

A STATUS REVIEW OF THE ARIZONA SHREW IN SOUTHEASTERN ARIZONA

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INTRODUCTION

The Arizona shrew (*Sorex arizonae*) is one of five species of *Sorex* (long-tailed shrews) found in Arizona. At one time, all long-tailed shrews from southeastern Arizona were considered vagrant shrews (*Sorex vagrans*). However, after analyzing morphological characteristics of various long-tailed shrew specimens from Arizona, Diersing and Hoffmeister described the Arizona shrew as a new species in 1977. It was reported from eight locations in the Huachuca, Santa Rita, and Chiricahua Mountains, with the type specimen having been collected at the upper end of Miller Canyon in the Huachuca Mountains (Hoffmeister 1986 and Simons et al. 1990). Since the description of this species, little has been learned about its status, population trends, activity patterns, or habitat needs. Due to this lack of information, the U.S. Fish and Wildlife Service (USFWS) listed the Arizona shrew as a Category 2 candidate species in December 1982. It is also included on the Arizona Game and Fish Department's (AGFD) list of **Threatened Native Wildlife in Arizona** (AGFD 1988), as a candidate species. As a result, matching funds were made available to the AGFD through Section 6 of the Endangered Species Act to determine the species' distribution and habitat requirements throughout its historical range in Arizona.

The primary objective of the 1992-1993 study was to verify the continued existence of the Arizona shrew in known locations and to identify any new sites. Secondary objectives included the collection of data on habitat requirements in relation to water and seasonal activity patterns associated with the arrival of summer rains.

METHODS

Survey work was conducted in several canyons of the Huachuca, Chiricahua, Whetstone, and Dragoon Mountains (Fig. 1). These mountain ranges include four of the six historical Arizona shrew locations reported in Hoffmeister (1986). After documenting shrew occupation at historical sites, a search image was developed and the trapping technique described below was applied to other areas with similar habitat.

Trapping efforts were concentrated near seasonal or perennial water courses. Two gallon (7.6 liter) plastic buckets were buried to the rim and the lids were elevated above the buckets two to five cm, with rocks or woody debris. These pitfalls were placed in lines perpendicular to the water course at distances ranging from 0 to 75 m, and in most cases, were set next to downed logs. Information collected at each capture site included exact location, slope, aspect, canopy closure, and habitat description. If possible, body weight and lengths of entire animal, tail, right ear, and hind foot were recorded for all specimens (see Appendix 1).

Interviews of knowledgeable people from Fort Huachuca, Ramsey Canyon Preserve, University of California Davis, and AGFD were conducted to identify efficient trapping techniques, meteorological and fire history, land use, and other management history pertinent to this review.

