

**Pocketed free-tailed bat, *Nyctinomops femorosaccus****Elizabeth D. Pierson & William E. Rainey*

**Description:** *Nyctinomops femorosaccus*, like all molossids, has a free tail which extends beyond the edge of the interfemoral membrane. It can generally be distinguished from the other three molossids which occur in California based on size or forearm length. This species, with a forearm length of 45-49 mm, and a weight of 10-14 g, is larger than *Tadarida brasiliensis* (forearm 36-46 mm, weight 11-15 g), and smaller than *Nyctinomops macrotis* (forearm 58-64 mm, weight 22-30 g) or *Eumops perotis* (forearm 75-83 mm, weight ca. 65 g) (Barbour and Davis 1969, Kumirai and Jones 1990, Schmidly 1991). It is closest in size to *T. brasiliensis*, and there is some overlap in forearm length between the two species. *N. femorosaccus* differs from *T. brasiliensis* in having its ears joined at the midline (a character which is common to all *Nyctinomops* species and *E. perotis*) (Constantine 1958). The ears meet, but are not joined, in *T. brasiliensis* (Constantine 1958, Barbour and Davis 1969). A shallow fold of skin on the uropatagium, near the knee (thus the name “pocketed free-tail bat”) is frequently difficult to find, and should not be relied upon as a distinguishing characteristic.

**Taxonomic Remarks:** *N. femorosaccus* is in the Family Molossidae. *N. femorosaccus* was first described by Merriam (1889) from a specimen found in Palm Springs, California. Although it was for many years known as *Tadarida femorosacca* (Barbour and Davis 1969), it was named *Nyctinomops femorosaccus* by Miller (1902), and that name has recently been reinstated (Freeman 1981, Koopman 1993). It is a monotypic species.

**Distribution:** This species ranges from southwestern Mexico through southwestern Texas, southern New Mexico, southcentral Arizona, and southern California (Hall 1981, Kumirai and Jones 1990).

This species is known historically from very few localities in California. The type specimen was from Palm Springs in Riverside County. Other localities were Borrego Palm Canyon, San Diego County (Neil 1940), and the vicinity of Suncrest, San Diego County (Krutzsch 1944a). Although colonies had been observed, there was no information on whether these colonies consisted of females and young. Thus it was not known based on these records whether the California populations were reproductive.

Recent surveys in California (Pierson and Rainey 1996b, c) suggest that while *N. femorosaccus* is likely confined to the southern third of the state, and is relatively uncommon, it is nevertheless more widespread in that region than was previously realized. In these recent surveys, positive identification of *N. femorosaccus*, via net captures, was obtained for two localities in San Diego County. Reproductive females were captured in Anza Borrego Desert State Park. Young, with partially open epiphyses, were captured in November 1994 at another site in San Diego County, providing evidence that the species raises young in southern California (K. Miner pers. comm.). An additional population, based on visual observations and acoustic records, was located in Painted Canyon, north of Mecca, Riverside County in August 1992. P. Brown (pers. comm.) in 1992 reported a *Nyctinomops* colony (most likely *femorosaccus*) in a large boulder near Lake Mathews, and possibly a colony in a canyon on Camp Pendleton. K. Miner (pers. comm.) has located additional roost sites in western San Diego County. *Nyctinomops* has been detected acoustically near the Chocolate and Cargo Muchacho mountains in Imperial County (P. Brown pers. comm.). Records obtained by the California Department of Health Services suggest *N. femorosaccus* could be expected anywhere in southern California south of the San Bernardino Mountains (D. Constantine pers. comm.).

**Life History:** Although very little is known specifically about the reproductive biology of *N.*

*femorosaccus*, it appears to follow the molossid pattern of breeding in the spring, with females giving birth to a single young in June and July (Kumirai and Jones 1990). Capture of young with only partially closed epiphyses in late November in San Diego County suggests that some young may be born as late as September (Pierson and Rainey 1996b, c).

Limited data are available on the diet of this species. Easterla and Whitaker (1972) in an examination of 13 stomachs, found the species to feed primarily on large moths (probably Sphingidae), but to include a number of flying insects in their diet, e.g., crickets (Gryllidae), grasshoppers (Tettigoniidae), flying ants (Formicidae), froghoppers (Cercopidae), and leafhoppers (Cicadellidae). The digestive tract of one *N. femorosaccus* from Arizona contained only Macrolepidoptera (probably hawk moths), and another from the same locality contained 85% Microlepidoptera and 15% Coleoptera (Ross 1967).

