

Status and Distribution of Terrestrial Snails in Southwestern New Mexico

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**Final Report to:
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Share With Wildlife Program**

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New Mexico talussnail (Florida Mountains)
(Sonorella hachitana flora)

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INTRODUCTION

Southwestern New Mexico supports a diversity of land snail species, many of which are endemic to a relatively small area (e.g., an isolated mountain range or individual canyons or talus slopes within a mountain range; Pilsbry 1915, Pilsbry and Ferriss 1917, Thompson 1974, Miller 1976, Metcalf and Smartt 1997, Lang 2000). The isolated nature and small population size of many of these species make them vulnerable to natural and human-caused disturbances that could lead to negative population-level effects, local extirpation, or extinction. Primary threats for terrestrial snails in southwestern New Mexico include 1) natural stochastic events such as flooding or extended drought, 2) soil disturbance from recreational use and mining activities, 3) environmental contamination from historical or contemporary mining, 4) vegetation disturbance and removal, 5) wildland and prescribed fires, 6) livestock overgrazing, 7) erosion, sedimentation, and changes in soil moisture related to the aforementioned threats, and 8) human-mediated climate change and its' interaction with threats listed above (Lang 2000, NMDGF 2016).

Development of conservation agreements among stakeholders could potentially preclude listing of a species under the Endangered Species Act when they are evaluated in the future. To formulate and develop conservation agreements, contemporary data on distribution, natural history, and population status, as well as an initial threats assessment is required. These data can inform the subsequent development and implementation of monitoring programs that ensure conservation agreements are meeting defined goals.

The objective of year two of this project was to continue to provide updated information on the status and distribution of terrestrial snails in southwestern New Mexico that are considered Species of Greatest Conservation Need (SGCN) by New Mexico Department of Game and Fish (Table 1). Surveys during year two sought to further identify areas within a species range that represent habitat of varying quality (e.g., poor, moderate, high¹) to focus future survey efforts in areas of high-quality habitat during ideal field survey conditions (i.e., wet, moist, and/or humid conditions) when snails are most likely to be surface-active. In order to assess population status of a species with any degree of accuracy, surveys need to occur when detectability of live snails is high.

METHODS

Preparation for 2020 field surveys of SGCN terrestrial snails² (Table 1) used a two-pronged approach: 1) I compiled historical records based on primary reports and published articles and 2) I queried and compiled museum records from online natural history museums known to house New Mexico terrestrial snail specimens. Historical records from reports and articles and museum records have been compiled and shared in a previous report (Wallace 2021, including from Lang 2005). In preparation for 2021 surveys, I reviewed reports that were unavailable in early 2020 (e.g., Slaughter and Boykin 2011) and queried additional museums found to contain New Mexico land snail records (Natural History Museum of Los Angeles County, University of

¹ Identifying habitats of varying quality (including non-habitat) will aid in further defining a target species' habitat; historically, habitat descriptions were often generally or vaguely defined.

² Hereafter referred to as target species.

Florida Museum of Natural History, Field Museum of Natural History Chicago and Museum of Comparative Zoology Harvard); these new records are shown in Appendices B and C. I also contacted Lance Gilbertson (Natural History Museum of Los Angeles County) and George Ferguson (University of Arizona Herbarium) to discuss their field experiences surveying for target land snails in southwestern New Mexico from the late 1980's to the early 2000's.

Table 1. Terrestrial snail Species of Greatest Conservation Need in southwestern New Mexico.

Family	Common Name	Species	County
Helminthoglyptidae	New Mexico talussnail (Big Hatchet Mountains)	<i>Sonorella hachitana hachitana</i> ¹	Hidalgo
	New Mexico talussnail (Florida Mountains)	<i>Sonorella hachitana flora</i> ¹	Luna
	Doña Ana talussnail	<i>Sonorella todseni</i> ³	Doña Ana
Oreohelicidae	Mineral Creek mountainsnail	<i>Oreohelix pilsbryi</i> ²	Sierra
	Fringed mountainsnail	<i>Radiocentrum ferrissi</i> ¹	Hidalgo
Polygyridae	Silver Creek woodlandsnail	<i>Ashmunella binneyi</i> ²	Grant
	Hacheta Grande woodlandsnail	<i>Ashmunella hebari</i> ¹	Hidalgo
	Cooke's Peak woodlandsnail	<i>Ashmunella macromphala</i> ²	Luna
Urocoptidae	Cross Holospira snail	<i>Holospira crossei</i> ¹	Hidalgo
	Metcalf Holospira snail	<i>Holospira metcalfi</i> ³	Grant

¹ Species occurs in the Madrean Archipelago ecoregion. All ecoregions as defined by NMDGF (2016).

² Species occurs in the Arizona/New Mexico Mountains ecoregion.

³ Species occurs in Chihuahuan Deserts ecoregion.

In preparation for 2021 field surveys, I used an iterative approach that included revisiting historical localities extracted and mapped from reports, articles, and museums³ and reevaluated them based on field experiences during 2020. This allowed me to further refine areas to target during 2021 surveys. An important and informative result of the current survey will be more precise georeferenced localities that will greatly aid future investigations.

In 2021, I continued to coordinate with knowledgeable individuals from the U.S. Forest Service (USFS) and the Bureau of Land management (BLM) familiar with the survey areas regarding access to sites or lack thereof (e.g., private lands, locked gates, inaccessible roads, etc.). I also coordinated with two private landowners to gain access through their properties to access BLM

³ See Wallace (2021) for issues related to mapping historical localities with any degree of precision.

managed lands in Chaney Canyon in the Big Hatchet Mountains and Mahoney Park⁴ in the Florida Mountains⁵.

I surveyed for snails using visual encounter surveys (VES) that targeted micro-environments that could support more mesic conditions (e.g., slopes with decomposing rock piles or talus slides, wood or leaf debris accumulations, and shaded canyon bottoms) to increase the probability of detecting snails. This included flipping rocks and other potential cover objects (e.g., woody debris). I also sifted through fine sediments, small and large rocks, and plant debris (e.g., leaf litter and decaying organic matter) as snails and shells were often found at a depth of approximately 0.01 to ≥ 0.5 m depending on the substrate (e.g., fine soils versus rocky talus). The actual survey approach at any given site was dictated by on-site conditions and varied widely among sites and species.

All data, including presence of snail species (live snails, shells), land manager and district, and county are included in Table 3. I photo-vouchered live specimens and shells (both *in situ* and in the lab) and photographed representative macro- and micro-habitat at each site (see Appendix A for examples).

At each survey site, I recorded a suite of habitat variables that included 1) elevation, 2) aspect (with compass), 3) slope (with clinometer), 4) dominant geology and vegetation, 5) weather conditions, 6) relative soil moisture, and 7) soil and litter accumulation. I will use 2021 data to provide an updated generalized description of the environment in which individual target species were observed across sites. I also recorded signs of habitat disturbance at survey sites that included 1) mining activities, 2) development projects, 3) livestock presence and use, 4) vegetation removal 5) recreational use, 6) fire, 7) invasive plants or mollusks, and/or 8) chemical contamination. I will use this information to further inform threats assessments for species in 2021.

RESULTS

Field Surveys – Overview

I surveyed for target species during 21-28 June and 5-10 October 2021 and 10-14 May 2022 in southwestern New Mexico (Figure 1). Survey results are summarized in Table 2 and representative photographs of snails and their habitat are found in Appendix A.

⁴ Low elevation area northwest of Baldy Peak named on the USGS 7.5 minute topographic map, “South Peak, NM (1996)”

⁵ During 2020 surveys, access to Mahoney Park was “unrestricted”, but during 2021 surveys a sign on an access gate stated that permission was necessary for access. This change in access status among years underscores the need for continued coordination with private landowners.



Figure 1. Overview of 2021-2022 terrestrial snail survey area with target mountain ranges in southwestern New Mexico.

Table 2. Overview of SGCN terrestrial snail survey results for targeted areas in southwestern New Mexico, 2021.

Locality	Mountain Range	County	Sites Surveyed ^a
Silver Creek	Black Range	Sierra	12
Mineral Creek	Black Range	Sierra	5
Doña Ana Peak	Doña Ana Mountains	Doña Ana	26 ^b
Cooke's Peak	Cooke's Range	Luna	10
Castle Dome Wash	Florida Mountains	Luna	13
Baldy Peak, NW slope	Florida Mountains	Luna	4
Howell's Ridge	Little Hatchet Mountains	Grant	7
Chaney Canyon	Big Hatchet Mountains	Hidalgo	6

^a Sites surveyed is a count of unique and/or separate habitat features surveyed within a given locality and is often determined by the extent of a species' geographical range, potential available habitat, and access.

^b Potential habitat for the Doña Ana talussnail occurs as relatively small, scattered patches on an extremely steep and environmentally exposed slope.

Field Survey – Target Species

Family: Polygyridae

Silver Creek woodlandsnail - *Ashmunella binneyi*

The type locality of the Silver Creek woodlandsnail is Silver Creek at ~8,500 ft in the Black Range (Pilsbry and Ferriss 1917). The Silver Creek woodlandsnail is known to occur in Grant County along the northwestern slope of Sawyer Peak from Silver Creek north to Bull Top Creek [sic]⁶ and Spring Canyon between 8,000 and 8,500 ft. in elevation (Pilsbry and Ferriss 1917). These are northeast – southwest trending, steep-sided, relatively narrow canyons with slopes ranging from 50-70%. Dominant geology is igneous with limestone rock outcrops occurring sporadically along the canyon slopes (Slaughter and Boykin 2011). The vegetation community is dominated by a ponderosa (*Pinus ponderosa*) and southwestern white pine overstory (*P. strobiformis*) with mixed stands of Gambel's oak (*Quercus gambelii*) and alligator bark juniper (*Juniperus deppeana*). There is relatively little understory development, typical of Petran Montane Conifer Forest (Brown 1994). Ash and fine soils associated with the occurrence of wildfire are the dominant substrates. All of its known range occurs on Gila National Forest, Silver City Ranger District.

Metcalf and Smartt (1997) report finding individuals of the Silver Creek woodlandsnail in its historic range in upper Spring Canyon, but they provide no details as to when they surveyed or relative abundance of live snails or shells. Slaughter and Boykin (2011) report Silver Creek woodlandsnail localities as follows: 1) abundant in upper Silver Creek at 8,550 elevation ($n=30$ live collected), 2) abundant at "Spring Canyon Trailhead"⁷ at 7,100 elevation ($n=30$ live collected), 3) Spring Canyon at 7,439 ft. elevation ($n=22$ live collected)⁸, and 4) Spring Canyon at 7,396 ft. elevation ($n=8$ live collected)⁷.

The Silver Creek woodlandsnail has no ranking with U.S. Fish and Wildlife Service (USFWS)

⁶ This is assumed to be Bull Trap Canyon as named on USGS 7.5 min. Hillsboro Peak quadrangle (2000). Bull Trap Canyon lies between Silver Creek and Spring Canyon. Pilsbry and Ferris (1917) state they accessed all sites from above, along the main ridgeline.

