

NOTE

REVIEW OF THE DISTRIBUTIONS OF THE RIO GRANDE AND THIRTEEN-LINED GROUND SQUIRRELS IN NEW MEXICO

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Abstract.—The Rio Grande Ground Squirrel (*Ictidomys parvidens*) and the Thirteen-lined Ground Squirrel (*I. tridecemlineatus*) reach their western range limits in New Mexico. Several records of these species from the 19th Century are from regions where they are not known to occur today and consequently often have been dismissed. Here I reconsider the veracity of these records and report additional new records that better define the historical and current distributions of these species in New Mexico. The historical records suggest population extirpations due to loss of grassland habitat.

Key Words.—desert grassland; extirpation; historical occurrence records; *Ictidomys parvidens*; *Ictidomys tridecemlineatus*; mammal; range limits; Texas.

In their revision of the ground squirrels (*Spermophilus*), Helgen et al. (2009) elevated the subgenus of lined ground squirrels (also called weasel ground squirrels), *Ictidomys*, to the genus level. As currently arranged, there are three species within this genus, of which two occur in New Mexico: the Rio Grande Ground Squirrel (*I. parvidens*) and the Thirteen-lined Ground Squirrel (*I. tridecemlineatus*; Findley et al. 1975). Previously, *I. parvidens* was usually considered a subspecies of the third species in the genus, the Mexican Ground Squirrel (*I. mexicanus*; Helgen et al. 2009); however, these forms are geographically isolated and genetically distinct, thus warranting species recognition (Harrison et al. 2003; Harron et al. 2004; Helgen et al. 2009).

Ictidomys parvidens and *I. tridecemlineatus* are sister taxa, and they have a parapatric distribution at the northern range margins of *I. parvidens* (Harrison et al. 2003; Harron et al. 2004; Thompson et al. 2013). Although there is a narrow region where the two species are sympatric, they apparently have never been documented together at the same location (Stangl et al. 2012). *Ictidomys parvidens* occupies mesquite savannas and semi-desert grasslands (Young and Jones 1982). The known geographic range of *I. parvidens* extends from central Texas and southeastern New Mexico, south to southern Coahuila and Tamaulipas (Hall 1981) with a recently discovered distinctive and isolated population to the west in the Bolson de Mapimi, Durango, Mexico (Baudoin et al. 2004). *Ictidomys tridecemlineatus* generally occupies short-grass plains, prairies, and montane parklands (Armstrong 1971; Streubel and Fitzgerald 1978). The geographic range of *I. tridecemlineatus* is expansive, extending from the prairie provinces of Canada, south through the Great Plains to the coastal plain of Texas, eastward through the upper Midwest to central Ohio, and west to the Rocky Mountains reaching its southwestern range limits in New Mexico and adjacent east-central Arizona

(Hall 1981). Ancient and contemporary hybridization between these species occurs in the zone of contact along their parapatric boundary in New Mexico and Texas (Cothran et al. 1977; Thompson et al. 2013, 2015). It has been speculated that contemporary hybridization was facilitated by expansion of *I. parvidens* along roadsides, and most known instances of hybridization have been in human-modified environments, such as golf courses and cemeteries, although these situations have been most frequently sampled (Thompson et al. 2013).

Both species reach range limits in New Mexico: for *I. parvidens*, its northwestern edge, and for *I. tridecemlineatus*, its southwestern edge. Populations at range margins can shed light on limiting factors that regulate abundance and distribution of a species. Range margins typically have complex spatial structures due to natural fragmentation of habitat, and they can be dynamic especially in response to human-mediated changes that can cause either expansion or contraction of range, the latter of which may herald conservation concern. Both species have experienced changes in distribution. For instance, at the warmer and drier southern range limits of *I. tridecemlineatus*, former populations have been replaced by *I. parvidens* (Stangl et al. 2012). The distribution of these two species in New Mexico has been poorly studied with the only compilations of records being Bailey (1932) and Findley et al. (1975). Thus, my purpose for this study was to report new and previously unreported distributional records of *I. tridecemlineatus* in New Mexico that better define its known range in the state, and to evaluate the credibility of several unusual 19th Century records of *I. tridecemlineatus* and *I. parvidens* that have bearing on the historical distribution of the species.