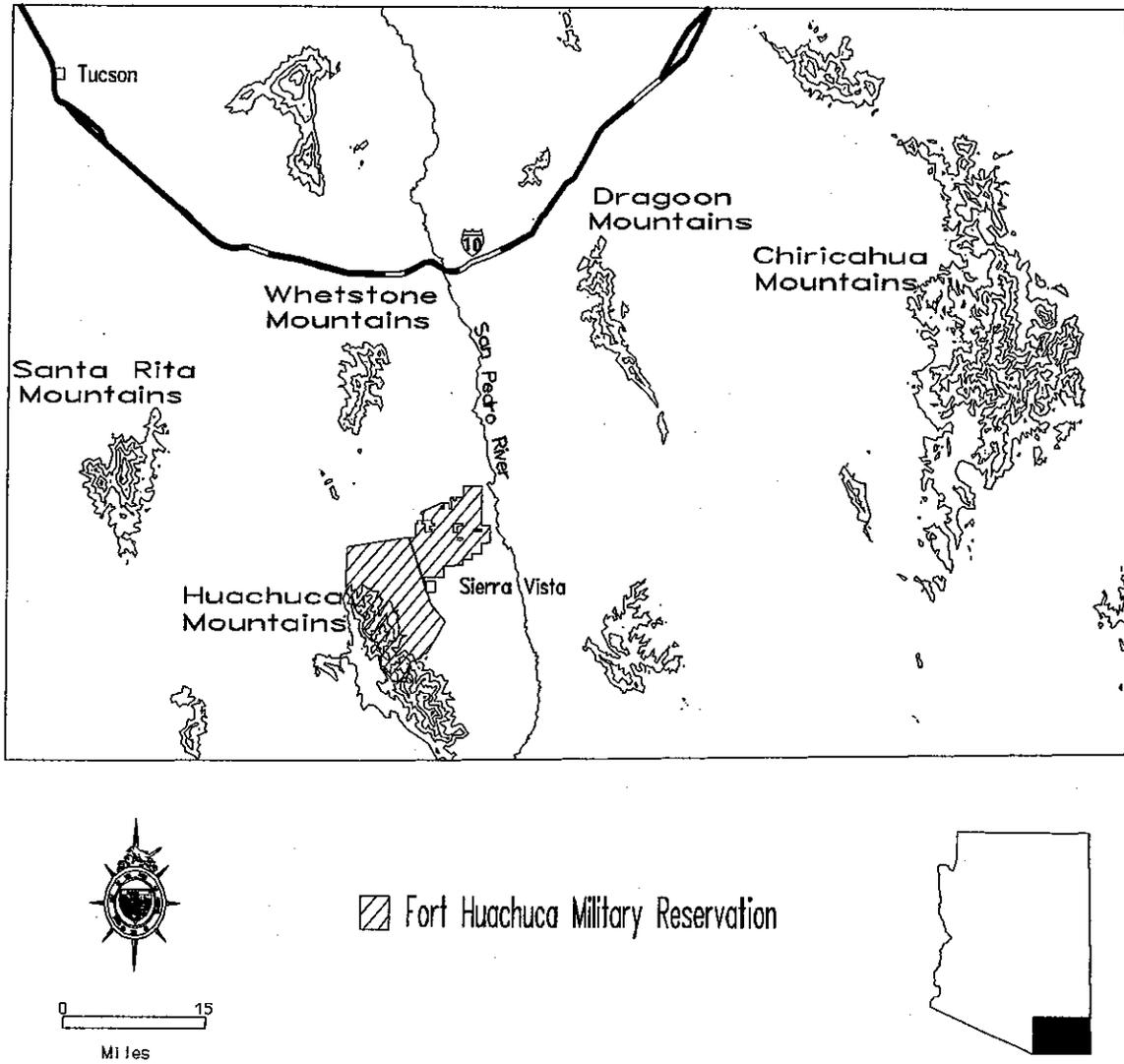


Figure 1. Mountain ranges surveyed for *Sorex arizonae* in southeastern Arizona.

RESULTS

Trapping

Field work was conducted from 27 May to 28 October 1992 and 5 May to 18 November 1993. The localities and dates where *S. arizonae* were captured are shown in Table 1. All shrews captured were collected as voucher specimens and temporarily held by AGFD prior to donation for scientific collections.

Similar to the results of Szaro et al. (1988), shrews outnumbered all other mammalian captures in pitfalls. Forty-four shrews were captured in 10,374 trap nights including thirty Arizona shrews, thirteen dusky shrew (*Sorex monticolus*), and one desert shrew (*Notiosorex crawfordi*). Other mammals trapped include brush mice (*Peromyscus boylii*), deer mice (*Peromyscus maniculatus*), rock mice (*Peromyscus difficilis*), and cliff chipmunk (*Eutamias dorsalis*). Other animal species caught during the survey or identified in the area were Clark's spiny lizard (*Sceloporus clarki*), Yarrow's spiny lizard (*Sceloporus jarrovi*), Madrean alligator lizard (*Gerrhonotus kingi*), black-tailed rattlesnake (*Crotalus molossus*), mountain kingsnake (*Lampropeltis pyromelana*), and whipscorpion (*Mastigoproctus giganteus*).

Habitat Evaluation

Arizona shrews trapped during the 1992-1993 study were associated with Madrean evergreen woodlands and Petran montane conifer forests (Benson and Darrow 1981). These two life zones occur at elevations between 1372 and 2134 m. Trees are often spaced widely with an understory of various species of shrubs and grasses. Annual precipitation ranges between 36 and 46 cm. Dominant species include desert scrub oak (*Quercus turbinella*), Mexican blue oak (*Quercus oblongifolia*), white-leaf oak (*Quercus hypoleucoides*), Emory oak (*Quercus Emoryi*), Arizona cypress (*Cupressus arizonica* and *C. glauca*), Arizona madrone (*Arbutus arizonica*), Chihuahua pine (*Pinus chihuahuana*), Arizona sycamore (*Platanus racemosa*) and three-leaf pinyon (*Pinus cembroides*). The aspect of all shrew collection sites ranged from 22 to 265° while slope varied from 2 to 34%. Elevations ranged from 1730 to 2027 m. Canopy closure ranged from 20 to nearly 100%.