⁷ This site could not be identified on USGS topographic or USFS maps (i.e., elevations do not match potential "trailheads").

⁸ Authors assumed these individuals to be presumptive hybrids with the Iron Creek woodlandsnail.

and is considered "Sensitive" by USFS (2013).

My surveys focused on both sides of Silver Creek canyon and were generally within 10 to 75 meters of the canyon bottom. I primarily targeted individual rocks, rock piles and outcrops but also flipped down, dead woody debris when encountered.

I surveyed for this species at 12 sites in Silver Creek canyon (Table 2). I encountered 2 live adults and 4 live juveniles in Silver Creek. Live snails (including adults and juveniles) ranged from 0 to 6 individuals per hour (Table 3) and were relatively uncommon. Shells were relatively uncommon; detection rates ranged from 2.4 to 16.8 shells per hour. Many of the shells located showed obvious signs of fire damage. All live snails were associated with rocks.

Metcalf and Smartt (1997) considered Silver Creek woodlandsnail and the Iron Creek woodlandsnail (*Ashmunella mendax*) as "...probably closely related and possibly conspecific..." but maintained them as separate species based on Pilsbry and Ferriss' (1917) original description. Slaughter and Boykin (2011) conducted a phylogenetic analysis on *Ashmunella* spp. from the Black Range to clarify taxonomic uncertainties using polymerase chain reaction (PCR) amplifications of two mitochondrial gene regions. Their results do not support the recognition of Silver Creek woodlandsnail as a valid taxon. Regarding the validity of the current taxonomy, NMDGF should consult with experts in phylogenetics to determine if this species warrants continued recognition as a Species of Greatest Conservation Need.

The single greatest threat to this species is the impact of the Silver Fire of 2013. This wildfire burned many areas at moderate to severe intensities, including much of the upper watersheds where historic locations of Silver Creek woodlandsnail were recorded. This resulted in a mosaic of small, unburned areas and larger areas where stand replacing fire had occurred. The latter resulted in an obvious reduction in canopy and organic ground cover across large areas of canyon slopes and likely led to direct mortality of snails from fire or indirect mortality from post-fire erosion and/or debris flows. Removal of large areas of canopy and ground cover likely increased the aridity of slopes that were previously inhabited by snails and has resulted in a reduction in available habitat and therefore smaller, more isolated occupied areas. While the species has not been extirpated, its range-wide population may have been greatly reduced with remaining snail subpopulations now functionally isolated from other subpopulations. Future surveys should target both burned and unburned areas to determine (as feasible) if snails are still found in burned areas. I recommend that the USFS monitor forest recovery post-fire and implement fire management practices that reduce the potential for severe wildfires in the species' range.

Hacheta Grande Woodlandsnail - *Ashmunella hebardii*

The Hacheta Grande woodlandsnail was described by Pilsbry and Vanatta (1923) from "...the northwestern slope of Hacheta Grande...in a broad canyon...at about 7600 ft.⁹" in the Big Hatchet Mountains, south-southwest of Hachita in Hidalgo County. This canyon is undoubtedly Chaney Canyon. The species' description is based solely on bleached or partially bleached shells, and although they considered them to be related to the Big Hatchet woodlandsnail (*Ashmunella mearnsii*; known from Big Hatchet Peak approximately 1000 ft. higher in elevation), they considered their shell morphology as "...conspicuously distinct (Pilsbry and Vanatta 1923)." The upper slopes of Chaney Canyon are composed of limestone (Drewes 1991). The vegetation community is Madrean Evergreen Woodland at higher elevations and a mixture of Interior Chaparral and Semidesert Grassland at mid- to lower elevations (Brown 1994). Slopes range from about 40 to 60 % with increasing slope as elevation increases. Snail habitat consists

⁹ Shells were not collected by the authors.

of limestone outcrops that generally occur perpendicular to the main slope with rock piles along the bases of cliff faces. Dominant vegetation included skunkbush sumac (*Rhus trilobata*), evergreen sumac (*R. virens*), mountain mahogany (*Cercocarpus* spp.), pinyon pine (*Pinus cembroides*), desert scrub oak (*Quercus turbinella*), and beargrass (*Nolina microcarpa*). This species occurs exclusively on the Las Cruces District, BLM.

Metcalf and Smartt (1997) report that “*Ashmunella hebardi*,...appears to be a local endemic of the Big Hatchet Peak area. We have collected it near what must be the type locality [T.L.] on the south side of Chaney [sic] Canyon (a broad canyon, as indicated in the description of the T.L.) on the northwestern, precipitous slope of Hacheta Grande. Here, it occurs under loose stones below cliffs in an area of unusually tall pinyon pines.” They report finding shells that fit the morphology of the original description of Hacheta Grande woodlandsnail but also shells that were transitional in shell morphology with Big Hatchet woodlandsnails and shells more typical of Big Hatchet woodlandsnails “...within 0.3 mile and several hundred feet, altitudinally.”

The Hacheta Grande woodlandsnail was first reviewed for listing under the Endangered Species Act (ESA) in 1991 and subsequently in 1994 (USFWS 1991, 1994) and was considered a Category 2 species. Category 2 species were those species USFWS considered to have potential for protection under the ESA but for which there were insufficient data, at that time, to initiate a formal review. The USFWS eliminated Category 2 species in 1995. Therefore, these species were no longer afforded protections under the ESA. USFWS (2009) published a 90-day finding that determined “...the petition does not present substantial information to indicate that listing the Hacheta Grande woodlandsnail may be warranted.¹⁰” This species is currently “Not Listed” (USFWS 2021a). The Hacheta Grande woodlandsnail is considered “Sensitive” by BLM (2018) and threatened by NMDGF (2020).

I surveyed southern Chaney Canyon in the northwest portion the Big Hatchet Mountains below Big Hatchet Peak. I first encountered Hacheta Grande woodlandsnails at 1935 m (6350 ft). I surveyed for this species within an ~ 1-3 m wide area at the base and edges of rock outcrops and cliffs and flipped any cover objects encountered; these were predominantly relatively flat limestone rocks. I sifted through loose sediments and debris that were associated with cover objects. I observed one live, aestivating individual with an intact epiphragm¹¹, yielding a detection rate of one live snail per hour; snail was under a 0.09 m² flat limestone slab and was at the soil surface (i.e., not among or attached to sediments or plant debris). Shell detections ranged from 0.0 to 65.0 shells per hour with shells becoming more common at higher elevation (Table 3).

The area is remote, and access is limited due to private lands and an associated locked gate that bar the public from accessing public lands beyond. Therefore, the area would be very unlikely to receive recreational use. Cattle grazing occurs in Chaney Canyon but is limited to the lower slopes; cattle sign was not observed on the steep, rocky slopes where the species is found. I urge the BLM to consider this species when developing management plans for this part of the

¹⁰ The same determination was made for the Big Hatchet woodlandsnail (*Ashmunells mearnsii*; USFWS 2009).

¹¹ The epiphragm is a mucous membrane that seals a snails' aperture and reduces moisture loss during dry periods of inactivity.

mountain range, especially plans related to controlled or prescribed burns. Taxonomic studies using updated molecular techniques are needed to determine whether the Hacheta Grande woodlandsnail and the Big Hatchet woodlandsnail represent full species or a single species with a continuum of intergrading shell morphologies.

Cooke's Peak woodlandsnail - *Ashmunella macromphala*

Cooke's Peak woodlandsnail was described by Vagvolgyi (1974) and is only known from Cooke's Peak in the Cooke's Range north-northeast of Deming in Luna County. Snails have been collected from north and east of Cooke's Peak, primarily along igneous talus slides at an elevation of approximately 6100-7600 ft. (Vagvolgyi 1974, Lang 2000). The vegetation community at higher elevations is Madrean Evergreen Woodland and at mid- to lower elevations is a mixture of Interior Chaparral and Semidesert Grassland (Brown 1994). The upper slopes are steep, ranging from about 55 to 70% slope and are characterized by long, narrow talus slides bordered historically by Gambel's oak and mountain mahogany (Vagvolgyi 1974; S. Torrez, BLM, pers. comm.). These talus slides are composed of relatively large rocks (~ 0.04m²) with smaller rocks, soil, and leaf litter filling interstitial spaces, especially along the oak-talus interface. Predominant substrates within talus are fine sediments and organic ash related to fire. This species occurs exclusively on the Las Cruces District, BLM.

At the type locality, Vagvolgyi (1974) collected 80-90 live adults at one talus slide, which was bordered by oaks, from under rocks and among leaf debris that had accumulated in the interstitial spaces; debris was lacking in moisture and elevation was estimated at 6,900-7,000. Metcalf and Smartt (1997) collected "specimens" from talus slides similar to those described by Vagvolgyi (1974), yet they do not specify if specimens were live snails or shells. In May of 1998 and 2000, Lang (2000) collected live juveniles and adults from leaf litter that had accumulated in talus slides to a depth of ≤ 1 m in the "vicinity of the" type locality at an elevation of ~7600 ft.¹²

The Cooke's Peak woodlandsnail was first reviewed for listing under the ESA in 1991 and subsequently in 1994 (USFWS 1991, 1994) and was considered a Category 2 species. Category 2 species were those species USFWS considered to have potential for protection under the ESA but for which there were insufficient data, at that time, to initiate a formal review. The USFWS eliminated Category 2 species in 1995. Therefore, these species were no longer afforded protections under the ESA. USFWS (2009) published a 90-day finding that determined the Cooke's Peak woodlandsnail may be warranted for listing under the ESA due to current or potential threats to its habitat (e.g., fire, rockslides and manmade or natural impacts related to climate change). This species is currently "Under Review" (USFWS 2021b). The Cooke's Peak woodlandsnail is also considered "Sensitive" by BLM (2018) and threatened by NMDGF (2020).

In 2021, in addition to targeting sites at the oak-talus interface for surveys, I surveyed other areas with potential snail habitat to better understand the distribution of this species across different habitat types. This included rocky hillslopes with individual, large rocks or rock piles (i.e., non-talus structures) and areas within talus slides away from the oak-talus interface (i.e., more

¹² Elevations for the type locality of Cooke's Peak woodlandsnail reported in Vagvolgyi (1974) are not congruent with that reported by Lang (2000) from what he considered near the "type locality."

towards the center of slides) that might provide suitable habitat¹³. Surveys involved slowly digging in the talus slides or rock piles, to avoid collapse of the depression that could lead to crushed or buried snails or shells, or flipping medium to large, flat rocks. Pits were excavated from ~ 0.1 - \geq 0.5 m deep and were ~ 0.25 m².