Ictidomys parvidens has been documented from southeastern New Mexico in Chaves, Eddy, and Lea counties (Findley et al. 1975; Frey 2004; Geluso and

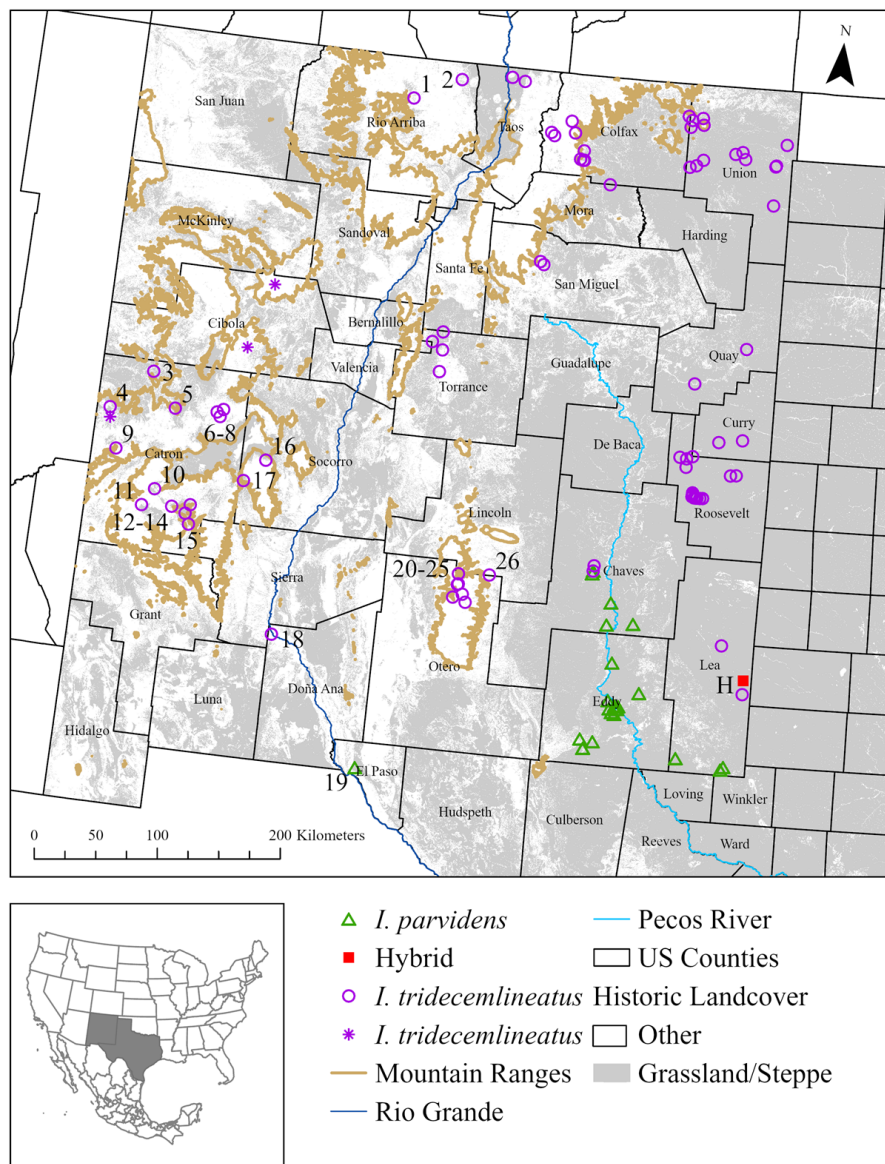


FIGURE 1. Specimen records of the Rio Grande Ground Squirrel (*Ictidomys parvidens*; green triangles) and Thirteen-lined Ground Squirrel (*I. tridecemlineatus*; purple circles) in New Mexico and El Paso County, Texas. Numbers refer to specimen records mentioned in the text and listed in the appendix. The purple asterisks (*) in Cibola and Catron counties indicate locations of observations of *I. tridecemlineatus* mentioned in the text. Peach-colored lines indicate the 2,200 m contour interval around major mountain ranges. Shaded areas indicate the pre-European distribution of grasslands in New Mexico and adjacent areas of Texas based on the Landfire biophysical layer. The inset map shows the location of New Mexico and Texas in the U.S.