The four trap sites (middle and lower Huachuca Canyon, Soren Pass, and French Joe Spring) that did not produce any Arizona shrews differed slightly from other sites in their absence of downed logs, forest debris, lack of canopy, and vegetation type (see Table 1). However, slope and aspect were similar between all trap sites. In the Huachuca canyon, the differences mentioned above were caused by man. Evidently in 1991, Fort Huachuca Forestry personnel changed the understory composition in lower and middle Huachuca Canyon sites by removing fallen or dead-standing logs, thinning live trees, and pruning lower limbs (Sheridan Stone pers. com. 1992).

The Dragoon Mountains did not appear to have much habitat suitable for Arizona shrews. There were few fallen logs, shallow leaf litter, and very little canopy closure at Soren Pass. Access to

Table 1. Localities, dates, average distance from water, and trap nights for all shrews captured in southeastern Arizona, 1992-1994.

| Location | Dates | Average capture distance from water | Trap nights | Elevation | # of shrews caught |
|--|--|-------------------------------------|-------------|-----------|--------------------|
| Huachuca Mountains | | | | | |
| McClure Springs [REDACTED] | 07/31/92 thru 08/18/92 | 26 m | 727 | 1928 m | 8 ¹ |
| Blacktail Canyon-upper [REDACTED] | 09/17/92 thru 09/29/92 | 21 m | 154 | 2027 m | 5 |
| Blacktail Canyon-lower [REDACTED] | 10/06/92 thru 10/21/92 | > 50 m | 290 | 1760 m | 3 |
| Huachuca Canyon-upper [REDACTED] | 9/29/92 thru 10/28/92 | 5 m | 290 | 1920 m | 1 |
| Huachuca Canyon-middle [REDACTED] | 08/19/92 thru 09/29/92 | No Captures | 778 | 1750 m | 0 |
| Huachuca Canyon-lower [REDACTED] | 09/29/92 thru 10/28/92 | 0 | 58 | 1730 m | 1 ² |
| Copper Canyon [REDACTED] | 05/13/93 thru 11/18/93 | 5 m | 2148 | 1890 m | 1 |
| Ramsey Canyon [REDACTED] | 10/01/92 thru 10/28/92 | 5 m | 392 | 1745 m | 5 |
| Chiricahua Mountains | | | | | |
| Rucker Canyon [REDACTED] | 05/05/93 thru 08/04/93 | 23 m | 1704 | 1896 m | 1 |
| Pine Canyon [REDACTED] | 08/05/93 thru 08/31/93 | 5 m | 312 | 1899 m | 17 ³ |
| East Turkey Creek [REDACTED] | 07/09-12/92 08/10-14/92 08/14-10/22/92 | 2 m | 284 | 1917 m | 2 ⁴ |
| Whetstone and Dragoon Mountains | | | | | |
| French Joe Springs [REDACTED] | 9/01/93 thru 11/18/93 | No Captures | 936 | 1634 m | 0 |
| Soren Pass [REDACTED] | 05/25/93 thru 11/18/93 | No Captures | 2301 | 1975 m | 0 |

¹*Sorex arizonae* except as noted

²*Notiosorex crawfordi*

³Twelve of these captures were *Sorex monticolus*

⁴One of these captures was a *Sorex monticolus*

upper elevations is limited and habitat suitable for Arizona shrews may be present in these remote locations. The Whetstone Mountains had a narrow riparian corridor that appeared as though it could support a population of Arizona shrews but none were collected. However, this site (French Joe Springs) was trapped late in the year which may have effected trapping success.

DISCUSSION

Arizona shrews have been recognized as a unique species for 17 years, and within that time, only 15 specimens have been collected. The lack of collections could be related to biologists using Sherman live traps for small mammal surveys instead of pitfalls. Shrews are rarely captured using conventual box traps and Maddock (1992) found mammals weighing less than 25 grams are more frequently caught in pitfalls rather than box traps. Even though shrews are more likely to be captured using pitfalls, Simons et al. (1990) emphasized, surveys for this species should be viewed cautiously in the case of negative results because they are not always captured in pitfalls, even at known localities.

The 1992-1993 trapping effort produced 30 Arizona shrews, doubling the number of known specimens, and affirming that populations still occupies at least two historic and six new locations. This success also suggests that specialized trapping techniques such as pitfalls can yield reasonable success rates for this species.