**Habitat:** This species appears to be confined primarily to arid lowland areas (Barbour and Davis, 1969, Schmidly 1991). In Big Bend National Park in Texas, it has been found only in desert shrub and river floodplain arroyo (Easterla 1973). It has been detected as high as 2,160 m elevation in pine-oak forest in Mexico (Kumirai and Jones 1990). In California it has been located only in the Lower and Upper Sonoran life zones (Krutzsch 1948), associated primarily with creosote bush and chaparral habitats. It is found primarily in association with prominent rock features -- very large boulder jumbles or rocky canyons.

*N. femorosaccus* is a crevice dwelling species, usually associated with high cliffs and rugged rock outcroppings (Barbour and Davis 1969), although it has also been found in caves (Dalquest and Hall 1947), and in buildings, e.g., a colony living under roof tiles in a building at the University of Arizona, Tucson (Gould 1961). Colony size may be relatively small. Krutzsch (1944b) reported 50-60 animals in a colony in Borrego Palm Canyon, Anza Borrego Desert State Park, San Diego County, although a colony of >100 has been located in San Diego County by K. Miner (pers. comm.).

Two roost sites were described by Krutzsch for California. The roost in Borrego Palm Canyon (Krutzsch 1944b, 1948) was in several crevices, on a southwest facing slope, about 3.6 m above the base of a cliff. One crevice was ca. 5 cm wide, and formed an irregular horizontal opening several feet long. At the Suncrest site (Krutzsch 1945, 1948) the bats were in a vertical crevice in a large granite boulder. The crack varied in width from 2.5 to 7.5 cm. *N. femorosaccus* inhabited the higher, narrower portion of the crack, and *E. perotis* was in the lower, wider portion.

Recently located roosts have all been in rock crevices (Pierson and Rainey 1996b, c). At one site the animals were in several vertical cracks, on a rock wall in a narrow canyon, about 4-5 m above the ground. Although they shared one crack with a nursery roost of *E. perotis*, they appeared to be roosting separately. At another site they were in a dry, narrow, rocky canyon, in a large horizontal crack, beneath an overhang, ca. 5 m above the ground. At a San Diego County site, animals presumed to be *N. femorosaccus* emerged from a number of cracks on the cliff face (K. Miner pers. comm.). P. Brown (pers. comm.) located a roost under an exfoliating slab in a large granite boulder. The slope was such that the roost was at least 4 m above the ground.

This species frequently makes audible calls in and around the roost at emergence (Krutzsch 1944, 1948, Pierson and Rainey 1996b, c; K. Miner pers. comm.). At several sites animals have been observed at emergence swooping back and forth, calling to each other with a characteristic intense "chatter" for a number of minutes, before leaving the roost area. The literature indicates that this species leaves the roost well after dark (Gould 1961). In California, animals have been observed

leaving the roost after dark in the summer, but well before dark in November.

Although there are not enough records for this species from California to document seasonal patterns, the species likely occurs year round. Kruttsch (1948) has records from March, May, July and August. Recent records from San Diego County from late November suggests the species overwinters there (Pierson and Rainey 1996b, c). The species is present year-round in southern Arizona (Gould 1961, Hoffmeister 1986).

**Status:** Class II. Recent surveys concluded the species has a restricted distribution in southern California, and is rare to uncommon, but breeding populations do exist within the state.