Geluso 2004; Thompson et al. 2013; Frey et al. 2023; Fig. 1). Here, most records are confined to the Chihuahuan Basins and Playas ecoregion, which occurs at the lowest elevations within the Pecos River Plains, and the region south of the Llano Estacado. The known northern range limits are in the vicinity of Roswell, central Chaves County, and near the northern terminus of the Chihuahuan Basins and Playas ecoregion. Records also extend into the adjacent Chihuahuan Desert Grassland ecoregion in the Ocotillo Hills near Carlsbad (Frey et al. 2023) as well as into the Shinnery Sands ecoregion at Eunice (Thompson 2015). A hybrid population occurs at Hobbs, on the southern edge of the Arid Llano Estacado ecoregion (Thompson 2015).

Baird (1857:320) and Coues and Allen (1877:871) reported a female specimen of *Spermophilus mexicana* (= *I. parvidens*) preserved in alcohol bearing the number 2656 from Fort Bliss, N.M. and procured by S.W. Crawford (Table 1). Each author provided slightly different measurements of the specimen, indicating both authors independently examined and measured the specimen (Table 2). The external measurements are consistent with *I. parvidens* rather than *I. tridecemlineatus* or the Spotted Ground Squirrel (*Xerospermophilus spilosoma*) in having a relatively large body size (163 mm, 178 mm), long tail (114 mm), long hairs on the tail (33 mm or 37 mm depending on source), and large hindfeet (42 mm; Table 2). The specimen is missing and

TABLE 1. Nineteenth Century records of the Rio Grande Ground Squirrel (*Ictidomys parvidens*) and Thirteen-lined Ground Squirrel (*I. tridecemlineatus*) in New Mexico. All localities are reported as from New Mexico.

Species	Number	Locality	Source	Nature	other	References
<i>I. parvidens</i>	2656	Fort Bliss	S.W. Crawford	“In alco’l”		Baird 1857
<i>I. parvidens</i>	2656	Fort Bliss	S.W. Crawford	“Alcoholic”	female	Coues and Allen 1877
<i>I. tridecemlineatus</i>	517	Fort Thorn	T.C. Henry	“Skin”		Baird 1857
<i>I. tridecemlineatus</i>	19	Tierra Amarilla	J.T. Rothrock	“In flesh”	Oct. 1873	Coues and Yarrow 1875

no other records of the species have been reported from this region (Fig. 1, location 19), but I see no compelling reason to discount its veracity, given that the specimen was obviously examined by two eminent taxonomic mammalogists. Most subsequent researchers, however, either dismissed or were unaware of the record. Howell (1938) accepted the record and included it on his range map for the species, but he did not reference the specimen or cite Baird (1857) or Coues and Allen (1877). Consequently, Schmidly (1977) dismissed the record as he was only aware of the cryptic report by Howell, but not that it was based on a specimen. Similarly, Anderson (1972) was skeptical of the report, because he was only aware of Baird (1859) who mentioned occurrence at El Paso, but apparently was unaware of the earlier monographs containing details of a specimen to substantiate the record. Stangl et al. (2012) dismissed the record because they thought Baird (1857) had confused it with a specimen of *I. tridecemlineatus* from Fort Thorn, New Mexico (see below), apparently unaware that the two specimens bear different catalog numbers and were collected by different people (Table 1).

