

**ARIZONA GAME AND FISH DEPARTMENT  
HERITAGE DATA MANAGEMENT SYSTEM**

**Animal Abstract**

**Element Code:** AMAFF11220

**Data Sensitivity:** No

**CLASSIFICATION, NOMENCLATURE, DESCRIPTION, RANGE**

**NAME:** *Microtus mexicanus*  
**COMMON NAME:** Mexican Vole, Mogollon Vole  
**SYNONYMS:** *Microtus mogollonensis*  
*Microtus fulviventer*  
*Arvicola phaeus*  
*Arvicola mogollonensis*  
**FAMILY:** Cricetidae

**AUTHOR, PLACE OF PUBLICATION:** de Saussure, H., 1861. Orthoptera nova americana: Diagnoses praeliminares.(Series IIa).

**TYPE LOCALITY:**

**TYPE SPECIMEN:**

**TAXONOMIC UNIQUENESS:** Taxonomy of both species and subspecies is contested for this organism. Recent data indicates the original classification of the subspecies *Microtus mexicanus hualapaiensis*, *M. m. navaho*, and *M. m. mogollonensis* was erroneous, and the Hualapai Mexican Vole (*M. m. hualapaiensis*) was therefore delisted from the U.S. Fish and Wildlife Endangered Species Act on June 23, 2017 (USDI FWS 2017). The majority (i.e., five out of seven) of scientists who reviewed the "Hualapai vole (*Microtus mogollonensis hualapaiensis*) Genetic Analysis" report by Busch et al. (2001) determined that Hualapai Mexican voles (*Microtus mexicanus hualapaiensis*) are not genetically distinct from other vole subspecies in Arizona. The best available science no longer supports the segregation of *M. mexicanus* into subspecies in Arizona (USDI FWS 2017).

Some authorities consider voles in Arizona, New Mexico, and Texas to be *Microtus mogollonensis* rather than *M. mexicanus* (Frey and LaRue 1993, Frey 2009). The U.S. Fish and Wildlife Service noted that many reviewers and documents referenced while resolving subspecies taxonomy refer to voles in Arizona as *M. mogollonensis*. Musser and Carleton (in Wilson and Reeder 2005) noted the need for further phylogeographic studies of the *M. mexicanus* complex and kept *mogollonensis* in *M. mexicanus*. ITIS (2021) indicates that *M. mogollonensis* is an invalid taxon, and the U.S. Fish and Wildlife Service determined to refer to this taxon as *M. mexicanus* in their rule delisting the subspecies (USDI FWS 2017). The Arizona Game and Fish Department's Heritage Data Management System follows U.S. Fish and Wildlife Service taxonomy.

**DESCRIPTION:** Small, cinnamon-brown, mouse-sized mammal with a short tail and long fur that nearly covers its small round ears. It appears thickset, blunt-nosed and short-legged. The pelage is coarse and lax; upper parts cinnamon buff to dark cinnamon brown, with a mixture of black hairs resulting in grizzled-brownish color; sides paler; venter washed with grayish buff to cinnamon, sometimes whitish; tail slightly bicolored, dusky to dark brown above, paler below; incisive foramina short, wide, and truncate posteriorly. The mean total length ranges between 137.2 - 141 mm (5.35-5.5 in), tail 30.2 - 32 mm (1.2-1.25 in), and hind foot 19.6 - 22 mm (0.76-0.86 in); weight averages around 28 g. Two pair of mammary glands, 1 pair pectoral and 1 inguinal. The molar teeth (three on each side of each upper and lower jaw for a total of 12) are rootless, ever-growing and flat-crowned with enamel patterns of alternating triangles. Second upper molar with only 4 lakes posterior, palatal margin grooved or acutely notched; skull is short, wide, relatively angular and sculptured.

**AIDS TO IDENTIFICATION:**

**ILLUSTRATIONS:** Color photo (Whitaker, Jr. 1996: plate 122)  
Color photo (Kime 1995: p. 19)  
B&W drawing (Schmidly and Martin 1977: p. 122)

**TOTAL RANGE:** Southern Rocky Mountains southward into the Sierra Madre of Mexico to central Oaxaca Mexico (Tamarin 1985).