Little is known about the habitat requirements of Arizona shrews. According to Simons et al. (1990), specimens collected from Fort Huachuca were associated with water. They suggest that *S. arizonae* may be limited to higher elevations or at lower elevations adjacent to surface water. This study confirms that Arizona shrew habitat may exist near surface water but water may not be the most important factor. Trapping success was highest at intermediate distances from water (Fig. 2). We suggest that downed woody debris associated with mature forests may be a more important component of preferred habitat. For example, in Ramsey Canyon at an elevation of 1745 m, five Arizona shrews were caught in an average of 78 trap nights. This site had a constant flow of water and downed woody debris. However, in lower Blacktail Canyon at an elevation of 1760 m, three Arizona shrews were taken along downed logs in an average of 97 trap nights. At this site, the nearest surface water is greater than 50 meters away. Compare the results of these two trap sites to middle Huachuca Canyon at an elevation of 1750 m, where there was a constant flow of water and no downed woody debris. A total of 778 trap nights were expended at this site but no shrews of any species were caught (Fig. 3). Again, one of the most obvious differences between these sites is the amount of woody debris instead of the availability of water.

Another factor to consider when trapping Arizona shrews is the time of year. Trapping efforts were conducted from May until November but captures were not recorded until August. This coincided with the peak of summer rains. Similar to other shrews in southern or tropical regions, these seasonal rains may trigger breeding and dispersal for Arizona shrews (Churchfield 1990). This might include

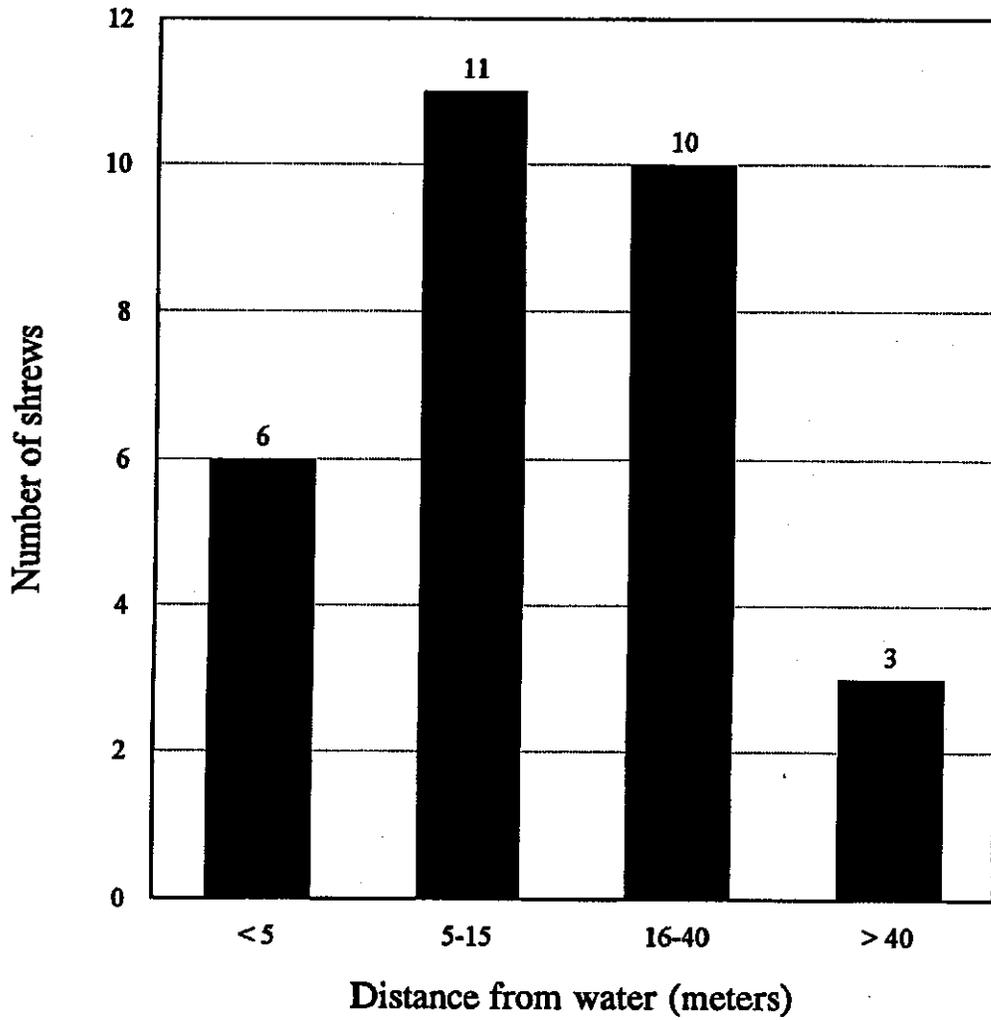


Figure 2. Capture distance from water for *Sorex arizonae*.