The headquarters of Fort Bliss has been located in several areas of El Paso, El Paso County, Texas, which is adjacent to Doña Ana and Otero counties New Mexico. The fort was established in 1848 and until 1860 it was often considered within the department of New Mexico (Bender 1934). The fort is located in the Hueco Bolson, which grades into the adjacent Tularosa Basin of New Mexico to the north, forming a large, interconnected intermountain basin within the Chihuahuan Basins and Playas ecoregion. Formerly, this region was semi-desert grassland (Rango et al. 2000), which is consistent with the habitat affinities of *I. parvidens*. Thus, the Fort Bliss record likely represented a western extension or peripheral isolate at the western range limits of *I. parvidens*, similar to the recently discovered population of *I. parvidens* in the Mapimi Biosphere Reserve, Durango; however, this region subsequently suffered extreme ecological change. The former semi-desert grasslands of the Hueco Bolson

and Tularosa Basin were converted to expansive mesquite coppice dunes as a response to excessive livestock grazing in the mid to late 1800s (Rango et al. 2000). Given that this region no longer supports semi-desert grassland, it seems likely that this population of *I. parvidens* would have been extirpated. The species should still be sought in any larger areas of persisting semi-desert grassland at the western range limits of the species, including in adjacent areas of Chihuahua, Mexico.

Ictidomys tridecemlineatus reaches its southwestern range limits in New Mexico and adjacent east-central Arizona where its distribution is broken into apparently allopatric populations with a high degree of morphological variation that requires taxonomic revision (Armstrong 1971; Hall 1981). Distribution of the species is poorly described in New Mexico. The subspecies of the southern Great Plains (*I. t. arenicola*) occurs broadly on the eastern plains of New Mexico westward to the Sangre de Cristo-Sandia-Gallinas-Sacramento chain of mountains and south on the Llano Estacado to east-central Lea County where it hybridizes with *I. parvidens* (Bailey 1932; Hall 1981; Thompson et al. 2013; Fig. 1). Both *I. t. arenicola* and *I. parvidens* have been reported from Roswell, Chaves County (Bailey 1932), but hybridization in that region has not been evaluated.

An endemic mountain form of the thirteen-lined ground squirrel (*I. t. hollisteri*) was described from the Sacramento Mountains, Otero County, on basis of a series of specimens collected by the U.S. Bureau of Biological Survey from a single location at 2,438 m (8,000 ft) elevation in Elk Valley on the Mescalero Apache Reservation (Bailey 1913; Fig 1, location 24). Some authors have included specimens of *I. tridecemlineatus* from the mountain parks of the Sangre de Cristo Mountains within this subspecies (Howell 1938, Hall 1981). The Sangre de Cristo and Sacramento mountains are the two largest mountain ranges east of the Rio Grande River, although it is questionable that populations in each of the mountain ranges represent the same subspecies given that they are isolated by 290 km,

TABLE 2. Body measurements of the Rio Grande Ground Squirrel (*Ictidomys parvidens*) in New Mexico. Data are taken directly from the references and measurements are in millimeters that I converted from the inches as presented in the original source. Abbreviations are TNE = tip of nose to eye, TNER = tip of nose to ear, TNO = tip of nose to occipital, TV = tail length to end of vertebrae, TH = tail length to end of hairs, LF = length of forefoot, LH = length of hindfoot, HE = height of ear.

Species	Record	TNE	TNER	TNO	Tail	TV	TH	LF	LH	HE	Reference
<i>I. parvidens</i>	2656	13.2	38.6	45.2	162.6	114.3	144.8	25.9	41.9		Baird 1857
<i>I. parvidens</i>	2656	17.8	38.1	45.7	177.8	114.3	151.1	27.9	41.9	4.3	Coues and Allen 1877

there are pelage differences between these highly disjunct populations (Baily 1932, Howell 1938), and other populations of montane mammals in these mountains exhibit deep genetic divergence (Frey 2026). Thus, it seems prudent to follow Bailey (1932) in restricting *I. t. hollisteri* to the population occurring in the Sacramento Mountains, pending further taxonomic evaluation.

The historical status of *I. tridecemlineatus* in the Sacramento Mountains has been difficult to understand as no specimens other than the seven topotypes collected by the Biological Survey were known. The Academy of Natural Sciences of Philadelphia, however, has a previously unreported series of 74 specimens of *I. tridecemlineatus* from seven locations (Fig. 1, locations 20–26) in the Sacramento Mountains that were collected as part of the Wharton Huber Expedition to the Mescalero Apache Reservation in the early 1930s. These records demonstrate that *I. tridecemlineatus* historically was abundant and widely distributed in the mountain meadows of the southern Sacramento Mountain subrange. Another meadow species, the Peñasco Least Chipmunk (*Neotamias minimus atristriatus*), which is federally listed as Endangered, also was collected by Huber from many of the same meadow valleys (Jennifer Frey and Kenneth Boykin, unpubl. Report; Jennifer Frey, unpubl. Report). The last record of *N. m. atristriatus* in the southern Sacramento subrange was in 1966 (Jennifer Frey and Kenneth Boykin, unpubl. Report) and there are no further records of *I. tridecemlineatus* since specimens collected by Huber. Thus, both meadow species may be extirpated from the southern Sacramento Mountains, likely a result of habitat loss due to agriculture and excessive livestock grazing.