Survey results in 2021 for Cooke's Peak woodlandsnail in talus slides impacted by the BLM 2014 controlled burn were like those of 2020. I surveyed for this species at 10 sites in the Cooke's Range in 2021. I encountered no live snails and shells were relatively uncommon. Of those shells I did detect, most were fire-damaged fragments ($n = 37$). Shells that were intact or nearly intact were detected at rates that ranged from 16.9 to 26.0 shells per hour¹⁴ (Table 3) and most of these exhibited signs of fire-damage (e.g., bleached and/or charred). As in 2020, all shells and fragments observed were in a matrix of fine, blackened soils and/or organic ash (e.g., burned leaves and woody debris) in the interstitial spaces among rocks at the oak-talus interface. Only one adult shell was found with an intact periostracum, i.e., a potentially recent mortality¹⁵. All other habitat types surveyed (see above) yielded no observation of shells. This strongly suggests that the oak-talus interface, the habitat that burned most intensely, is the most important habitat for this species.

Based on these results, future surveys should focus only along the oak-talus interface. Due to the apparently low abundance of this species, surveys during ideal, moist conditions when snails are surface active will be important for increasing detectability in this fire-impacted landscape and providing a better understanding of its' current population status.

I also observed shells of white-lip dagger (*Pupoides albilabris*) at a detection rate of 3.8 to 8.0 shells per hour and shells of Mexican coil (*Helicodiscus eigenmanni*) at a detection rate of 1.9 to 4 shells per hour.

The primary observed threats for this snail are the impacts from the BLM controlled burn that occurred in June of 2014. The goal of this management action was to burn some of the dense mountain mahogany to stimulate new growth to benefit wildlife, but because of the steep and rocky nature of the terrain, the majority of the burn was in the denser areas of Gambel's oak trees¹⁶, which are also the areas where the best snail habitat was historically found. The result was that the oaks burned fairly intensely and, while it did not kill all the trees, it dramatically reduced canopy cover (S. Torrez, BLM, pers, comm.). At present, the oaks are sucker-sprouting and the "crowns" do provide some degree of shade, albeit only from about a third to half the height of the former canopy. Future surveys should target both burned and unburned areas (if they exist) to determine (to the extent possible) if snails are still found in burned areas. I recommend that the BLM continue to monitor vegetation recovery post-fire and implement fire management practices in the Cooke's range that consider the potential impacts to this species.

¹³ Because of the observed potential fire-effects of the 2014 prescribed fire on this species, I expanded targeted surveys to other habitats to sample potential areas that were apparently not affected by this fire.

¹⁴ Detection rates calculated only at those sites at the oak-talus interface.

¹⁵ It is currently unknown how long periostracum remains intact following death or rates of shell decomposition for target species in the arid southwestern U.S. (but see Pearce 2008).

¹⁶ Mountain mahogany that occurred away from the dense Gambel's oak stands showed minimal to no fire effects.

FAMILY: UROCOPTIDAE

Cross Holospira Snail - *Holospira crossei*

Cross Holospira was described by Dall (1895)¹⁷ from the “Top of Hacheta Grande Mountains...” and is known from several locations throughout the Big Hatchet Mountains (Pilsbry 1915, Pilsbry and Vanatta 1923¹⁸), which are located south-southwest of Hachita in Hidalgo County. The Big Hatchet mountains are composed primarily of limestone (Drewes 1991). The vegetation community is Madrean Evergreen Woodland at higher elevations and a mixture of Interior Chaparral and Semidesert Grassland at mid- to lower elevations (Brown 1994). Big Hatchet Peak is at 8,366 ft elevation. Mountain slopes can range from ~ 45 to 60 % but slope is negligible when surveying along the base of limestone cliffs (Wallace pers. obs.). This species is associated with dry, rocky limestone outcrops in the vicinity of pinyon pines and junipers (*Juniperus* spp.). The terrain I have surveyed in Thompson Canyon consists of scattered limestone outcrops surrounding the east and north slopes of “Daniels Mountain¹⁹”, which is the biggest peak in the southwestern portion of the canyon. This species occurs exclusively on the Las Cruces District, BLM.

During 20-26 August 1910²⁰, Pilsbry collected thousands of shells during a week-long survey throughout the central and southern part of the range (Pilsbry 1915, 1946). It is unclear if he collected any live material, but the descriptions of the many “races” he collected are all based on shell morphology and not internal soft anatomy. Metcalf and Smartt (1997) report collections of live individuals “...in limestone talus on the north facing slope of this mountain...” in 1985 (no date given). During November 1988 surveys, they encountered abundant shells “...along the northern cliff face of Hachita Grande...”

The Cross Holospira snail has no ranking with USFWS and is considered “Sensitive” by BLM (2018).

I surveyed southern Chaney Canyon in the northwest portion of the Big Hatchet Mountains below Big Hatchet Peak. Cross Holospira shells were first encountered at 1829 m (6000 ft) and became more abundant as elevation increased. I surveyed for this species within an ~ 1-3 m wide area at the base and edges of rock outcrops and cliffs and flipped any cover objects encountered; these were predominantly relatively flat limestone rocks. I sifted through loose sediments and debris that were associated with cover objects. One live, aestivating Cross Holospira was detected under a limestone rock with an intact epiphragm with attached fine plant debris. Live

¹⁷ This species, along with *Sonorella hachitana* and others, was among the first land snails to be described for New Mexico. These descriptions were a result of collections made by Dr. E.A. Mearns during the Mexican Boundary Survey (Pilsbry 1915).

¹⁸ These shells were collected in Chaney Canyon at 7600 ft.

¹⁹ This feature was named by Pilsbry (1915) but is not named on any contemporary maps. I have conclusively identified its location based on Pilsbry’s description.

²⁰ Pilsbry states that conditions during surveys were very dry and hot.

detection rate was one snail per hour. Shells of this species were abundant at most sites surveyed and detections ranged from 8.0 to > 100 shells per hour²¹ (Table 3).

The area is remote, and access is limited due to private lands and an associated locked gate that bar the public from accessing public lands beyond. Therefore, the area would be very unlikely to receive recreational use. Cattle grazing occurs in Chaney Canyon but is limited to the lower slopes; cattle sign was not observed on the steep, rocky slopes where the species is found. I urge the BLM to consider this species when developing management plans for this part of the Big Hatchet mountains, especially plans related to controlled or prescribed burns.

Metcalf Holospira Snail – *Holospira metcalfi*

Metcalf Holospira was described by Thompson (1974) and is endemic to Howell's Ridge, an isolated limestone reef in the northeastern portion of the Little Hatchet Mountains in Grant County. This species was found at an average elevation of 5,500 ft. (Metcalf and Smartt 1997, Wallace pers. obs.). Mountain slopes perpendicular to the ridge range from ~ 40 to 50% but slope is negligible when surveying along the base of limestone cliffs. The vegetation community is Semidesert Grassland (Brown 1994) with isolated junipers and shrubs occurring at the base of 10 - 80 ft. cliffs and on the slopes below. This species occurs exclusively on the Las Cruces District, BLM.

This species was found underneath and along the edges of limestone rocks, where soil interfaces with the rock. Based on previous accounts (Metcalf and Smartt 1974, Metcalf and Smartt 1997), the species has been collected from 3 locations, but the impression is given that the species is or could be present at any point along Howell's Ridge, a feature that is approximately 6 miles long (Metcalf and Smartt 1997).

The Metcalf Holospira snail has no ranking with USFWS and is considered "Sensitive" by BLM (2018).

I surveyed for this species by moving along the base of the rock outcrops and cliffs within an ~ 1-3 m wide area and flipping any cover objects encountered; these were predominantly relatively flat limestone rocks ranging from ~ 0.01 – 0.09 m². I sifted through loose sediments and debris that were associated with cover objects, especially along the edges. I also excavated and/or sifted through soil and debris accumulations along cracks and edges of vertical rocks and under dead vegetation, particularly sotol (*Dasyilirion wheeleri*). Habitat is very similar to that for Cross Holospira (see above).

In 2021, I surveyed for Metcalf Holospira along the northwestern portion of Howell's Ridge and detected 2 live adults (at two sites) aestivating under rocks with intact epiphragms for a live snail detection rate of 1.0 – 2.3 snails per hour. Shells were abundant and detection rates ranged from 30.0 – 152.3 shells per hour²² (Table 3). While enroute to the above ridgeline, I surveyed a reddish, igneous outcrop and found no snails or shells. I observed one Fringed Mountainsnail

²¹ Cross Holospira shells were so abundant at higher elevations that I stopped counting at 100 shells.

²² These estimates exclude two sites that were likely marginal habitat and where no shells were observed.

(*Radiocentrum ferrissi*) fossil and one New Mexico talussnail²³(*Sonorella hachitana*) fossil (see Metcalf and Smartt 1997). Surprisingly, no *Rabdotus durangoanus* (no common name) were observed here (see below).

I also surveyed the extreme northwestern outcrop of the central portion of Howell's Ridge²⁴; no live snails were found but shells were relatively common. Shell detections ranged from 12.0 to 52.8 per hour. *Rabdotus durangoanus* were relatively common and ranged from 0.0 to 67.2 (12.0 to 67.2 per hour if the one zero site is removed). These estimates include 10 individuals identified as juveniles. Most *Rabdotus* shells were moderately to very bleached, possibly representing "subfossils", although a few ($n \approx 4$) exhibited a faded periostracum. A live *Rabdotus* was observed along this same outcrop to the southeast in 2020, so the area is known to be occupied.

To date, Metcalf's *Holospira* has been observed at three discreet limestone outcrops/cliffs along Howell's Ridge that are not contiguous but occur across ~ a 2.4 km (1.5 mi) distance. All surveys occurred during dry periods; detections of live snails should increase in this dry mountain range during wet periods. Despite surveys being conducted during the dry season, it appears this highly endemic species maintains a relatively robust population, although future surveys under ideal field condition will be necessary to further clarify this species' status.

The area is remote and would be unlikely to receive any recreational use. During surveys, I did encounter limited debris associated with immigrants (backpacks, clothing, blankets, food tins) at the immediate base of cliffs and larger rock piles that were likely used for cover. This all appeared very weathered and probably dates to the last major wave of immigration around 2000²⁵. This human activity certainly posed a minor threat due to trampling and disturbance of micro-habitats but was likely limited temporally and relatively inconsequential to the population's status. I did not detect much sign of cattle grazing, although it inevitably occurs along the lower slopes. Despite this, some sites where this species occurs would be at least partially accessible to cattle, resulting in the potential for trampling. I recommend that BLM consider this highly endemic species when developing management plans, especially as they pertain to range management (including prescribed fires).

FAMILY: HELMINTHOGLYPTIDAE

New Mexico talussnail (Florida Mountains) - *Sonorella hachitana flora*

The New Mexico talussnail (Florida Mountains) subspecies was first described by Pilsbry (1915) from the Florida Mountains south-southeast of Deming in Luna County. It is known to occur in the western and northwestern portion of the mountain range (Pilsbry 1939, Miller 1967). Based on these historical descriptions, the previous localities would appear to be in upper Capitol Dome Draw and at the base of the mountain northwest of Mount Baldy, in the vicinity of

²³ The New Mexico talussnail fossil was a shell fragment but was identified based on aperture size.

