrangement, all *M. velifer* in California would be *M. v. velifer*. The first collection in California was on 16 July 1909 at Needles, San Bernardino County (Grinnell 1918).

Distribution: *M. velifer* is distributed across the southwestern quarter of the United States, from Kansas, Oklahoma and western Texas to southern Nevada and southeastern California, and south through Mexico, reaching its southern limit in Honduras (Fitch et al. 1981). Within the U.S., it is most widely distributed in Arizona.

In California, its distribution is limited to the Colorado River basin, primarily the Whipple, Mule, and Riverside mountains. Although the California Department of Health Services has received isolated specimens from farther to the west (D. Constantine pers. comm.), the only known roost sites are found in the mountain ranges within the Colorado River basin. The species is present in California primarily during the maternity season, from early April through September. A few individuals of both sexes were seen in a mine along the Colorado River in December 1993 (P. Brown pers. comm.), and there is one unverified winter record from Parker Dam (Royal Ontario Museum record).

Life History: *M. velifer* is highly colonial, typically forming maternity colonies of 2,000 to 5,000 (Barbour and Davis 1969, Fitch et al. 1981). A colony of 20,000 was located in a mine in Arizona in 1991 (V. Dalton pers. comm.). Maternity colonies form in the spring (in early May in California [Stager 1939]), and disband in late summer. Copulations take place in the fall or winter, and females give birth to a single young in early summer. Young are born at ca. 26% adult weight (Fitch et al. 1981), and attain adult weight by week 9 to 10. They begin to fly at about 3 weeks of age, and begin to forage at about 4 weeks (Kunz 1974).

This species appears to be opportunistic in its feeding habits. In some localities small moths (Lepidoptera) appear to be dominant in the diet, and in other settings beetles are the most common food item (Coleoptera) (Kunz 1974, Fitch et al. 1981). Vaughan (1980) reported this species feeding opportunistically and selectively on a swarm of flying ants near a roosting area.

Habitat: This species is found primarily at lower elevations (the Sonoran and Transition life zones) of the arid southwest, in areas dominated by creosote bush, palo verde, brittlebush, and cactus.

M. velifer roosts primarily in caves and mines, but has also been found in buildings, and under bridges (Stager 1939, Constantine 1958, Davis and Cockrum 1963, Barbour and Davis 1969, Fitch et al. 1981, Hoffmeister 1986). It appears to tolerate summer roost temperatures as high as 37°C (Constantine 1958). It has also been found on repeated occasions, particularly in the non-reproductive season, in swallow nests (Fitch et al. 1981). Although the first record for California was from an old warehouse in Needles, most records are from abandoned mines in the Riverside Mountains. This population, with multiple colonies numbering in the thousands, was studied intensively by Stager (1939) in the 1930s and Vaughan (1959) in the 1950s. This species was present in the mines from early April through August, with almost no animals left by October 1. Where the majority of the California population goes in the winter is unknown. In southern Arizona, this species has been found in the winter occupying wet mine tunnels above 6,000 ft (1,830 m), where roost temperatures are 8° to 11° C.

Foraging habitat for the California population is predominantly the floodplain of the Colorado River. Both Stager (1939) and Vaughan (1959) report on *M. velifer* foraging low (2-4 m above the ground) over dense vegetation in this area. Stager (1939) describes the foraging habitat as consisting primarily of cottonwood (*Populus*) and arrowweed (*Pluchea*). Vaughan (1959) observed that the linear stands of screw bean (*Prosopis pubescens*), tamarisk (*Tamarix* spp.), catsclaw (*Acacia greggii*), and mesquite (*Prosopis* spp.) that border the oxbow ponds along the river were the favored foraging habitat. Less frequently the species was observed foraging in drier washes -- dominated by mesquite, catsclaw and palo verde (*Cercidium floridum*).

Status: Class I. The distribution of this species within historic time in California has likely always been limited, as the species reaches the northwestern limits of its range along the Colorado River in southeastern California and southern Nevada. Extensive studies of this species in the 1930s and 1950s document very large California colonies numbering many thousands of individuals. Although both Stager and Vaughan collected animals for scientific purposes, these collection activities were not extensive enough to have adversely impacted the population. Extensive survey work has been conducted in this region over the past 25-30 years (P. Brown pers. comm., D. Constantine pers. comm., P. Leitner pers. comm.). Currently there are only two known maternity roosts for *M. velifer* along the Colorado River, one with approximately 300 animals, and the other about 200 (P. Brown pers. comm.). The mines that once housed the very large colonies no longer have any *M. velifer*. P. Brown (pers. comm.) has located two previously unknown mines with large deposits of *M. velifer* guano, one in the Cargo Muchacho Mountains and the other in the Riverside Mountains. When surveyed in 1993, the Cargo Muchacho mine had no bats, and the other had a few males. Based on this information, we must conclude that the status of this species in California is currently very precarious.

The most likely explanation for the dramatic declines in *M. velifer* populations along the Colorado River is loss of foraging habitat through the conversion of the floodplain to agriculture. The loss of native vegetation has almost certainly altered the invertebrate community. Also, the entire area is subjected to extremely heavy aerial spraying with pesticides, which could both reduce the prey base and directly poison the bats (e.g., Clark and Stafford 1981, Clark et al. 1983). The riparian habitat is mostly gone in the vicinity of the smaller maternity colony, and is rapidly being lost to river front homes and trailer parks near the other colony (P. Brown pers. comm.).