**RANGE WITHIN ARIZONA:** Plateaus and mountains of Arizona.

**SPECIES BIOLOGY AND POPULATION TRENDS**

**BIOLOGY:** Unlike most other small rodents, voles are active day and night, year-round. They have two daily activity peaks, one at mid-day and the other in early evening (Kime 1995). Vole runways are 1.5 to 2 inches wide, extending from one burrow entrance to another, and to feeding sites. Presence of vole sign at trap locations in the Hualapais' during the 1991 survey, differed slightly depending on the amount of vegetation understory including grass cover, forbs, leaf litter, rocks, logs, and soil content. When moist soil and moderate grass cover prevailed, runways were very conspicuous. When heavy leaf litter was present, sizable portions of the runways were usually concealed, making them very difficult to locate (Kime et al 1992). Potential predators include a variety of mammalian, avian and reptilian species.

**REPRODUCTION:** Have only four mammae, rather than the normal complement of eight for the genus, which limits the number of young produced. The average number of young ranges from 2-3 (2-5 in Whitaker, Jr. 1996), with peak pregnancy rates highest during the spring and summer, and lowest in the winter (Hilton 1992). Reproductive activities occur throughout most of year, but primarily May-October; about 30-40 days between litters (Whitaker, Jr.

1996). Its globular nest, constructed of dried grass and forbs, is placed in a dense clump of vegetation, under a log or rock, in a depression on the ground, or in a chamber in its burrow.

Populations and distribution of *Microtus* in the Hualapais may be influenced by fresh green vegetation which stimulates breeding. Thus, during times of drought or habitat degradation, the lack or poor quality of fresh green vegetation could possibly result in a low level of successful reproduction. Conversely, increased fresh plant growth during periods of increased precipitation could contribute to the increase and expansion of vole populations (Spicer et al 1985).

Based on study results for the species, conducted in Flagstaff, Arizona, breeding was not seasonally restricted, but was restricted in correspondence with adverse environmental conditions such as subfreezing daytime temperatures or snow cover (Hilton 1992).

**FOOD HABITS:** Grasses, forbs, and other plants.

**HABITAT:** Primarily associated with dry grass/forb habitats in Ponderosa Pine dominated forest. Studies conducted in 1991 by the Arizona Game and Fish Department (AGFD), suggests that this species uses dry, grassy areas on moderate to steep slopes with north aspects (Kime et al 1992). According to the Fish and Wildlife Service (1991), they are now found only in moist, grass/sedge habitats along permanent and semipermanent waters (such as springs and seeps), but may be capable of occupying drier areas when grass/forb habitats are available. More recent studies (Kime 1995) indicate their preferred habitat is grassy areas usually in or adjacent to spruce-fir, ponderosa pine, or Gambel's oak stands at higher elevations (above 6000 feet), and pinyon-juniper woodland or sagebrush at lower elevations (below 6000 feet). In the Hualapai Mountains, the aspect of all vole areas ranged from 290 to 114E, while slopes varied from 0 to 41 percent (Kime et al 1994).

According to Tamarin (1985) and Kime et al (1994), habitat factors that appear most important in influencing local distribution of *Microtus* are: vegetation type, moisture conditions, and amount of cover. Due to the fluctuation of these habitat factors, site occupancy may be seasonal. This observation is based off of studies conducted in 1991 (Kime et al 1994).

**ELEVATION:** 939 m - 2560 m (3,080 - 8,400 feet).

**PLANT COMMUNITY:** Primarily associated with dry grass/forb habitats in Ponderosa Pine dominated forest. Dominant species at most of the recent collection sites (Kime et al 1994) in the Hualapai Mountains include ponderosa pine (*Pinus ponderosa*), Gambel oak (*Quercus gambelii*), common hoptree (*Ptelea angustifolia*), New Mexican locust (*Robinea neomexicana*), Quaking aspen (*Populus tremuloides*), mountain snowberry (*Symphoricarpos oreophilus*), columbine (*Aquilegia chrysantha*), Arizona black walnut (*Juglans major*), canyon grape (*Vitis arizonica*), fendlerbush (*Fendlera rupicola*), goldenrod (*Solidago* spp.), *Baccharis* spp., and a perennial mutton grass (*Poa* spp.).