²⁴ This section of Howell's Ridge was immediately northwest of the area surveyed in 2020 where 37 live snails and abundant shells were observed.

²⁵ I am familiar with this phenomenon with ~ 10 years of experience working along the Arizona-Mexico border from 1993 - 2003.

Mahoney Park, at an approximate elevation of 5,500 to 7,000 ft. Mountain slopes range from 50 to 70 % (Wallace pers. obs.). The vegetation community is a transition zone of Semidesert Grassland and Interior Chaparral with elements of Madrean Evergreen Woodland along washes and at the base of cliffs (Brown 1994). This species occurs exclusively on the Las Cruces District, BLM.

Pilsbry (1915) states “Around the base of this central summit [northwest Baldy Peak?] we found...*Sonorella* by digging in the soil among the rocks where there was shade.” Miller reports finding this species “...in rock piles on north facing slopes below large cliffs on the south side of the canyon [Capitol Dome Draw?]...”

The New Mexico talussnail (Florida Mountains) subspecies has no ranking with USFWS and is considered “Sensitive” by BLM (2018).

I surveyed for New Mexico talussnails below the northwestern slope of Baldy Peak above Mahoney Park during June. Survey conditions were good/near ideal as the area received ≥ 8 millimeters (mm; 0.3 inches [in]) of rain the previous day²⁶. Soils were semi-saturated and rock exposures were generally wetted. There was a sporadic to steady light rain during surveys with waves of fog moving through the area. I focused efforts on areas where shells had been observed in 2020 and surveyed for this species by traversing the slopes and looking for suitable talussnail habitat. Potential habitat was not commonly encountered, despite long traverses across slopes and at the base of cliffs. When encountered, which was uncommon, I sifted through small rock piles and talus slides. One live subadult snail²⁷ was observed for a detection rate of 0.0 to 1.0 live snails per hour (Table 3). The snail was easily detected and was active and apparently foraging on damp rocks, detritus, and dead vegetation; there were no obvious cover sites in close proximity. I intensively searched the area around the snail, but no other live snails were detected. Shell detections ranged from 0.8 – 5.3 per hour, including one juvenile shell. Most shells were bleached and lacked periostracum, but in one, a faded shoulderband was apparent. As in 2020, there were few cover objects or areas that represented typical talussnail habitat across the survey area.

I surveyed the north-facing slope of Capital Dome Draw in October. I targeted sites where shells had been observed in 2020 and expanded my search in those areas to include the many colluvial/talus/rockpile features that are common at mid-elevations to further refine what represents habitat for this species. Surveys involved slowly moving rocks and digging in the talus slides or rock piles to avoid collapse of the depression that could lead to crushed or buried snails or shells and/or flipping medium to large, flat rocks along the perimeters of slides or piles. Pits were excavated from ~ 0.1 - ≥ 0.5 m deep depending on conditions at the site and were ~ 0.25 m². Conditions were dry during surveys and no live snails were observed. Shells were uncommon and detections ranged from 0.0 to 7.3 per hour (Table 3). Shells ranged from bleached (possibly subfossils) to those with the periostracum moderately intact (i.e., chestnut-colored shoulderband

²⁶ As was reported from the nearest National Weather Service (NWS) at Deming, NM (<https://forecast.weather.gov>), approximately 24 airline km (15 mi) north-northwest of Mahoney Park. Based on field conditions during the survey, the survey area likely received more rain than the valley bottom where the rain gauge recorded 8 mm, hence the “ \geq ”

²⁷ Age determination based on the lack of reflexed lip at aperture, but size was similar to adult shells found.

was easily observed). Many of the rock features surveyed yielded no observations of shells nor were epiphragm scars observed²⁸ (e.g., see Doña Ana talussnail below).

The area is remote and is unlikely to receive much recreational use, at least on the slopes where snails occur. I did not detect any cattle grazing up on the steep, precarious slopes, although there are cattle in the lower elevation areas. I recommend that BLM to consider this species when developing management plans for this mountain range, especially plans related to range management and controlled or prescribed burns.

Doña Ana talussnail – *Sonorella todseni*

The Doña talussnail was first described by Miller (1976) from the north slope of the Doña Ana Mountains immediately north of Las Cruces in Doña Ana County. It is known to occur on the north, northeast, and southeast slopes of Doña Ana Peak at an elevation of approximately 5600-5835 ft (Sullivan 1997, Lang 2000). Slopes range from ~ 50 to 80% (Sullivan 1997, Wallace pers. obs.). It is most often found associated with rhyolitic outcrops and talus slides, and Lang (2000) suggested that live snails were more often associated with black rhyolitic rocks, as opposed to brown rhyolitic rocks. The vegetation community is characteristic of Semidesert Grassland (Brown 1994) and grasses are the dominant vegetative cover. Plants with a stature greater than grasses are sparse and widely dispersed and include juniper, sotol, yuccas (*Yucca* spp.), silktassel (*Garrya* spp.), and Mormon tea (*Ephedra* spp.). This species occurs exclusively on the Las Cruces District, BLM.

Miller (1976) reports that on 28 August 1972, many live snails, as well as shells, were collected. Sullivan (1997) found 50 live individuals at 5 sites, suggesting they were relatively abundant during his survey(s). While he does not specify the months or weather conditions during his surveys, it is assumed that these occurred during a wet/moist period. Metcalf and Smartt (1997) report that “specimens” were not very common, but they do not specify when or under what environmental conditions their survey(s) occurred, nor whether their “specimens” were live snails or shells.

The Doña Ana talussnail was first reviewed for listing under the ESA in 1991 and subsequently in 1994 (USFWS 1991, 1994) and was considered a Category 2 species. Category 2 species were those species USFWS considered to have potential for protection under the ESA but for which there were insufficient data, at that time, to initiate a formal review. The USFWS eliminated Category 2 species in 1995. Therefore, these species were no longer afforded protections under the ESA. In 2009, USFWS (2009) published a 90-day finding that determined the Doña Ana talussnail may be warranted for listing under the ESA due to manmade or natural impacts related to climate change. This species is currently “Under Review” (USFWS 2021c). The Doña Ana talussnail is also considered “Sensitive” by BLM (2018) and threatened by NMDGF (2020).

I surveyed for this species at 20 sites on the north slope of Doña Ana Peak and the slopes of an adjacent peak to the northeast during October. Potential habitat for the Doña Ana talussnail occurs as relatively small, scattered patches of rock piles and talus slides of varying areas and

²⁸ *Sonorella* spp. are well known for leaving epiphragm scars (see Waters 2011).

depths on steep and environmentally exposed slopes. During surveys, I traversed across and upslope, targeting rock features where shells had been observed in 2020 and novel features to better define the area this species occupies and to identify those features that represent quality habitat (i.e., features with high densities of shells). Identifying the latter will allow future survey efforts to target these georeferenced features during ideal field conditions (i.e., wet, moist, and/or humid conditions) when snails are most likely to be surface-active and detectability is highest, thus providing a better assessment of population status. Surveys involved turning potential cover objects (e.g., medium to large rocks, vegetative debris) and/or slowly digging in the talus slides to avoid collapse that could lead to crushed or buried snails or shells. Pits were excavated from 0.1 - 0.5 m deep and $\sim 0.25 \text{ m}^2$ depending on the size and structure of the feature.

No live snails were observed, and many rock features yielded no sign of snails. Many features without shells were relatively shallow and/or were perched on bedrock rather than soil. Shell detection rates ranged from 0.0 to 81.0 per hour. When only considering the five features where shells were observed, detection rates ranged from 24.5 to 81.0 per hour (Table 3). Shells were often found in aggregations with epiphragm scars on adjacent rocks. Most shells from the talus slide with the highest detection rate (81.0/hour) had a relatively intact periostracum (i.e., relatively recent mortalities) and epiphragm scars were very common on nearby rocks. There were also several juvenile shells associated with aggregations of adult shells; few juvenile shells have been found previously. These observations make this site a top priority for future surveys under ideal weather conditions.

The range is a steep and rugged area but given its proximity to Las Cruces, there is some recreational use for hiking, climbing, and “summiting” of the peak. In fact, the BLM is currently considering applications from outdoor outfits to obtain commercial access permits, and they are considering how these activities might affect Doña Ana talussnails (J. Barela, BLM, pers. comm.). I did not detect any cattle grazing on the upper steep, precarious slopes, although there are cattle in the area. The area is protected as a BLM wilderness area. I recommend that the BLM monitor this species for the potential effects of increased recreational activities and to consider this species when developing future management plans for this mountain range.

FAMILY: OREOHELICIDAE

Mineral Creek mountainsnail – *Oreohelix pilsbryi*

The Mineral Creek mountainsnail was first described by Ferriss (1917) from a short reach of Mineral Creek west-northwest of Chloride in Sierra County. Historically it is known to occur along an approximately 400 m reach on Mineral Creek and is associated with limestone outcrops along the creek on both sides (Lang 2000). The creek is perennial with a steady but low discharge based on visits in June and October 2020 and 2021. The dominant vegetation is Montane Riparian Woodland (Brown 1994) with alder (*Alnus oblongifolia*), oak, and alligator juniper dominating the nearly closed canopy. This species occurs on Gila National Forest, Black Range Ranger District, but there are private inholdings related to old mining claims immediately adjacent to the site.

Surveys in 1915, 1987, and 1999 found these snails to be abundant at the type locality (Ferriss 1917, Metcalf and Smartt 1997, Lang 2000). Ferriss (1917) reports a potential, but unknown, predator of this species as evidenced by an ~ 2 mm hole found on some shells.

The Mineral Creek mountainsnail was first reviewed for listing under the ESA in 1991 and subsequently in 1994 (USFWS 1991, 1994) and was considered a Category 2 species. Category 2 species were those species USFWS considered to have potential for protection under the ESA but for which there were insufficient data, at that time, to initiate a formal review. The USFWS eliminated Category 2 species in 1995. Therefore, these species were no longer afforded protections under the ESA. In 2009, USFWS (2009) published a 90-day finding that determined the Mineral Creek mountainsnail may be warranted for listing under the ESA due to current or potential threats to its habitat. This species is currently “Under Review” (USFWS 2021d). The species is also considered “Sensitive” by USFS (2013) and threatened by NMDGF (2020).

Surveys involved looking for snails attached (with epiphragm) to loose rocks, rock outcrops, and vegetative debris, gently digging through the abundant leaf litter to look for live individuals and shells loose in or under the litter, or flipping cover objects on the ground. Surveys during wet periods involved looking for snails active on various substrates.