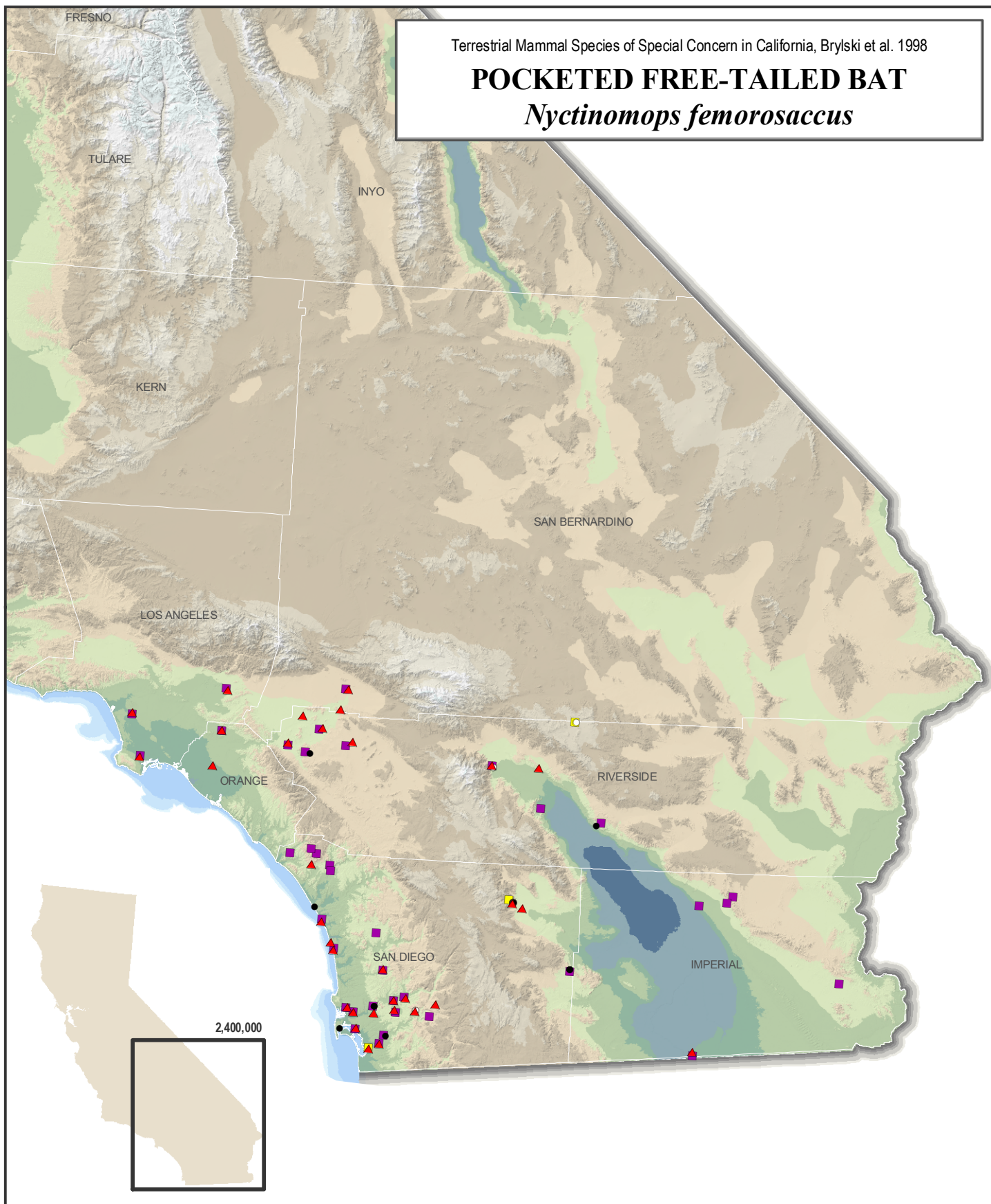
Alterations or disturbance of cliff habitat (i.e., water impoundment projects, highway projects, and recreational climbing) could potentially affect this species. Two roosts in San Diego County are in close proximity to reservoirs. Not enough is known regarding the habitat requirements of this species to identify other potential threats, particularly those which might affect foraging habitat.

**Management Recommendations:** Additional surveys for this species (which could be conducted in the context of surveys for other species) are urgently needed, especially in the canyon areas of southern California (San Diego, Imperial and Riverside counties) to determine both spatial and temporal distribution, and to determine habitat requirements. Acoustic sampling may be the most efficient and effective method of detecting the presence of this species in an area. Like other molossids, however, this species has a variable vocal repertoire, and more extensive investigation of call characteristics needs to be conducted before a protocol can be established for distinguishing this species from *N. macrotis* and *T. brasiliensis*. Attempts should be made to identify more maternity sites, and to ensure that key maternity sites are protected.

Terrestrial Mammal Species of Special Concern in California, Brylski et al. 1998

## POCKETED FREE-TAILED BAT

*Nyctinomops femorosaccus*



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

- Post - 1978
- 1978 and before

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