

ARIZONA GAME AND FISH DEPARTMENT  
HERITAGE DATA MANAGEMENT SYSTEM

Animal Abstract

Element Code: AMAFH01014  
Data Sensitivity: No

**CLASSIFICATION, NOMENCLATURE, DESCRIPTION, RANGE**

**NAME:** *Zapus hudsonius luteus* Miller  
**COMMON NAME:** New Mexico jumping mouse  
**SYNONYMS:** *Zapus princeps luteus*  
*Zapus luteus australis*  
*Zapus luteus luteus*  
**OTHER COMMON NAMES:** New Mexico meadow jumping mouse, meadow jumping mouse  
**FAMILY:** Dipodidae (Subfamily: Zapodidae)

**AUTHOR, PLACE OF PUBLICATION:** Miller, Proc. Biol. Soc. Washington, 24:253, 1911.

**TYPE LOCALITY:** Española, 5,000 feet, Rio Arriba County, New Mexico.

**TYPE SPECIMEN:** HT: USNM-133601.

**TAXONOMIC UNIQUENESS:** The genus *Zapus* is one of three genera in the subfamily Zapodidae. The genus is comprised of three species, all of which occur in North America. The species *Z. hudsonius* is comprised of 12 subspecies, which occur throughout North America. The subspecies *luteus* was formerly recognized under *Zapus princeps*, but Hafner et al. (1981) concluded that *Z. princeps luteus* was a peripheral, isolated relict and conspecific of the meadow jumping mouse, *Z. hudsonius*.

Recent genetic and morphological studies conclusively determined that *Z. hudsonius luteus* is a distinct, well-diverged monophyletic group differentiated from other *Z. hudsonius* subspecies (Frey 2008, King et al. 2006, Malaney et al 2012, Vignieri et al. 2006). Malaney et al. 2017 examined species delimitation of North American jumping mice and proposed 11 species for taxonomic revision, including *Z. hudsonius luteus* to be reclassified as *Z. luteus luteus*. A petition to change the taxonomy of the New Mexico jumping mouse has not been submitted to the US Fish and Wildlife Service at this time, and *Zapus hudsonius luteus* remains the accepted subspecies designation (USFWS 2020).

**DESCRIPTION:** A jumping mouse recognized for its extremely long tail and long hind feet. The hind legs (with 5 toes) are much longer than the delicate forelegs (with 4 toes), and the tail is attenuate, sub-cylindrical and longer than the body. For the species, the total length is 18.0-23.4 cm (7.1-9.2 in), length of tail is 10.1-13.7 cm (3.98-5.39 in), and the weight is 12-30 g (0.423-1.058 oz), which varies with the season (Wilson and Ruff, 1999). Hind feet are long, measuring 2.8-3.5 cm (1.1-1.4 in) (Whitaker 1972; Smith 1999). The general pelage is coarse with broad dorsal band of brown or yellowish brown darkened with brownish black

hairs. The sides are paler, under parts white or sometimes suffused with yellowish color. The back of the forefeet and hind feet is grayish white, while the sparsely haired tail is distinctly bicolor (dark brown above and yellowish white below). They have a small, narrow, and relatively high crowned head, with a short and pointed nose. The upper lip has a median groove. Their eyes are small, located midway between ears and nose; ear dark with narrow pale edge and somewhat longer than surrounding hair. They have 8 teats: 2 pectoral, 4 abdominal, and 2 inguinal; Smith (1999) reports 4 inguinal, 1 pectoral, and 1 abdominal for the species. The condylobasal length of the skull is less than 21 mm. Maxillary toothrow is less than 3.7 mm, incisive foramina shorter than 4.6 mm, baculum shorter than 5.1 mm (Hoffmeister 1986). Jumping mice and the aye-aye are the only mammals with eighteen teeth.

**AIDS TO IDENTIFICATION:** *Zapus*, with a bicolored tail and four molariform teeth, differs from *Napaeozapus* (the only other North American genus in the sub family) which has a white-tipped tail and only three molariform teeth. *Z. hudsonius* is smaller, has a narrower skull in proportion to its length, smaller premolars, and a shorter toothrow than other species of *Zapus*.