West of the Rio Grande, another endemic form (*I. t. monticola*) is known from the montane grasslands of the White Mountains, Arizona, and the adjacent Datil-Mogollon Highlands region of west-central New Mexico (Findley et al. 1975; Hoffmeister 1986); the form is not restricted to the White Mountains of Arizona as stated in Horncastle et al. (2019). In New Mexico it previously has been reported from the Datil Mountains northwest of the town of Datil (Catron County; Fig. 1, locations 6–8), Railroad Canyon, which is an eastern spur of the O-Bar-O grasslands north of Beaverhead (Catron County; Fig. 1, location 14), and the eastern edge of the Plains of San Agustin north and west of the San Mateo Mountains (Socorro County; Findley et al. 1975; Fig. 1, locations 16–17). Additional unreported specimens are from these grasslands at Beaverhead (Fig. 1, location 15), O-Bar-O Canyon (Fig. 1, location 12–13), and the Datil Mountains (Fig. 1, location 6). A specimen collected from Centerfire Bog (Fig. 1, location 9) indicates the presence of the species in grasslands in the upper Centerfire Creek watershed. In addition, I collected specimens in 1995 and 1996 from the isolated grasslands at Collins Park (Fig. 1, location 10; Museum of Southwestern Biology [MSB] catalog numbers 82157, 82158, 89534, 91711)

and in 1995 from the Negrito airstrip at the western edge of the T-Bar grasslands in Catron County (Fig. 1, location 11; MSB catalog number 82093). These records indicate a broader distribution of the species in the isolated parks and grasslands of the Datil-Mogollon Highlands. In addition, the species also occurs on the plains north of the Datil-Mogollon Highlands in Catron County. In 2024 I collected a specimen and observed others northeast of Escondido Mountain (Fig. 1, location 5; New Mexico State University Vertebrate Wildlife Museum [NMSUVWM] catalog number 3044). Additional specimens are from 17.8 km (11 mi) N, 9.7 km (6 mi) W of Quemado (Fig. 1, location 3) and near Red Hill from US Highway 60, 6.8 miles E Arizona-New Mexico border (Fig. 1, location 4). A photograph of the species is from south-southwest of Redhill (<https://www.inaturalist.org/observations/62310044>; Fig. 1). Together, these records suggest an extensive distribution in the grasslands immediately north of the Datil-Mogollon Highlands. *Ictidomys tridecemlineatus* likely occurs elsewhere on the plains and mesas further north in west-central New Mexico. Bailey (1932) reported observing one on Cebollita Mesa 24 km southwest of Acoma (south-central Cibola County; Fig. 1) and Troy Best (pers. comm.) reported observing one in montane grasslands near the crest of Mount Taylor (northeastern Cibola County; Fig. 1).

Baird (1857) reported a specimen of *I. tridecemlineatus* from Fort Thorn, Doña Ana Co., procured by Thomas Charlton Henry and preserved as a skin and bearing the number 517 (Table 1; Fig. 1, location 18). Fort Thorn existed from 1853–1859 and Henry was stationed at the fort during the early years (Kraemer 1996). Findley et al. (1975) accepted this record but mapped the location incorrectly in southern Doña Ana County. Fort Thorn was located on the west bank of the Rio Grande and west of the present town of Salem in the extreme northwestern corner of the county. During the exploration period of the 19th Century when there were few place names, specimens typically were described based on the fort or settlement nearest the collection location (Frey and Malaney 2006). The fort was located about 32 km east of the Black Range, a prominent mountain range demarking the southeastern edge of the Datil-Mogollon Highlands. Extensive semi-desert grasslands surrounded the eastern and southern piedmont of the Black Range to within < 10 km of the fort (Skaggs et al. 2011). These semi-desert grasslands were likely confluent with the grasslands associated with other locations for the species in the Datil-Mogollon Highlands, such as the Plains of San Agustin. Thus, although there have been no subsequent records from the eastern side of the Black Range, the Fort Thorn record suggests that they historically occurred in this area.