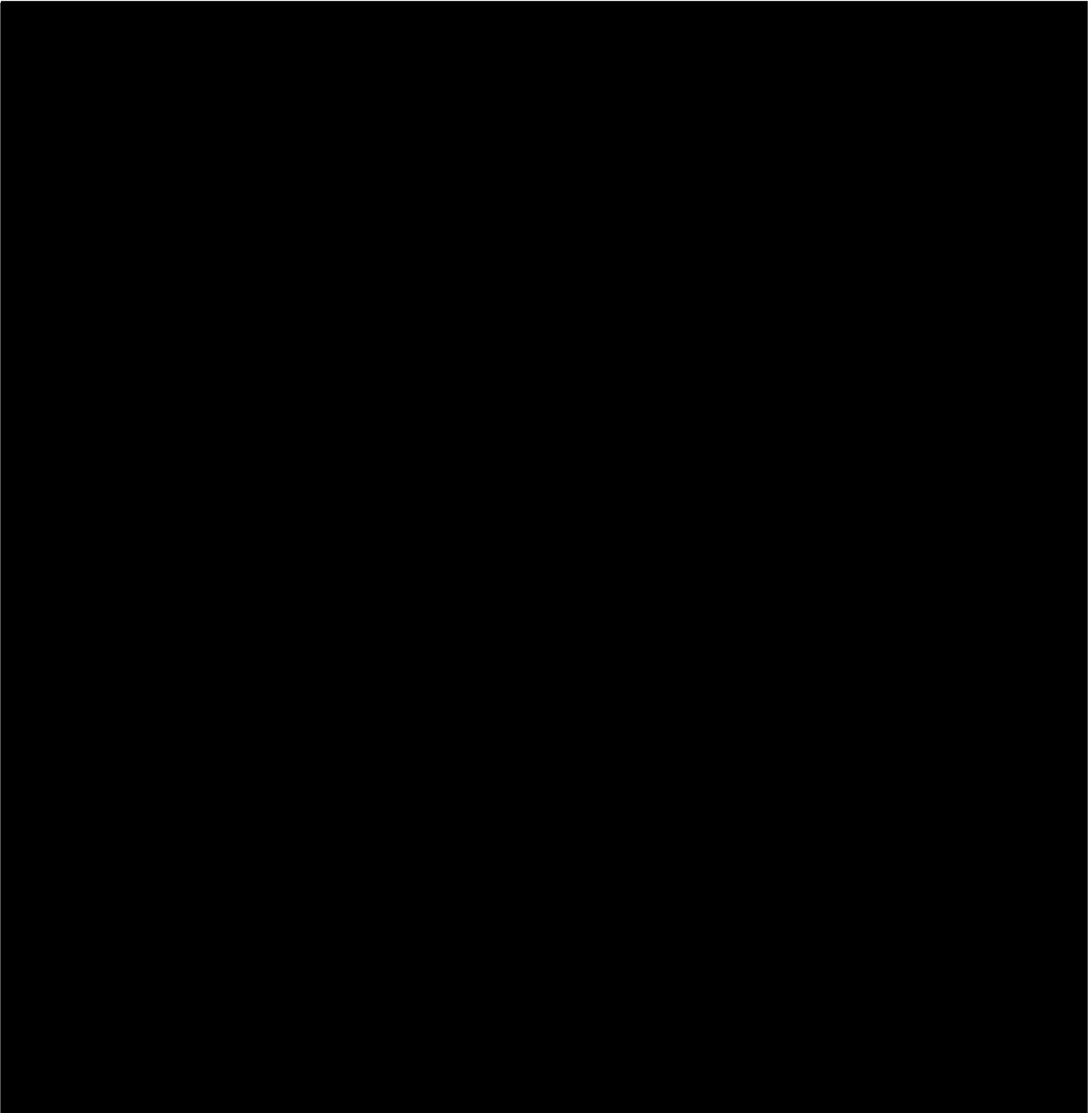


Figure 3. Collection sites of *Sorex arizonae* in Huachuca Mountains.

increased activity on the ground surface, the abandonment of home ranges, and eventually, dispersal of young. It may also explain the ratio of male to female captures (see Appendix 1). Males tend to wander in search of females and cross into unfamiliar territories making them more susceptible to capture (Churchfield 1990). A lactating Arizona shrew was caught on 17 September 1992 documenting that this species does indeed breed at this time of year.