Specimen records suggest the morphologically similar western jumping mouse (*Z. princeps*) and *Z. h. luteus* occur with broad sympatry and syntopy in the northern part of *Z. h. luteus*'s range (Frey 2008). *Z. h. luteus* lacks the white ear fringe common in *Z. princeps*, has a paler and richer dorsum pelage, and a less distinct dorsal band (Hafner et al. 1981, Frey 2008). Differences in dentition and cranial and body measurements were found to be significant, but overlap between taxa exists which makes identification difficult based on measurement alone (Frey 2008). Recent captures along the Florida River in southwestern Colorado were originally determined to be the western jumping mouse based on physical and morphological characteristics, but genetic analyses resulted in DNA sequences matching the New Mexico meadow jumping mouse. Further testing is being conducted to rule out error of initial results and confirm morphological and physical distinctions (Zahratka 2018).

#### **ILLUSTRATIONS:**

Line drawing-skull (Hoffmeister 1986: Fig. 5.240)

Black and white photo (Whitaker 1972: Fig. 1)

Line drawings (Whitaker 1972: Fig. 2)

Color photos (USFWS 2020)

**TOTAL RANGE:** *Z. h. luteus* ranges through portions of New Mexico, eastern Arizona, and southern Colorado. In New Mexico, they have been found in the San Juan Mountains, Sangre de Cristo Mountains, Jemez Mountains, Sacramento Mountains, Rio Grande Valley, and lower Rio Chama Valley. In Colorado, populations occupy the Florida River and Sambrito Creek. In Arizona, populations occupy the White Mountains in southern Apache County, and in northern Greenlee County.

**RANGE WITHIN ARIZONA:** White Mountains of eastern Arizona, in southern Apache and northern Greenlee counties. New Mexico Meadow jumping mice are found in three hydrologic units which are not hydrologically connected. These are the Little Colorado River Headwaters, San Francisco River, and Black River. This subspecies likely occurred in the upper Verde River watershed in Yavapai County, historically (Frey 2011).

### **SPECIES BIOLOGY AND POPULATION TRENDS**

**BIOLOGY:** The mouse has a limited active period, only during periods when forb, grass, and sedge seeds are available. The active period is typically late May or early June to late September or October in montane areas and mid-May to late October in lower elevations (Frey 2015, Morrison 1987, Wright and Frey 2011). The New Mexico meadow jumping mouse is a true hibernator, usually hibernating for eight or nine months out of the year, which is longer than most mammals (Frey 2005). Little is known about the hibernacula of New Mexico meadow jumping mice; only one has been found to date (Wright and Frey 2011). Photoperiod cues hibernation, and adults enter hibernation earlier than juveniles (Chambers 2018, Muchlinski 1980). Emergence from hibernation is cued by soil temperatures, and thus varies with elevation and latitude. There is some evidence to suggest females emerge from hibernation later than males (Frey 2015, Morrison 1987, Zahratka 2016). Jumping mice do not appear to cache food for the winter, surviving on fat reserves, and mortality is high if individuals enter hibernation with low body masses (Bain and Shenk 2002, Schorr et al. 2009). Food availability is particularly important during the early and late portions of the active season, as mice recover from and prepare for hibernation, respectively. (Frey 2005). Upon spring emergence, mice must gain adequate weight for breeding, rearing young, and subsequent hibernation (Chambers 2018).

The New Mexico meadow jumping mouse nests in dry soils, but uses moist, streamside, riparian soils to hunt in at night, making the home range long and narrow (averaging 245 to 308 ft (75 to 94 m)) along permanent running water. Home ranges for the species vary, Smith (1999) reported overlapping home ranges in sizes between 0.15 and 1.1 hectares, while Frey and Wright (2012) measured home ranges from 0.2 to 4.15 hectares. They are generally very quiet, however some vocalization has been recorded. They have a keen sense of smell and probably use scent to communicate as well. They are good swimmers, both on the surface and underwater. The longest known lifespan of this species in the wild is 3 years, with an average lifespan <1 year. Longest known lifespan in captivity was 5 years (Smith 1999).

These mice are docile creatures, seldom attempting to bite even when roughly handled. A freeze reaction is the main startle response, which is apparently their primary defense against predators. They are generally solitary animals. However, if two or more are in the same locality, they are not antagonistic toward each other, apparently offering very little defense in the face of a foe. Adults typically make small hops of about a1 to 6 inches (2.5 to 15.2 cm) at a time, but when startled, are capable of approximately 3.3 foot (1 m) leaps. Known predators

include snakes, great horned owls, screech owls, red-tailed hawks, weasels, and foxes (Smith 1999).