Cave and mine dwelling bats are very vulnerable to disturbance in their roost sites, particularly if they form large exposed aggregations as does *M. velifer*. Human disturbance is not likely to be a significant factor in this setting, however. The mines along the Colorado receive considerable

recreational use in the cool, non-summer months, but very little during the extremely hot summer (= bat reproductive) season.

Another threat to mine dwelling bats in California is the renewal of mining activity in historic districts (Brown and Berry 1991, Brown 1995).

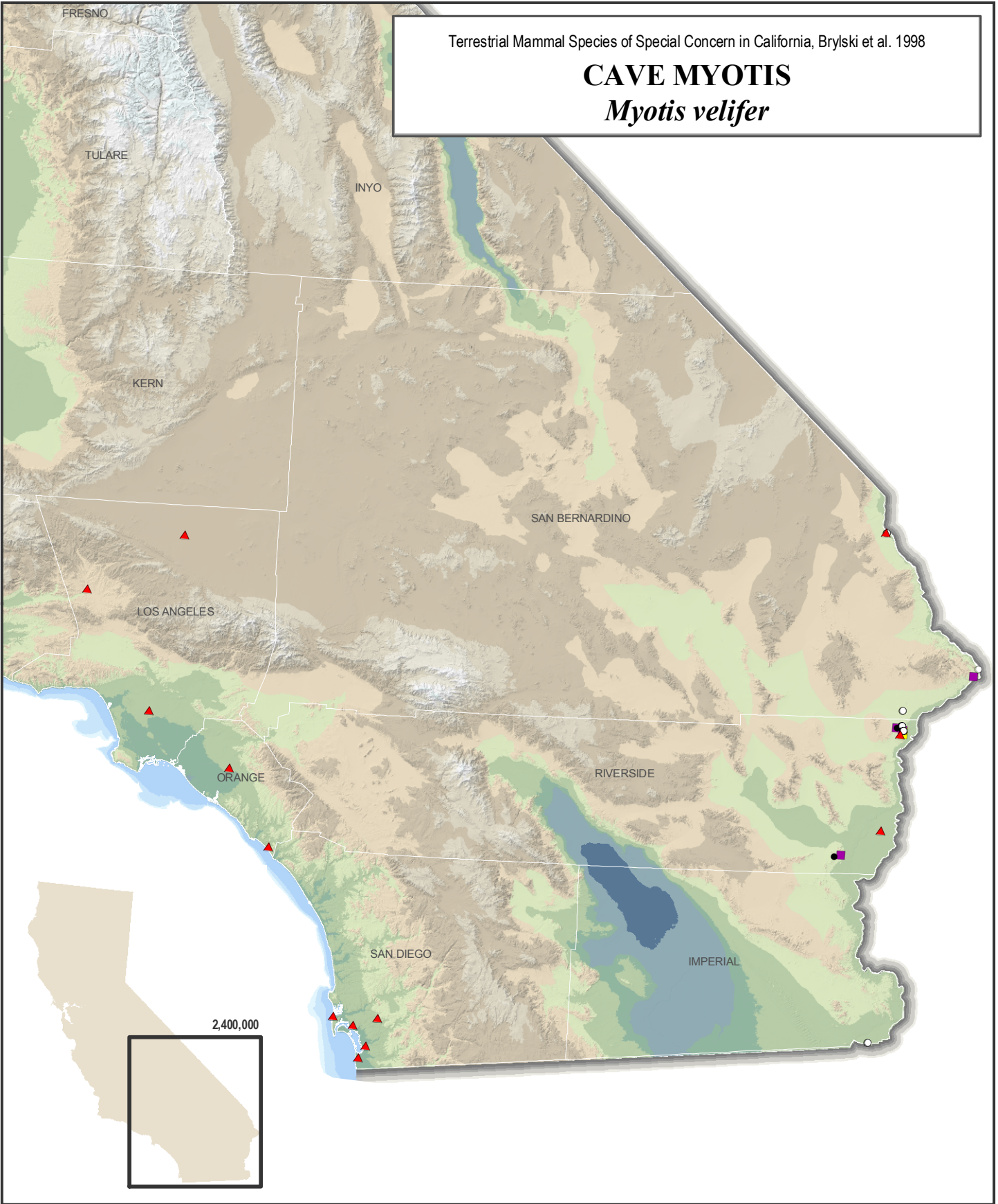
Management Recommendations: The two remaining *M. velifer* populations should be systematically monitored. Although P. Brown (pers. comm.) has examined these colonies sporadically, she has not had the opportunity to monitor them on a regular basis. Also, radiotracking studies to investigate foraging habitat should be conducted.

Steps need to be taken to protect the two remaining populations, both on BLM land. One site is currently protected by having no claimant and being unknown to all but a few researchers; the other might have an active claim. Renewed mining should be avoided at both sites.

The last forty years has seen a dramatic decline in bat abundance and diversity along the Colorado River. The situation is particularly acute for *M. velifer* because this species occurs nowhere else in California. This situation is, however, symptomatic of a larger issue, which is the loss of the native habitat in the Colorado River floodplain. State and Federal agencies should identify areas of ecological importance along the river, and undertake projects to restore the floodplain ecosystem.

CAVE MYOTIS

Myotis velifer



Locations verified by authors
(captures, observations, museum records)

- Post - 1978
- 1978 and before

- ▲ Constantine 1998
- CNDDB 1979 -1998
- CNDDB 1978 and before