I surveyed for this species at 5 sites in June, including two sites north and upslope (but in the same watershed) of the type locality that were identified as potential habitat (e.g., rock outcrops) using satellite imagery (Google Earth). Surveys at the type locality in June 2021 occurred prior to, during, and following a rainstorm of approximately 13 mm (0.5 in)²⁹. Live snail detections (adults and juveniles combined) ranged from 24.0 to 141.6 per hour. When considered separately, adult detection rates ranged from 22.3 to 110.4 per hour and juveniles from 1.7 to 31.2 per hour (Table 3). It is likely that juveniles, especially the smallest individuals (≤ 5 mm in diameter), were under-counted due to size and lower detectability. Regardless, the occurrence of a continuum of life stages suggests a population with strong recruitment. The lower detection rates reported were from the pre-rain survey and were based on aestivating individuals whereas the higher rates were from surveys during optimal moisture conditions and were from three to nearly six times more productive. This underscores the necessity to survey snails under ideal weather conditions when snails are surface-active in order to ascertain the current population status of a species.

During the pre-rain survey, aestivating snails were located either attached to outcrops with epiphragm or were found loose (i.e., not attached) in leaf litter and woody debris along the base of rock outcrops with epiphragm intact similar to results from 2020 surveys. Once fully active, snails were found on essentially all available substrates, presumably foraging. These included 1) rock crops, boulders, and smaller rocks, 2) soil, 3) down, dead woody debris, 4) leaf and pine litter, 5) dried grass (sometimes ≥ 0.1 m above the ground), and 6) mosses.

²⁹ As reported from the nearest NWS station at Truth or Consequences, NM approximately 52 airline km (32 mi) southeast of the Mineral Creek site. Rainfall in the upper Mineral Creek watershed was likely higher than this as it was sufficient to cause a small flash flood in the canyon.

Metcalf and Smartt (1997) report the Mineral Creek mountainsnail as “...occurring abundantly..., but the area of its occurrence was quite small, no more than 100 ft [30 m] along the northeast-facing outcrop where Mineral Creek makes a right-angle bend [the type locality].” and Lang (2000) reported that it “...was remarkably abundant throughout a 0.25 - 0.3 mile [402 – 483 m] reach of stream along limestone outcrops that constrict Mineral Creek to a narrow sinuous channel.” At my survey site furthest up-canyon, I detected the species 0.76 river kilometers (km) (0.47 river miles [mi]) above the type locality, nearly doubling the previously reported distance of occurrence along the canyon. Additionally, I surveyed upslope, perpendicular to the canyon for approximately 30 m (98 ft) and counted 118 live snails (98 adults, 26 juveniles). As both up-canyon and up-slope surveys resulted in detections, there is no question that this species occurs beyond these points. Knowing the aerial extent of the Mineral Creek mountainsnail’s geographic range is essential to documenting changes in population status and geographic range through future monitoring efforts.

Mineral Creek is relatively remote because access through the canyon is restricted by private lands. To access USFS lands, one must hike over the ridgeline from Chloride Creek. This protects the site from what otherwise could be heavy, canyon-bottom recreational uses (e.g., off-highway vehicles, camping and campfires, bouldering, etc.). Currently, the greatest potential threat to this species is wildfire, as evidenced by the recent Black Fire of May 2022. The fire burned into upper Mineral Creek but was contained above the type locality. Future surveys will be necessary to determine if the fire burned areas occupied by the Mineral Creek mountainsnail in the middle to upper portions of the canyon. Another potential threat is that cattle have unrestricted access to the riparian corridor along which the snails occur. The limestone outcrops in the canyon bottom, at and above the type locality, occur immediately adjacent to seepy, shallow, pooled areas in the creek that are heavily used by cattle. Many snails of all life stages were observed in leaf litter and on the ground under leaf litter near the base of outcrops on flat ground. Individuals in such a position could easily be trampled by cattle accessing the watering area. There is also a possibility that minerals or contaminants from abandoned mines that occur upslope of occupied areas could leach into streamside areas, thereby contaminating local water and soil. Additionally, in June 2021, “road” maintenance had occurred with heavy machinery (e.g., bulldozer) that undoubtedly disturbed some snails and habitat along the creek. The impact of the disturbance was likely minimal from a population-level perspective though based on the overall distribution of the species in the canyon (i.e., in areas away from the road). I recommend that the USFS exclude cattle with fencing at the type locality immediately along the creek. This would be a relatively simple, protective action and would still allow cattle access to water. Further, the USFS should coordinate with the permittee to reduce future impacts to snails from road improvements and consider this species when developing fire management plans in this district.

Fringed Mountainsnail – *Radiocentrum ferrissi*

The fringed mountainsnail was first described by Pilsbry (1915)³⁰ from Sheridan Canyon on the

³⁰ Described as *Oreohelix (Radiocentrum) hachetana*. At the time, Pilsbry considered *Radiocentrum* a subgenus of *Oreohelix*. It has since been raised to full generic status (Babrakzai et al. 1975).

east-central slope of the Big Hatchet Mountains located south-southwest of Hachita in Hidalgo County; the range is composed primarily of limestone (Drewes 1991). Based on satellite imagery, the dominant vegetation is represented by Semidesert Grassland (Brown 1994). Pilsbry (1915) reports “On the talus slope there is a growth of dwarf oak [possibly *Quercus turbinella*] about knee-high,...big wild roses [*Rosa* spp.]... [cholla] *Cylindropuntia*, [prickly pear] *Opuntia*, bisnagas [Barrel cactus (*Ferocactus* spp.)]. On top, above the cliffs, the [ocotillo] *Fouquieria*, sotol, mescal [*Agave* spp.] society is found.” This species occurs exclusively on the Las Cruces District, BLM.

Pilsbry (1915) collected this species from 2 stations; “...Station 3³¹, on ledges of high cliffs opposite the mouth of Sheridan Canyon, under stones,...August 21, 1910...Also at Station 1, Teocalli Butte³².” Pilsbry describes the site in Sheridan Canyon as “...on an almost inaccessible cliff...The *Oreohelix* colony is of small extent; the ledges where they were observed living are probably not over a couple of square rods in area³³, with perhaps an equal area on the talus below the cliffs, where dead shells were found. These estimates are from memory...” Based on descriptions of genitalia in Pilsbry (1915), live specimens were collected. This species has not been collected since Pilsbry’s 1910 expedition (Metcalf and Smartt 1997, Lang 2000).

The fringed mountainsnail has no ranking with USFWS and is considered “Sensitive” by BLM (2018).

I was not able to access Sheridan Canyon. Sheridan Canyon is likely not accessible by a 4x4 pickup truck due to frequent washouts where the two-track road crosses the canyon bottom; BLM accesses the canyon using all-terrain vehicles (ATV; T. Mitchusson, BLM, pers. comm.).

Due to the steep, rocky terrain, and general inaccessibility of the limited localities of this species, recreational use would seem limited to an occasional intrepid hiker or mountain climber and is likely very low. Livestock use of this canyon is unknown at present but, based on the locality description above, the rough terrain likely limits access by livestock. There is always the possibility that wildfire or prescribed burns could affect fringed mountainsnail and other snail species in the range (e.g., see Cooke’s Peak woodlandsnail account). It is difficult to make any recommendations at this time as occupied habitat was not surveyed. I urge the BLM to consider this species (and similar endemic species of this range) when developing management plans for the Big Hatchet Mountains, in particular as they relate to fire management.

³¹ J.H. Ferriss made the collection at these seemingly precarious sites at Station 3.

³² This named feature is not found on contemporary USGS topographic maps but appears to be at the head of Sheridan Canyon based on Pilsbry’s sketched map.

³³ This would be equivalent to approximately 50 m².

Table 3. Summary of 2021-2022 survey results and relative abundance estimates for live snails and shells.

Date	Location	Species1	Adult live	Juvenile live	Adult Shell	Juvenile Shells	Live/hr ²	Shell/hr ³	County	Land Manager	District
10/10/21	Castle Dome	None	0	0	0	0	0.0	0.0	Luna	BLM	Las Cruces
10/10/21	Castle Dome	None	0	0	0	0	0.0	0.0	Luna	BLM	Las Cruces
10/10/21	Castle Dome	None	0	0	0	0	0.0	0.0	Luna	BLM	Las Cruces
10/10/21	Castle Dome	None	0	0	0	0	0.0	0.0	Luna	BLM	Las Cruces
10/10/21	Castle Dome	None	0	0	0	0	0.0	0.0	Luna	BLM	Las Cruces
10/10/21	Castle Dome	None	0	0	0	0	0.0	0.0	Luna	BLM	Las Cruces
10/10/21	Castle Dome	None	0	0	0	0	0.0	0.0	Luna	BLM	Las Cruces
10/10/21	Castle Dome	SOHAFL	0	0	2	0	0.0	4.3	Luna	BLM	Las Cruces
10/10/21	Castle Dome	SOHAFL	0	0	1	0	0.0	3.5	Luna	BLM	Las Cruces
10/10/21	Castle Dome	SOHAFL	0	0	2	0	0.0	6.0	Luna	BLM	Las Cruces
10/10/21	Castle Dome	SOHAFL	0	0	1	0	0.0	4.0	Luna	BLM	Las Cruces
10/10/21	Castle Dome	SOHAFL	0	0	1	0	0.0	6.0	Luna	BLM	Las Cruces
10/10/21	Castle Dome	SOHAFL	0	0	0	4	0.0	7.3	Luna	BLM	Las Cruces
6/23/21	Chaney Canyon	ASHHEB	0	0	1	0	0.0	1.2	Hidalgo	BLM	Las Cruces
6/23/21	Chaney Canyon	ASHHEB	0	0	1	0	0.0	1.5	Hidalgo	BLM	Las Cruces
6/23/21	Chaney Canyon	ASHHEB	0	0	11	2	0.0	22.3	Hidalgo	BLM	Las Cruces
6/23/21	Chaney Canyon	ASHHEB	1	0	46	19	1.0	65.0	Hidalgo	BLM	Las Cruces
6/23/21	Chaney Canyon	HOLCRO	0	0	7	1	0.0	8.0	Hidalgo	BLM	Las Cruces
6/23/21	Chaney Canyon	HOLCRO	0	0	6	1	0.0	8.4	Hidalgo	BLM	Las Cruces
6/23/21	Chaney Canyon	HOLCRO	0	0	14	4	0.0	14.4	Hidalgo	BLM	Las Cruces
6/23/21	Chaney Canyon	HOLCRO	1	0	11	0	1.5	16.5	Hidalgo	BLM	Las Cruces
6/23/21	Chaney Canyon	HOLCRO	0	0	38	1	0.0	66.9	Hidalgo	BLM	Las Cruces
6/23/21	Chaney Canyon	HOLCRO	0	0	100	0	0.0	100.0	Hidalgo	BLM	Las Cruces
6/25/21	Cookes Peak	ASHMAC	0	0	6	3	0.0	16.9	Luna	BLM	Las Cruces
6/25/21	Cookes Peak	ASHMAC	0	0	10	3	0.0	26.0	Luna	BLM	Las Cruces
6/25/21	Cookes Peak	HELEIG	0	0	1	0	0.0	1.9	Luna	BLM	Las Cruces
6/25/21	Cookes Peak	HELEIG	0	0	2	0	0.0	4.0	Luna	BLM	Las Cruces
6/24/21	Cookes Peak	None	0	0	0	0	0.0	0.0	Luna	BLM	Las Cruces
6/24/21	Cookes Peak	None	0	0	0	0	0.0	0.0	Luna	BLM	Las Cruces
6/24/21	Cookes Peak	None	0	0	0	0	0.0	0.0	Luna	BLM	Las Cruces
6/24/21	Cookes Peak	None	0	0	0	0	0.0	0.0	Luna	BLM	Las Cruces
6/24/21	Cookes Peak	None	0	0	0	0	0.0	0.0	Luna	BLM	Las Cruces
6/24/21	Cookes Peak	None	0	0	0	0	0.0	0.0	Luna	BLM	Las Cruces
6/25/21	Cookes Peak	None	0	0	0	0	0.0	0.0	Luna	BLM	Las Cruces
6/25/21	Cookes Peak	None	0	0	0	0	0.0	0.0	Luna	BLM	Las Cruces
6/25/21	Cookes Peak	None	0	0	0	0	0.0	0.0	Luna	BLM	Las Cruces
6/25/21	Cookes Peak	PUPALB	0	0	2	0	0.0	3.8	Luna	BLM	Las Cruces