**REPRODUCTION:** New Mexico meadow jumping mice primarily breed in July or August and give birth to 2-7 young after an average 18-21 day gestation. Likely only one litter is produced each year, as the summer activity period is too short to successfully rear two litters, especially in montane habitats. Pregnant females have been documented in June, however, which suggests mice may have two breeding cycles per year when conditions are favorable, or in valley populations (Chambers 2018, Frey 2015). Neonates are born naked, pink, blind, clawless, and deaf, in maternal nests. The female provides all the care for their young, until they are weaned and fully developed. This occurs four weeks after birth, which is a long rearing period for a rodent (Frey 2015, Van Pelt 1993). It is unlikely that juveniles breed the same year they are born (Frey 2015).

**FOOD HABITS:** Diet is dominated by seeds, with grass and forb seeds predominant, and seeds of sedges, bulrush (*Scirpus* spp.), and cattail (*Typha latifolia*) infrequently eaten (Chambers 2018, Morrison 1990, Quimby 1951). Insects appear to be only a small portion of diets, potentially consumed only incidentally or opportunistically (Chambers 2018, Sanchez et al. 2019).

**HABITAT:** Essential habitat attributes include tall (34 in (61 cm) and dense riparian vegetation and very moist soil conditions. Requires riparian herbaceous vegetation associated with seasonally available or perennial flowing water and adjacent floodplain and upland areas with vegetation characteristics needed for foraging, breeding, and hibernating (USFWS 2020). Riparian areas immediately adjacent to perennial streams with shallow grades are selected for, but seasonal streams, wetlands or marshes with no visible running water, agricultural ditches and canals, wet meadows, seeps, and areas along intermittent water ways that retain moist soils may also support viable jumping mouse habitat (Frey and Wright 2012, U.S. Forest Service 2012, Zahratka 2019).

The subspecies are generally not found in areas along stagnant or standing water, areas that contain large expanses of standing water deeper than 2 cm (0.8 in), rocky stream banks, or areas of exposed bare ground, even when required tall dense riparian vegetation is present (Frey 2017). Suitable microhabitat is composed of forbs, sedges, and grasses on highly moist soils in close proximity to flowing water. Occupied sites exhibit a high degree of species richness and diversity (Zahratka 2018).

According to Whitaker (1992), in New Mexico, *Z.h. luteus* selected habitats in the Jemez and Sacramento mountains that included sedge-forb-willow zones along permanent streams; large wet meadows in river floodplains in the Rio Grande Valley; and on the Bosque del Apache NWR, preferred narrow riparian zones along irrigation ditches. Moist riparian zones with tall, dense sedges provides suitable habitat in many areas, while the presence of beavers is useful in maintain habitat (New Mexico Dept. Game & Fish 2008, in NatureServe 2011).

**ELEVATION:** 4,500-9,500 ft (1,372-2,896 m), ranging from the middle Rio Grande Valley in New Mexico to montane areas in the White Mountains, Arizona (USFWS 2020).

**PLANT COMMUNITY:** Persistent emergent herbaceous wetlands or scrub-shrub wetlands with an understory of forbs and sedges. Examples include marshes characterized by presence of forbs, sedges (*Carex* spp.), and bulrush (*Schoenoplectus* and *Scirpus* spp.) and riparian areas along perennial streams composed of willows (*Salix* spp.) or alders (*Alnus* spp.). The herbaceous vegetation is composed primarily of forbs, sedges, or grasses. These include, but are not limited to, the following herbaceous species: spikerush (*Eleocharis* spp.), beaked sedge (*Carex utriculata*), rushes (*Juncus* spp.), and numerous species of grasses such as bluegrass (*Poa* spp.), slender wheatgrass, brome (*Bromus* spp.), foxtail barley, or Japanese brome, and forbs such as water hemlock (*Circuta douglasii*), field mint (*Mentha arvensis*), asters (*Aster* spp.), or cutleaf coneflower (*Rudbeckia laciniata*). The jumping mouse appears to avoid stands of uniformly dense patches of woody vegetation or stands of cattail and sedges that lack an herbaceous understory (USFWS 2020).