In northern New Mexico, the only record of *I. tridecemlineatus* from west of the Rio Grande was a specimen first reported by Coues and Yarrow (1875:120)

from Tierra Amarilla (Rio Arriba County), collected on 1 October 1873 by Joseph T. Rothrock and bearing the number 19 (Table 1; Fig. 1, location 1). Rothrock was a member of the Wheeler Expedition and Bailey (1932:117) reported that the specimen was in the “National Museum” though it is unclear if Bailey actually saw the specimen or was referencing Coues and Yarrow (1875). In 2014 staff at the U.S. National Museum could not find the specimen or evidence that it had ever been cataloged as it was not in the database or in an older geographic/systematic card file, and the specimen number, 19, is not a U.S. National Museum catalog number (Robert Fisher, pers. comm.). The specimen was reported as “in flesh” and other so designated specimens collected by Rothrock were preserved in fluid. Although most specimens from the Wheeler Expedition were cataloged in the National Museum, some such as duplicates or those to be used for study at other institutions were sent to other collections such as the Chicago Academy of Science, which was one of the largest collections of its time and a hub for taxonomic research (Robert Fisher, pers. comm.). For instance, Robert Kennicott was a member of the Academy and some of his research focused on ground squirrel taxonomy (e.g., Kennicott 1863). The Chicago Academy of Sciences was partially destroyed by a fire in 1866, and the remainder totally lost in the Great Chicago Fire of 1871, which destroyed all specimens, original field notes, and unpublished manuscripts describing new species. Kennicott died in 1866 and many of his research specimens and unfinished works may have been housed at the Academy at the time of the fire. It is speculated that this and the other unusual specimens of *Ictidomys* might have been lost in the fire (Robert Fisher, pers. comm.).

Tierra Amarilla is located at the western base of the San Juan Mountains near the confluence of the Brazos and Chama rivers (Fig. 1, location 1). In adjacent areas of southern Colorado, the westernmost population is an endemic subspecies (*I. tridecemlineatus blanca*) in the San Luis Valley, a large isolated alpine valley (Armstrong 1972). No records are known from the San Juan Mountains in either state. Thus, like the other seemingly unusual 19th Century records of now missing *Ictidomys* specimens, the record of *I. tridecemlineatus* from Tierra Amarilla could be dismissed as an error. In 2012, however, I collected a specimen of *I. tridecemlineatus* from a high elevation (2,765 m) montane grasslands in the San Juan Mountains near Stewart Meadows in Rio Arriba County (Fig. 1, location 2; NMSUVWM catalog number 3043). This and other new records reported herein suggest that *I. tridecemlineatus* may have a much broader distribution in western New Mexico than currently understood. The new records from western New Mexico also suggests that the mammals of grassland environments in western New Mexico have been particularly poorly surveyed and that future survey efforts are likely to uncover important new information about the distributions of small mammals in the state.

Acknowledgments.—This paper is dedicated to the memory of Robert “Fish” D. Fisher (1945–2019), former Collections Manager of Mammals for the U.S. Geological Survey Patuxent Wildlife Research Center at the National Museum of Natural History. Robert helped me unravel many small mysteries concerning the mammals of New Mexico, including the Tierra Amarilla specimen of *Ictidomys tridecemlineatus*. I thank Joseph Youtz for preparing the figure and Nathan Petersen for the record of *Ictidomys tridecemlineatus* in Catron County posted to iNaturalist.