Date	Location	Species1	Adult live	Juvenile live	Adult Shell	Juvenile Shells	Live/hr ²	Shell/hr ³	County	Land Manager	District
6/25/21	Cookes Peak	PUPALB	0	0	4	0	0.0	8.0	Luna	BLM	Las Cruces
10/7/21	Dona Ana	None	0	0	0	0	0.0	0.0	Doña Ana	BLM	Las Cruces
10/7/21	Dona Ana	None	0	0	0	0	0.0	0.0	Doña Ana	BLM	Las Cruces
10/7/21	Dona Ana	None	0	0	0	0	0.0	0.0	Doña Ana	BLM	Las Cruces
10/7/21	Dona Ana	None	0	0	0	0	0.0	0.0	Doña Ana	BLM	Las Cruces
10/7/21	Dona Ana	None	0	0	0	0	0.0	0.0	Doña Ana	BLM	Las Cruces
10/7/21	Dona Ana	None	0	0	0	0	0.0	0.0	Doña Ana	BLM	Las Cruces
10/7/21	Dona Ana	None	0	0	0	0	0.0	0.0	Doña Ana	BLM	Las Cruces
10/7/21	Dona Ana	None	0	0	0	0	0.0	0.0	Doña Ana	BLM	Las Cruces
10/7/21	Dona Ana	None	0	0	0	0	0.0	0.0	Doña Ana	BLM	Las Cruces
10/7/21	Dona Ana	None	0	0	0	0	0.0	0.0	Doña Ana	BLM	Las Cruces
10/7/21	Dona Ana	None	0	0	0	0	0.0	0.0	Doña Ana	BLM	Las Cruces
10/7/21	Dona Ana	None	0	0	0	0	0.0	0.0	Doña Ana	BLM	Las Cruces
10/7/21	Dona Ana	None	0	0	0	0	0.0	0.0	Doña Ana	BLM	Las Cruces
10/7/21	Dona Ana	None	0	0	0	0	0.0	0.0	Doña Ana	BLM	Las Cruces
10/8/21	Dona Ana	None	0	0	0	0	0.0	0.0	Doña Ana	BLM	Las Cruces
10/8/21	Dona Ana	None	0	0	0	0	0.0	0.0	Doña Ana	BLM	Las Cruces
10/8/21	Dona Ana	None	0	0	0	0	0.0	0.0	Doña Ana	BLM	Las Cruces
10/9/21	Dona Ana	None	0	0	0	0	0.0	0.0	Doña Ana	BLM	Las Cruces
10/7/21	Dona Ana	SONTOD	0	0	39	15	0.0	81.0	Doña Ana	BLM	Las Cruces
10/8/21	Dona Ana	SONTOD	0	0	14	3	0.0	29.1	Doña Ana	BLM	Las Cruces
10/8/21	Dona Ana	SONTOD	0	0	22	2	0.0	37.9	Doña Ana	BLM	Las Cruces
10/8/21	Dona Ana	SONTOD	0	0	13	5	0.0	24.5	Doña Ana	BLM	Las Cruces
10/8/21	Dona Ana	SONTOD	0	0	8	2	0.0	26.1	Doña Ana	BLM	Las Cruces
6/21/21	Howell's Ridge	HOLMET	1	0	45	21	2.3	152.3	Grant	BLM	Las Cruces
6/21/21	Howell's Ridge	HOLMET	1	0	32	12	1.0	44.0	Grant	BLM	Las Cruces
6/21/21	Howell's Ridge	HOLMET	0	0	15	0	0.0	30.0	Grant	BLM	Las Cruces
6/22/21	Howell's Ridge	HOLMET	0	0	57	12	0.0	69.0	Grant	BLM	Las Cruces
10/5/21	Howell's Ridge	HOLMET	0	0	8	1	0.0	12.0	Grant	BLM	Las Cruces
10/5/21	Howell's Ridge	HOLMET	0	0	15	4	0.0	32.6	Grant	BLM	Las Cruces
10/5/21	Howell's Ridge	HOLMET	0	0	17	5	0.0	52.8	Grant	BLM	Las Cruces
6/21/21	Howell's Ridge	None	0	0	0	0	0.0	0.0	Grant	BLM	Las Cruces
6/21/21	Howell's Ridge	None	0	0	0	0	0.0	0.0	Grant	BLM	Las Cruces
6/22/21	Howell's Ridge	None	0	0	0	0	0.0	0.0	Grant	BLM	Las Cruces
10/5/21	Howell's Ridge	None	0	0	0	0	0.0	0.0	Grant	BLM	Las Cruces
10/6/21	Howell's Ridge	None	0	0	0	0	0.0	0.0	Grant	BLM	Las Cruces
10/5/21	Howell's Ridge	RABDUR	0	0	2	0	0.0	12.0	Grant	BLM	Las Cruces
10/5/21	Howell's Ridge	RABDUR	0	0	25	1	0.0	34.7	Grant	BLM	Las Cruces
10/5/21	Howell's Ridge	RABDUR	0	0	23	4	0.0	46.3	Grant	BLM	Las Cruces
10/5/21	Howell's Ridge	RABDUR	0	0	24	4	0.0	67.2	Grant	BLM	Las Cruces
10/5/21	Howell's Ridge	RABDUR	0	0	9	1	0.0	30.0	Grant	BLM	Las Cruces
6/22/21	Howell's Ridge	RADFER	0	0	1	0	0.0	1.0	Grant	BLM	Las Cruces
10/5/21	Howell's Ridge	SOHAFL	0	0	1	0	0.0	1.7	Grant	BLM	Las Cruces

Date	Location	Species1	Adult live	Juvenile live	Adult Shell	Juvenile Shells	Live/hr ²	Shell/hr ³	County	Land Manager	District
6/22/21	Howell's Ridge	SONHAT	0	0	1	0	0.0	1.0	Grant	BLM	Las Cruces
6/26/21	Mineral Creek	None	0	0	0	0	0.0	0.0	Sierra	USFS	Black Range
6/26/21	Mineral Creek	None	0	0	0	0	0.0	0.0	Sierra	USFS	Black Range
6/27/21	Mineral Creek	OREPIL	13	1	0	0	24.0	0.0	Sierra	USFS	Black Range
6/27/21	Mineral Creek	OREPIL	58	12	0	0	79.2	0.0	Sierra	USFS	Black Range
6/27/21	Mineral Creek	OREPIL	92	26	0	0	141.6	0.0	Sierra	USFS	Black Range
6/28/21	NW Baldy	SOHAFL	0	0	1	0	0.0	0.8	Luna	BLM	Las Cruces
6/28/21	NW Baldy	SOHAFL	0	0	2	0	0.0	1.3	Luna	BLM	Las Cruces
6/28/21	NW Baldy	SOHAFL	0	0	4	0	0.0	5.3	Luna	BLM	Las Cruces
6/28/21	NW Baldy	SOHAFL	0	1	3	1	1.0	4.0	Luna	BLM	Las Cruces
5/10/22	Silver Creek	ASHBIN	1	1	18	10	1.2	16.8	Grant	USFS	Silver City
5/10/22	Silver Creek	ASHBIN	0	0	1	0	0.0	2.4	Grant	USFS	Silver City
5/10/22	Silver Creek	ASHBIN	0	0	2	1	0.0	7.2	Grant	USFS	Silver City
5/10/22	Silver Creek	ASHBIN	0	0	2	0	0.0	3.0	Grant	USFS	Silver City
5/10/22	Silver Creek	ASHBIN	1	3	4	4	6.0	12.0	Grant	USFS	Silver City
5/11/22	Silver Creek	ASHBIN	0	0	2	0	0.0	3.0	Grant	USFS	Silver City
5/11/22	Silver Creek	ASHBIN	0	0	2	0	0.0	3.4	Grant	USFS	Silver City
5/10/22	Silver Creek	None	0	0	0	0	0.0	0.0	Grant	USFS	Silver City
5/11/22	Silver Creek	None	0	0	0	0	0.0	0.0	Grant	USFS	Silver City
5/11/22	Silver Creek	None	0	0	0	0	0.0	0.0	Grant	USFS	Silver City
5/11/22	Silver Creek	None	0	0	0	0	0.0	0.0	Grant	USFS	Silver City
5/10/22	Silver Creek	OREMET	1	2	2	3	1.8	3.0	Grant	USFS	Silver City
5/10/22	Silver Creek	OREMET	0	0	5	1	0.0	14.4	Grant	USFS	Silver City
5/10/22	Silver Creek	OREMET	0	0	1	0	0.0	1.5	Grant	USFS	Silver City
5/10/22	Silver Creek	OREMET	7	0	5	0	10.5	7.5	Grant	USFS	Silver City
5/10/22	Silver Creek	ORESPP	0	0	0	1	0.0	2.4	Grant	USFS	Silver City

¹ Genus/Species six letter codes: **ASHMAC** = *Ashmunella macromphala*; **HELEIG** = *Helicodiscus eigenmanni*; **HOLCRO** = *Holospira crossei*; **HOLMET** = *Holospira metcalfei*; **OREMET** = *Oreohelix metcalfei*; **OREPIL** = *Oreohelix pilsbryi*; **ORESUB** = *Oreohelix subrudis*; **PUPALB** = *Pupoides albilabris*; **RABDUR** = *Rabdotus durangoanus*; **RADFER** = *Radiocentrum ferrissi*; **SOHAFL** = *Sonorella hachitana flora*; **SONHAC** = *Sonorella hachitana*; **SONTOD** = *Sonorella todseni*

² Total live snails (adults and juveniles combined) calculated per hour

³ Total shells (adults and juveniles combined) calculated per hour

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Appendix A

Representative Photographs of Snails and Habitat



Photo 1. Chaney Canyon, Big Hatchet Mountains. Limestone outcrops in foreground and limestone cliffs in background.