RECOMMENDATIONS

Because the habitat requirements for Arizona shrews are not yet fully understood, measure soil moisture and temperature, document any forest management history, and determine fire history at occupied sites. Also, long-term monitoring along with vegetation sampling at known sites may clarify the role of habitat succession and colonization of disturbed areas in regards to shrew distribution.

Describe capture sites in terms of distance from water, elevation, canopy closure, and type of ground cover to determine preferred habitat for Arizona shrews.

Prescribed burns to lessen fuel loads should be conducted in the spring or early summer when Arizona shrews are still occupying home territories. Shrews will be able to escape fires by taking refuge in underground burrows found within their territories.

Fencing directly around spring heads to exclude livestock is inadequate for protecting potential Arizona shrew habitat. Fencing activity by managing agencies should start at least five meters from the water source and include any downed logs as well as suitable habitat found down stream from the spring.

Apply specific trapping techniques for shrews as described by Simons et al. (1990), and this study, to similar habitat in other southeastern Arizona mountain ranges. Any trapping efforts to determine species occurrence should correspond with summer rains. This study has found that if Arizona shrews are sampled during other times of year they may not be captured.

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APPENDIX

| Appendix 1. Summary of Arizona shrew (<i>Sorex arizonae</i>) captures in 1992-93 ¹ . | | | | | | | |
|---|----------|--------------|-------------|----------------|-----------|-------|-----|
| AGFD # | Date | Total length | Tail Length | Right hindfoot | Right ear | Mass | Sex |
| MCS 1 | 7/30/92 | 93.2 mm | 40.8 mm | 11.3 mm | 6.8 mm | 4.3 g | ♂ |
| MCS 2 | 8/3/92 | 99 mm | 42 mm | 11 mm | 7 mm | 2.6 g | ♂ |
| MCS 3 | 8/3/92 | 106 mm | 42 mm | 12 mm | 7 mm | 3.8 g | ♂ |
| MCS 4 | 8/14/92 | 101 mm | 44 mm | 11.9 mm | 7 mm | 3.3 g | - |
| MCS 5 | 8/14/92 | 109 mm | 43 mm | 12.8 mm | 7.4 mm | 5.2 g | ♀ |
| MCS 6 | 8/14/92 | 101 mm | 43.5 mm | 12.2 mm | 7 mm | 3.6 g | ♂ |
| MCS 7 | 8/14/92 | 98 mm | 42 mm | 12.2 mm | 6.5 mm | 3.6 g | - |
| MCS 8 | 8/15/92 | 101 mm | 44 mm | 12 mm | 7.3 mm | 3.7 g | ♂ |
| ETC 1 | 8/13/92 | 98 mm | 42 mm | 12 mm | 8 mm | 3.3 g | ♂ |
| UBC 1 | 9/17/92 | 109 mm | 44 mm | 12.5 mm | 7.3 mm | 4.3 g | ♀ |
| UBC 2 | 9/22/92 | 92 mm | 39.5 mm | 11.3 mm | - | - | - |
| UBC 3 | 9/27/92 | 108 mm | 48.5 mm | 12.6 mm | 7.1 mm | 3.4 g | ♀ |
| UBC 4 | 9/29/92 | 98.9 mm | 42 mm | 11 mm | 7.5 mm | 3.6 g | - |
| RC 1 | 10/1/92 | 103 mm | 45 mm | 12.2 mm | 7.1 mm | - | - |
| RC 2 | 10/2/92 | 97 mm | 41 mm | 12 mm | 6.9 mm | 3.1 g | ♂ |
| RC 3 | 10/3/92 | 104 mm | 45 mm | 12.6 mm | 7.8 mm | 3.1 g | ♂ |
| RC 4 | 10/3/92 | 101 mm | 40.6 mm | 12.1 mm | 7.2 mm | 2.9 g | - |
| RC 5 | 10/28/92 | 101 mm | 43 mm | 12.5 mm | 7.1 mm | 3.6 g | ♂ |
| LBC 1 | 10/6/92 | 105 mm | 41 mm | 12.6 mm | 6.9 mm | 3.3 g | ♂ |
| LBC 3 | 10/21/92 | 95 mm | 41 mm | 12 mm | 6 mm | 2.6 g | ♀ |
| CC 1 | 9/1/93 | 109 mm | 44 mm | 12.3 mm | - | - | - |

¹Nine specimens caught in Pine, Rucker, and Blacktail Canyons were too badly decomposed for measurement.