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APPENDIX

Details of museum specimen records of the Thirteen-lined Ground Squirrel (*I. tridecemlineatus*) and Rio Grande Ground Squirrel (*Ictidomys parvidens*) in Figure 1. Included are references or catalog numbers from the Academy of Natural Sciences of Philadelphia (ANSP); Denver Museum of Nature and Science (DMNS); Los Angeles County Museum (LACM); Museum of Southwestern Biology (MSB); New Mexico State University Vertebrate Wildlife Museum (NMSUVWM); University of Arizona (UAZ); United States National Museum (USNM); and Yale Peabody Museum (YPM).

Catron County, New Mexico:

- Location 3: 11 mi. N, 6 mi. W Quemado, Hubbell Ranch (MSB 55707, 55708).
- Location 4: 6.8 mi. (by U.S. 60) E from Ariz., N. Mex. state line, ca. 7550 ft., T1S, R20W, Sec. 21, SW1/4 (UAZ 22536).
- Location 5: plains NE of Escondido Mountain, 7.7 km S 0.3 km E Omega, old Mangus Ranch Airport, 34.24954, -108.35957, 7,250 ft. (NMSUVWM 3044).
- Location 6: 12 mi NW Datil, 9,000 ft (USNM 139306, 140290; Findley et al. 1975); Datil Mountains (DMNS 5764).
- Location 7: 10 mi. N and 5 mi. W of Datil (Findley et al. 1975).
- Location 8: 6 mi. N, 6 mi. W Datil, Datil Mts., T1S, R11W, Sec 11 (MSB 5357).
- Location 9: Centerfire Bog (MSB 60553).
- Location 10: Collins Park, 1.5 mi S, 7.5 mi E Eagle Peak, T7S R16W SW1/4 sec 36; 33 deg 39' 17.2 (MSB 882157, 82158); Collins Park (MSB 89534, 91711).
- Location 11: Negrito Airstrip Base Camp (MSB 82093).
- Location 12: O-O Canyon, 15 miles N of Beaverhead (YPM 2021).
- Location 13: O-O Canyon, 6 miles N of Beaverhead (YPM 2022).
- Location 14: 10 mi. N Beaverhead, Railroad Canyon, T8S, R12W, SEC31 (MSB 13694).
- Location 15: Beaverhead (LACM 93866).

Doña Ana County, New Mexico:

- Location 18: Fort Thorn (Baird 1857).

Otero County, New Mexico:

- Location 20: near south branch of Corrizo Creek, near foot Sierra Blanca Peak, 7000 ft. (ANSP 14698).
- Location 21: North Tularosa Canyon, 7700 ft. (ANSP 14702, ANSP 14704-14705, ANSP 14717-14720); 6 miles above Tularosa Canyon, 7700 ft. (ANSP 14703); Tularosa Canyon, 6 miles above Mescalero, 7700 ft. (ANSP 14706-14708, ANSP 14721-14722).
- Location 22: Sacramento Mts., North Tularosa Canyon, 5.5 miles above Mescalero (ANSP 15437-15452).
- Location 23: Tularosa Canyon, Seven Springs, 7000 ft. (ANSP 14701, ANSP 14715-14716).
- Location 24: Elk Valley, Mescalero Indian Reservation, Sacramento Mountains, 8,000 ft (USNM 119025); Mescalero Reserve, Elk Valley, 8,000 ft (USNM 118800-118802, 119024; 119026-119027); Sacramento Mountains, Elk Valley, 8000 ft. (ANSP 14710-14714, ANSP 15453-15484).
- Location 25: Sacramento Mountains, Elk Spring Canyon, 7500 ft. (ANSP 14699-14700, ANSP 14709).
- Location 26: Sacramento Mts., 5 miles north of Pajarita Mountain (ANSP 15435-15436).

Rio Arriba County, New Mexico:

- Location 1: Tierra Amarilla (Coues and Yarrow 1875).
- Location 2: San Juan Mountains, Forest Road 78 north of Stewart Meadows, 13S 0399352, 4081019, 9072 ft, 2765 m (NMSUVWM 3043).

Socorro County, New Mexico:

- Location 16: San Augustine Plain, near Monica Springs, 7500 ft (USNM 167049).
- Location 17: San Augustine Plain, 15 mi SW Monica Springs, 7500 ft (USNM 167370).

El Paso County, Texas:

- Location 19: Fort Bliss (Baird 1857, Coues and Allen 1877).