Photo 2. Chaney Canyon, Big Hatchet Mountains. Limestone outcrops with vegetation; habitat of *Ashmunella hebardii* and *Holospira crossei*.



Photo 3. Chaney Canyon, Big Hatchet Mountains. Limestone slab under which live *Ashmunella hebardii* were observed.



Photo 4. Live *Ashmunella hebardii* observed under limestone slab (see photo 3).



Photo 5. *Ashmunella hebardii*; bleached shells and those with varying degrees of periostracum.



Photo 6. Chaney Canyon, Big Hatchet Mountains. *Holospira crosseii* shells.



Photo 7. Cookes Peak, Cooke's Range. burned Gambel's oak showing regrowth (sucker-sprouting) to ~ 1/3 to 1/2 former canopy height.



Photo 8. Cookes Peak, Cooke's Range. Rock piles not associated with talus. No snail sign observed. Burned Gambel's oak (background)



Photo 9. Cookes Peak, Cooke's Range. Excavated pit in center of talus slide. No snail sign observed.



Photo 10. Cookes Peak, Cooke's Range. Talus slide bordered by recovering Gambel's oaks. Oak-talus interface is prime *Ashmunella macromphala* habitat.



Photo 11. Cookes Peak, Cooke's Range. Excavated pit at oak-talus interface showing blacked soils and organic ash. Fire damaged *Ashmunella macromphala* shells found here.



Photo 12. Cookes Peak, Cooke's Range. Charred rock from excavated pit at oak-talus interface showing heat intensity.



Photo 13. Cookes Peak, Cooke's Range. Bleached and fire damaged *Ashmunella macromphala* shells from excavated pit at oak-talus interface.



Photo 14. Cookes Peak, Cooke's Range. Fire damaged *Ashmunella macromphala* shells and one shell with intact periostracum (recent mortality?) from excavated pit at oak-talus interface.



Photo 15. Howell's Ridge, Little Hatchet Mountains. Major limestone reef where *Holospira metcalfi* shells found along base of cliffs.



Photo 16. Howell's Ridge, Little Hatchet Mountains. Most northwestern limestone outcrop/reef where live *Holospira metcalfi* found.



Photo 17. Howell's Ridge, Little Hatchet Mountains. Sotol where many *Holospira metcalfi* shells were found along most northwestern limestone outcrop/reef.



Photo 19. Howell's Ridge, Little Hatchet Mountains. *Holospira metcalfi* shells (juveniles and adults).



Photo 18. Howell's Ridge, Little Hatchet Mountains. *Holospira metcalfi* shells under dead sotol (above).



Photo 20. Howell's Ridge, Little Hatchet Mountains. *Rabdotus durangoanus* shells.



Photo 21. Northwest of Baldy, Florida Mountains. Overview of *Sonorella hatchitana* flora habitat. Note mist in background.



Photo 23. Live *Sonorella hatchitana* flora *in situ* (center); northwest of Baldy, Florida Mountains.



Photo 22. *Sonorella hatchitana* flora habitat where live snail found; northwest of Baldy, Florida Mountains. Note mist in background.



Photo 24. Live *Sonorella hatchitana* flora foraging (?) on moist, dead grass; northwest of Baldy, Florida Mountains.



Photo 25. North-facing slopes in upper Capitol Dome Wash, Florida Mountains, overview.



Photo 26. Capitol Dome Wash, Florida Mountains. Talus slide on lower slopes where *Sonorella hatchitana flora* shells were found.



Photo 27. Capitol Dome Wash, Florida Mountains. *Sonorella hatchitana flora* shell in situ along edge of previous talus slide (see photo 26). Note partially intact periostracum and chestnut shoulderband.



Photo 28. Capitol Dome Wash, Florida Mountains. *Sonorella hatchitana flora* shells showing bleached shell (left) and shell with light periostracum.



Photo 29. Capitol Dome Wash, Florida Mountains. *Sonorella hatchitana flora* shells showing shell with moderate (left) and relatively intact periostracum.



Photo 31. Doña Ana Peak, Doña Ana Mountains. North slope. Excavated pit in talus; no snail sign found.



Photo 30. Doña Ana Peak, Doña Ana Mountains. North slope. Relatively shallow talus and parent material on lower slope; no snail sign found.



Photo 32. Doña Ana Peak, Doña Ana Mountains. North slope. Talus slide where many *Sonorella todseni* shells with periostracum intact and epiphragm scars found.



Photo 33. Doña Ana Peak, Doña Ana Mountains. North slope. *Sonorella todseni* shells (adults and juveniles) from previous talus slide (see photo 32).



Photo 35. Doña Ana Peak, Doña Ana Mountains. *Sonorella todseni*; adult shells showing relatively intact periostracum; from previous talus slide (see photo 32).



Photo 34. Doña Ana Peak, Doña Ana Mountains. *Sonorella todseni* epiphragm scars of varying sizes (i.e., life stages) on rocks; excavated shells from previous talus slide (see photo 32).



Photo 36. Doña Ana Peak, Doña Ana Mountains. *Sonorella todseni*; juvenile shells showing moderately intact periostracum; from previous talus slide (see photo 32).



Photo 37. Mineral Creek, Black Range. Overview of canyon looking downstream. *Oreohelix pilsbryi* habitat in the fore- to mid-ground.



Photo 39. Mineral Creek, Black Range. *Oreohelix pilsbryi* boulder habitat along road/canyon bottom.



Photo 38. Mineral Creek, Black Range. Recent road maintenance near *Oreohelix pilsbryi* habitat (left).



Photo 40. Mineral Creek, Black Range. *Oreohelix pilsbryi* boulder habitat upslope of canyon bottom.



Photo 41. Mineral Creek, Black Range. *Oreohelix pilsbryi* boulder habitat; live snail in center.



Photo 43. Mineral Creek, Black Range. Aestivating *Oreohelix pilsbryi*; juvenile and adult attached to rock with epiphragm.



Photo 42. Mineral Creek, Black Range. *Oreohelix pilsbryi* upland habitat ~ 30 m above canyon bottom.



Photo 44. Mineral Creek, Black Range. Aestivating *Oreohelix pilsbryi* with epiphragm intact.



Photo 45. Mineral Creek, Black Range. *Oreohelix pilsbryi* "waking up." Note epiphragm dissolving into a film of bubbles.



Photo 47. Mineral Creek, Black Range. *Oreohelix pilsbryi*; active adult "foraging" on dead vegetation.



Photo 46. Mineral Creek, Black Range. *Oreohelix pilsbryi*; juvenile and adult; adult is active.



Photo 48. Mineral Creek, Black Range. *Oreohelix pilsbryi*; adult "foraging" on moss and pine needles; Mineral Creek.



Photo 49. Mineral Creek, Black Range. *Oreohelix pilsbryi*; several adults “foraging” on various substrates.



Photo 50. Mineral Creek, Black Range. *Oreohelix pilsbryi*; juvenile “foraging” on cottonwood leaf.



Photo 51. Mineral Creek, Black Range. *Oreohelix pilsbryi*; adult “foraging” on vertical rock face.



Photo 52. Mineral Creek, Black Range. *Oreohelix pilsbryi*; adults “foraging” on wet, dead wood with moss.

Appendix B

Snail Localities Extracted from Published Reports and Articles

Appendix B. Snail Localities Extracted from Published Reports and Articles

Genus	species	County	Mountain Range	Source	Locality/Site (Primary)	Locality Information (Secondary)	Elevation (ft)	Collecting Station	Collection Date
Ashmunella	mendex	Grant	Black Range	Slaughter and Boykin 2011	East end of Iron Creek Campground, along creek and SE slope.	NW aspect	7308	Site 1: SwW1	7-Aug-10
Ashmunella	mendex	Grant	Black Range	Slaughter and Boykin 2011	West from Wright's Cabin Picnic area	W aspect	7783	Site 2: SwW2	5-Sep-10
Ashmunella	mendex	Grant	Black Range	Slaughter and Boykin 2011	South Blackrange Crest TR79	W aspect	8236	Site 3: SwW3	27-Aug-10
Ashmunella	mendex	Grant	Black Range	Slaughter and Boykin 2011	North Percha Creek	N aspect	7050	Site 4: SwW 4	5-Sep-11
Ashmunella	mendex	Grant	Black Range	Slaughter and Boykin 2011	NW Drummond Canyon, S Blackrange Crest TR79	E aspect	8996	Site 5: SwWS	28-Aug-10
Ashmunella	mendex	Grant	Black Range	Slaughter and Boykin 2011	Near mouth of N-S running ravine emptying into East Canyon, Yates Canyon area	N aspect	7300	Site 6: SwW6	6-Aug-11
Ashmunella	mendex	Grant	Black Range	Slaughter and Boykin 2011	Southeast from Iron Creek Campground	N aspect.	7300	Site 7: SwW7	28-Aug-10
Ashmunella	binneyi	Grant	Black Range	Slaughter and Boykin 2011	Upper SilverCreek	W aspect	8550	Site 8: SwWSTLBin	16-Sep-11
Ashmunella	binneyi	Grant	Black Range	Slaughter and Boykin 2011	Spring Canyon Trailhead	W aspect	7100	Site 9: SwW9Bin	24-Sep-11
Ashmunella	binneyi	Grant	Black Range	Slaughter and Boykin 2011	Spring Canyon	ENE aspect	7439	Site 10: SwWIOBinH	20-Aug-11
Ashmunella	binneyi	Grant	Black Range	Slaughter and Boykin 2011	Spring Canyon	S aspect	7396	Site 11: SwWIIBinH	19-Aug-11
Ashmunella	cockerelli	Grant	Black Range	Slaughter and Boykin 2011	Silver Creek	SW aspect	7420	Site 12: SwW12	3-Sep-11
Ashmunella	cockerelli	Grant	Black Range	Slaughter and Boykin 2011	Sawyer Peak	W aspect	9550	Site 13: SwW13TLCA	4-Sep-11
Ashmunella	cockerelli	Grant	Black Range	Slaughter and Boykin 2011	Royal John Mine	W aspect	7380	Site 14: SwW14	8-Aug-11
Ashmunella	cockerelli	Grant	Black Range	Slaughter and Boykin 2011	Royal John Mine	SE aspect	7700	Site 15: SwW15CP	17-Sep-11
Ashmunella	cockerelli	Grant	Black Range	Slaughter and Boykin 2011	None	None	7420	Site 16: SwW16	17-Sep-11
Ashmunella	mogollonensis	Catron	Mogollon	Slaughter and Boykin 2011	Bead Spring	NE aspect	9700	Site 17: SwW17MOG	10-Sep-11