**POPULATION TRENDS:** Populations have declined significantly rangewide, continuing to decline across range. Most of the 77 currently known populations are disjunct from one another and have a low to very low likelihood of long term persistence (USFWS 2020).

### **SPECIES PROTECTION AND CONSERVATION**

**ENDANGERED SPECIES ACT STATUS:** LE (USDI, FWS 2014) with Critical Habitat (USDI, FWS 2016)  
[USDI, FWS 2007]  
[C USDI, FWS 2008-2011]  
[No status USDI, FWS 1996]  
[C2 USDI, FWS 1989]

**STATE STATUS:** 1 (AZGFD, AWCS 2022)  
[1A (AGFD SWAP 2012)]  
[WSC (AGFD, WSCA 1996 in prep)]  
[LT AGFD, TNW 1989]

**OTHER STATUS:** Forest Service Sensitive (USDA, FS Region 3 1999, 2007, 2013)

**MANAGEMENT FACTORS:** All documented populations likely have insufficient habitat. The main stressors effecting New Mexico jumping mouse are habitat loss and habitat fragmentation. Primary sources of current and future habitat loss include grazing pressure from livestock, elk, and feral horses that degrades vegetation structure and diversity as well as degrading stream banks; water management and use which is incompatible with riparian vegetation, such as mowing near irrigation ditches; lack of water due to drought, exacerbated by climate change; and severe wildland fires, also exacerbated by climate change, which degrade and alter riparian habitat. Additional sources of habitat loss include scouring floods,

stream incision, loss of beaver ponds, road construction, residential and commercial development, coalbed methane development, and unregulated recreation.

New Mexico meadow jumping mice exhibit low population growth, extreme microhabitat specificity, and limited movement and dispersal capability, all of which compound the threat of habitat fragmentation.

Protecting and conserving suitable riparian habitat can be accomplished through grazing and water management (USFWS 2020).

**PROTECTIVE MEASURES TAKEN:** Listed as endangered throughout its range in 2014 with approximately 5,657 ha (13,973 acres) of critical habitat designated March 16, 2016. 2,448 ha (6,046 ac) in Arizona (USFWS 2020). Eight geographic management areas have been established across the range. A recovery plan is scheduled to be completed by the end of 2020.

**SUGGESTED PROJECTS:** Increasing the number of local populations within geographic management units to defend against local extirpation. Recovery efforts should preferentially focus on restoration of habitats and expansion of existing populations (Malaney et al. 2012). Currently unsuitable habitat adjacent to known populations needs to be protected and restored, including adjacent upland and floodplain habitat.

Conservation recommendations include: 1. Establishing partnerships to install barriers/exclosures or change livestock management techniques to limit grazing and protect riparian habitats. 2. Work with stakeholders to maintain microhabitat components or limit actions that preclude restoration. 3. Identify priority areas to reduce fuels to minimize risk of high severity wildland fire and identify post-fire stabilization techniques. 4. Modify off-road vehicle use and recreation. 5. Management and restoration of beaver. 6. Complete an emergency contingency and salvage plan to capture mice in event of stochastic events such as high severity fire, drought, or flood. 7. Update monitoring protocol. 8. Investigate genetic diversity of populations. 9. Determine if assisted translocation or captive breeding programs would be beneficial as recovery tools. 10. Conduct research on critical aspects of jumping mouse life history such as reproduction, abundance, survival, movement behavior, and hibernation (USFWS 2020).

**LAND MANAGEMENT/OWNERSHIP:** BIA – Fort Apache Reservation (White Mountains Apache Tribe); USFS - Apache-Sitgreaves National Forest; AGFD – Black River Lands; Phelps Cabin Research Natural Area; Private.

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**ADDITIONAL INFORMATION:**

Confusion as to the identity of these animals in Arizona and New Mexico existed for many years. Genetic and morphometric studies culminated in 1981 to provide a clearer understanding of the taxonomy and consequently the biogeography of the Arizona and New Mexico populations, which were formerly thought to be *Z. princeps*.

<b>Revised:</b>	1992-01-08 (JSP)
	1993-02-19 (DBI)
	1997-03-04 (SMS)
	1999-07-08 (DAS)
	2005-02-25 (AMS)
	2005-03-24 (SMS)
	2007-12-10 (TFH)
	2020-10-28 (KSL)
	2023-03-15 (MBL)

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