**POPULATION TRENDS:****SPECIES PROTECTION AND CONSERVATION**

**ENDANGERED SPECIES ACT STATUS:** No Status (USDI, FWS 2017)  
[PDL (USDI, FWS 2015) (as *M. m. hualapaiensis*)]  
[LE USDI, FWS 1987, without critical habitat (as *M. m. hualapaiensis*)]

**STATE STATUS:** 3 (AZGFD, AWCS 2022)  
[1B (AGFD SWAP 2012); [1A (AGFD SWAP 2012) (as *M. m. hualapaiensis*)]

**OTHER STATUS:**

**MANAGEMENT FACTORS:** Grazing and recreation use and development are the primary threats to the vole and its habitat (USDI FWS 1991).

**PROTECTIVE MEASURES TAKEN:**

**SUGGESTED PROJECTS:** Further phylogeographic studies of the *M. mexicanus* complex are needed.

**LAND MANAGEMENT/OWNERSHIP:** BIA - Hualapai Reservation; BLM – Kingman Field Office; USFS – Prescott National Forest; State Land Department; Mojave County – Hualapai Mountain County Park; Private.

**SOURCES OF FURTHER INFORMATION****REFERENCES:**

- Arizona Game and Fish Department. 1988. Threatened Native Wildlife in Arizona. AZ Game and Fish Department Publication. Phoenix, Arizona. 32 pp.
- Arizona Game and Fish Department. 1996, in prep. Wildlife of special concern in Arizona. Arizona Game and Fish Department Publication. Phoenix, Arizona. 32 pages.
- Arizona Game and Fish Department. 2012. Arizona's State Wildlife Action Plan 2012-2022. Phoenix, AZ.
- Arizona Game and Fish Department. 2022. Arizona Wildlife Conservation Strategy: 2022-2032. Arizona Game and Fish Department, Phoenix, Arizona. 378 pages.
- Author unknown. 1986. Distributions and Habitats of Voles in Southeastern Colorado and Northeastern New Mexico. The Southwest Naturalist. Vol. 31 No. 2.
- Burt, W.H., and R.P. Grossenheider. 1976. Peterson Field Guides: A field guide to the Mammals, North America north of Mexico. Third Edition. Houghton Mifflin Co., Boston. P. 188.

- Busch et al. 2001. Hualapai vole (*Microtus mogollonensis hualapaiensis*) Genetic Analysis. Unpublished report.
- Cockrum, E.L. 1960. The recent mammals of Arizona: their taxonomy and distribution. The University of Arizona Press. Tucson, Arizona. Pp. 209-210.
- Frey, J.K., 2009. Genetics of allopatric populations of the montane vole (*Microtus montanus*) and Mogollon vole (*Microtus mogollonensis*) in the American Southwest. *Western North American Naturalist*, 69(2), pp.215-222.
- Frey, J.K., and T.L. Yates. 1992. Hualapai Mexican Vole (*Microtus mexicanus hualpaiensis*), genetic analysis. Preliminary report to Arizona Game and Fish Department. University of New Mexico, Albuquerque. Pp. 1-7.
- Frey, J.K., and C.T. LaRue. 1993. Notes on the distribution of the Mogollon Vole (*Microtus mogollonensis*) in New Mexico and Arizona. *The Southwestern Naturalist* 38(2):176-178.
- Frey, J.K., and T.L. Yates. 1993. Hualapai Mexican Vole (*Microtus mexicanus hualpaiensis*), Genetic Analysis. Final Report. University of New Mexico. Albuquerque, New Mexico. Pp. 1-26.
- Hall, E.R. 1981. *The Mammals of North America*. Vol. 2, Second Edition. John Wiley & Sons. New York, New York. P. 814.
- Hilton, B.L. 1992. Reproduction in the Mexican Vole, *Microtus mexicanus*. *Jour. Mamm.* 73(3): 586-590.
- Hoffmeister, D.F. 1986. *Mammals of Arizona*. University of Arizona Press. Tucson, Arizona. Pp. 441-443.
- Integrated Taxonomic Information System. 2021. Retrieved [December 13, 2021], from the Integrated Taxonomic Information System (ITIS), [www.itis.gov](http://www.itis.gov), CC0 <https://doi.org/10.5066/F7KH0KBK>
- Kime, K., W.E. Van Pelt, and D.W. Belitsky. 1992. Status of the Hualapai Mexican Vole in Northwestern Arizona. Arizona Game and Fish Department, Nongame and Endangered Wildlife Program. Phoenix, Arizona. Pp. 1-13.
- Kime, K., W.E. Van Pelt, and D.W. Belitsky. 1994. A Status Review of the Hualapai Mexican Vole in Northwestern Arizona. Arizona Game and Fish Department, Nongame and Endangered Wildlife Program. Phoenix, Arizona. Tech. Rep. 42, pp. 1-23.
- Kime, K.A. 1995. Life on the runway, Arizona's Mexican Voles. *Wildlife Views*. Arizona Game and Fish Department Publication. Phoenix, Arizona. Pp. 19-20.
- NatureServe Explorer: An online encyclopedia of life [web application]. 2001. Version 1.6. Arlington, Virginia, USA: NatureServe. Available: <https://explorer.natureserve.org/> (Accessed: December 11, 2003).
- Navajo Nation Fish and Wildlife Department. 2000. Endangered Species List for the Navajo Nation. Navajo Nation, Arizona. pp. 3.
- Navajo Nation Fish and Wildlife Department. 2008. Navajo Endangered Species List.
- Schmidly, D.J., and C.O. Martin. 1977. *The Mammals of Trans-Pecos Texas: including Big Bend National Park and Guadalupe Mountains National Park*. Texas A & M University Press. College Station, Texas. P. 122.
- Spicer, R.B., R.L. Glinski and J.C. deVos. 1985 (revised 1986). Status of the Hualapai Vole (*Microtus mexicanus hualpaiensis* Goldman). Arizona Game and Fish Department. Phoenix, Arizona. Pp. 1-49.

- Tamarin, R. H., editor. 1985. Biology of New World *Microtus*. American Soc. Mamm. Special Publication (8):1-893.
- USDI, Fish and Wildlife Service. 1982. Federal Register 47 FR 58454-58460.
- USDI, Fish and Wildlife Service. 1985. Endangered and Threatened Wildlife and Plants; Review of Vertebrate Wildlife, Notice of Review. Federal Register 50(181): 37958-37967.
- USDI, Fish and Wildlife Service. 1987. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for the Hualapai Vole. Final Rule. Federal Register 52(190): 36776-36780.
- USDI, Fish and Wildlife Service, Region 2, Ecological Services Field Office. 1991 (with 1992 addendum). Endangered and Threatened Species of Arizona. Ecol. Serv. Field Office, USFWS, Phoenix.
- USDI, Fish and Wildlife Service, Region 2. 1991. Recover Plan for the Hualapai Mexican Vole (*Microtus mexicanus hualpaiensis*). Albuquerque, NM. pp. 1-28.
- USDI, Fish and Wildlife Service. 2015. Endangered and Threatened Wildlife and Plants; Removing the Hualapai Mexican Vole from the Federal List of Endangered and Threatened Wildlife. Proposed Rule. Federal Register 80(107):21875-31880.
- USDI, Fish and Wildlife Service. 2017. Endangered and Threatened Wildlife and Plants; Removal of the Hualapai Mexican Vole From the Federal List of Endangered and Threatened Wildlife. Final Rule. Federal Register 82(120):28582-28588.
- Whitaker, Jr., J.O. 1996. National Audubon Society Field Guide to North American Mammals. Alfred A. Knopf. New York, New York. P. 634.
- Wilson, D. E., and D. M. Reeder (editors). 2005. Mammal species of the world: a taxonomic and geographic reference. Third edition. The Johns Hopkins University Press, Baltimore. Two volumes. 2,142 pp. Available online at:  
<https://www.departments.bucknell.edu/biology/resources/msw3/>

**MAJOR KNOWLEDGEABLE INDIVIDUALS:**

- William E. Van Pelt - Arizona Game and Fish Department, Phoenix, Arizona.  
Dr. Jennifer K. Frey - University of New Mexico, Albuquerque.  
Dr. Tad Theimer – Northern Arizona University, Flagstaff, Arizona.

**ADDITIONAL INFORMATION:**

**Revised:** 2001-01-30 (SMS)  
2003-12-30 (SMS)  
2021-12-13 (KSL)  
2023-03-06 (MBL)

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. X pp.