Genus	species	County	Mountain Range	Source	Locality/Site (Primary)	Locality Information (Secondary)	Elevation (ft)	Collecting Station	Collection Date
Ashmunella	tetrodon	Catron	Mogollon	Slaughter and Boykin 2011	Sheridan Gulch	NW aspect	6900	Site 18: SwW18TET	9-Sep-11
Ashmunella	mendex	Grant	Black Range	Slaughter and Boykin 2011	Railroad Canyon	NNW aspect	7165	Site 0: RRC1	27-Aug-10
Ashmunella	mendex	Grant	Black Range	Slaughter and Boykin 2011	Railroad Canyon	None	7228	Site 19: RRC2	27-Aug-10
Ashmunella	mogollonensis	Catron	Mogollon	Slaughter and Boykin 2011	Silver Creek	None	8860	Site 20: SLVRRCR	11-Sep-11

Appendix C

Museum Records

Appendix C. Museum Records

Family	Genus	Species	Museum Acronym	Catalog No.	Locality	County	Collector	Date Collected	
Polygyridae	Ashmunella	ashmuni	FMIZC	484323	Jemez Mountains, 7 to 9 miles west of Los Alamos Junction on New Mexico highway 4	Sandoval	W., M.	10/17/1951	
Polygyridae	Ashmunella	ashmuni	FMIZC	18276	Santa Fe	Santa Fe	Clark, J.		
Polygyridae	Ashmunella	ashmuni	FMIZC	101085	Rita De Los Frijoles Canyon				
Polygyridae	Ashmunella	ashmuni	FMIZC	1274	El Rito De Los Frijoles				
Polygyridae	Ashmunella	ashmuni	FMIZC	200889	Jemez Mountains				
Polygyridae	Ashmunella	ashmuni	FMIZC	101084	Bland				
Polygyridae	Ashmunella	ashmuni	FMIZC	36554	N/A		Stegmaier, C.	8/19/1961	
Polygyridae	Ashmunella	ashmuni	FMIZC	101088	Jemez Mt., near Bland				
Polygyridae	Ashmunella	ashmuni	FMIZC	199323	Holbrook				
Polygyridae	Ashmunella	ashmuni	FMIZC	131713	Jemez Mts, W of Bland	Sandoval	Webb		
Polygyridae	Ashmunella	ashmuni	FMIZC	131712	E Slopes of Jemez Mountains, near Bland	Sandoval	Webb		
Polygyridae	Ashmunella	binneyi	FMIZC	131714	Black Range, on Silver Creek, above The Box		Ferriss, J.		
Polygyridae	Ashmunella	chiricahuana	FMIZC	199367	Bland				
Polygyridae	Ashmunella	chiricahuana	FMIZC	101090	Bland		Ashmun, E.		
Polygyridae	Ashmunella	chiricahuana	FMIZC	101092	Jemez Mountains, Bland				
Polygyridae	Ashmunella	cockerelli	FMIZC	131717	Black Range, S of Sawyers Peak, on Slope of Ravine at Grand Central Mine		Ferriss, J.		
Polygyridae	Ashmunella	cockerelli	FMIZC	131718	Black Range, in Upper Silver Creek and Its Branches, above N Flank of Sawyers Peak		Ferriss, J.		
Polygyridae	Ashmunella	cockerelli	FMIZC	450374	Gila National Forest, Black Range, Royal John Mine Road/Coldspring Canyon ca 1 mi from mine	Grant	Coles, Brian	3/22/2005	
Polygyridae	Ashmunella	danielsi	FMIZC	131719	W Slope of Mogollon Mountains in Cave Spring Canyon, Ca 2 mi N Little Whitewater Creek		Daniels, L.		
Polygyridae	Ashmunella	danielsi	FMIZC	101107	Mogollon Mountains, White Water Canyon		Daniels, L.		

Family	Genus	Species	Museum Acronym	Catalog No.	Locality	County	Collector	Date Collected	
Polygyridae	Ashmunella	danielsi	FMIZC	199399	Cave Spring, Mogollin Mountains	Catron			
Polygyridae	Ashmunella	danielsi	FMIZC	131720	W Slope of Mogollon Mountains in Cave Spring Canyon, Ca 2 mi N Little Whitewater Creek		Daniels, L.		
Polygyridae	Ashmunella	danielsi	FMIZC	131721	W Slope of Mogollon Mountains in Cave Spring Canyon, Ca 2 mi N Little Whitewater Creek		Ferriss, J.		
Polygyridae	Ashmunella	danielsi	FMIZC	101108	Mogollon Mountains, Cave Spring Canyon		Daniels, L.		
Polygyridae	Ashmunella	kochi	FMIZC	533008	E of Orange, Guadalupe Mountains, S branch canyon, W from highest peak		Pilsbry, Henry	11/1/1922	
Polygyridae	Ashmunella	mearnsi	FMIZC	199678	Big Hatchet Mountains, Daniel Mountain	Hidalgo			
Polygyridae	Ashmunella	mearnsi	FMIZC	131739	Hachita Grande	Grant	Ferriss, J.		
Polygyridae	Ashmunella	mearnsi	FMIZC	101141	Big Hatchet Mountains, Big Hatchet Peak				
Polygyridae	Ashmunella	mearnsi	FMIZC	131738	Hachita Grande Mountains	Grant	Daniels, L.		
Polygyridae	Ashmunella	mendax	FMIZC	546310	Black Mountain Range, Gallina Canyon	Grant	Bauer, David	3/16/1984	
Polygyridae	Ashmunella	mendax	FMIZC	519333	Percha Creek Canyon, 0.5 mi W of Kingston	Sierra		5/27/1996	
Polygyridae	Ashmunella	mendax	FMIZC	101142	Gallina Canyon				
Polygyridae	Ashmunella	mendax	FMIZC	131740	Black Range, from Gallina Canyon and Sawyer Peak, N to Black Canyon		Ferriss, J.		
Polygyridae	Ashmunella	mendax	FMIZC	484419	Black Range, tributary to Iron Creek, 1.6 miles west of summit, near highway 180	Sierra	W., M.	10/23/1951	
Polygyridae	Ashmunella	mendax	FMIZC	199679	Gallinas Canyon, Black Range	Lincoln			
Polygyridae	Ashmunella	mogollonensis	FMIZC	485199	Deadwood Canyon, 6.9 mi E of Hwy. 260, Mogollon Mts.	Catron	W., M.	10/24/1951	

Family	Genus	Species	Museum Acronym	Catalog No.	Locality	County	Collector	Date Collected	
Polygyridae	Ashmunella	mogollonensis	FMIZC	101143	Mogollon Mountains, Willow Creek				
Polygyridae	Ashmunella	mogollonensis	FMIZC	199692	Willow Creek, Mogollon Mountains				
Polygyridae	Ashmunella	mogollonensis	FMIZC	131741	Mogollon Mountains, Willow Creek		Daniels, L.		
Polygyridae	Ashmunella	pseudodonta	FMIZC	101153	near Baldondo Springs, Capitan Mountains	Lincoln			
Polygyridae	Ashmunella	pseudodonta	FMIZC	131749	Capitan Mountains, White Oaks	Lincoln	Webb		
Polygyridae	Ashmunella	pseudodonta	FMIZC	199895	White Oaks	Lincoln			
Polygyridae	Ashmunella	pseudodonta	FMIZC	101152	Capitan Mountains, White Oaks	Lincoln			
Polygyridae	Ashmunella	pseudodonta	FMIZC	131750	Capitan Mountains, White Oaks	Lincoln	Ferriss, J.		
Polygyridae	Ashmunella	pseudodonta	FMIZC	131751	near Baldonade Springs, Capitan Mountains	Lincoln	Webb		
Polygyridae	Ashmunella	pseudodonta	FMIZC	199894	Capitan Mountains				
Polygyridae	Ashmunella	rhyssa	FMIZC	131753	Sierra Blanca		Ferriss, J.		
Polygyridae	Ashmunella	rhyssa	FMIZC	101163	Cloudcroft, Sacramento Mountains	Otero	Pilsbry, H.		
Polygyridae	Ashmunella	rhyssa	FMIZC	200944	Beulah				
Polygyridae	Ashmunella	rhyssa	FMIZC	101165	Columbine and Panay Canyons, Cloudcroft	Otero			
Polygyridae	Ashmunella	rhyssa	FMIZC	545938	Cloudcroft	Otero	Bauer, David	6/4/1986	
Polygyridae	Ashmunella	rhyssa	FMIZC	131752	Sierra Blanca		Webb		
Polygyridae	Ashmunella	rhyssa	FMIZC	101162	Sacramento Mountains		Ferriss, J.		
Polygyridae	Ashmunella	rhyssa	FMIZC	200881	near Cloudcroft	Otero			
Polygyridae	Ashmunella	rhyssa	FMIZC	101164	Alama Gorde Creek, Sacramento Mountains		Ferriss, J.		
Polygyridae	Ashmunella	rhyssa	FMIZC	199730	Sierra Blanca				
Polygyridae	Ashmunella	rhyssa	FMIZC	101166	Cloudcroft	Otero			
Polygyridae	Ashmunella	rhyssa	FMIZC	131755	Beulah		Webb		
Polygyridae	Ashmunella	rhyssa	FMIZC	200880	Sierra Blanco				
Polygyridae	Ashmunella	rhyssa	FMIZC	200943	Cloudcroft	Otero			
Polygyridae	Ashmunella	rhyssa	FMIZC	519332	Alamo Canyon, 8.4 mi S of High Rolls	Otero		4/21/1996	
Polygyridae	Ashmunella	rhyssa	FMIZC	484240	2 miles east of Cloudcroft	Otero	W., M.	5/7/1953	

Family	Genus	Species	Museum Acronym	Catalog No.	Locality	County	Collector	Date Collected	
Polygyridae	Ashmunella	rhyssa	FMIZC	484333	Sierra Blanca Mountains, 1.5 miles west of Alto, 5.6 miles north of Ruidoso	Lincoln		10/20/1951	
Polygyridae	Ashmunella	rhyssa	FMIZC	527458	Sacramento Mountains, Lincoln National Forest, near Cloudcroft	Otero	Prowinsky, F	6/7/1981	
Polygyridae	Ashmunella	rhyssa	FMIZC	47083	Sacramento Mountains, Lincoln National Forest, near Cloudcroft	Otero	Provinsky, F.	7/7/1981	
Polygyridae	Ashmunella	rhyssa	FMIZC	131754	Cloudcroft, Sacramento Mountains, Head of James Canyon	Otero			
Polygyridae	Ashmunella	tetrodon	FMIZC	131758	Black Range, from Holdens Spring, N to Black Canyon and Morgan Creek	Socorro Co.			
Polygyridae	Ashmunella	tetrodon	FMIZC	101172	Dry Creek Canyon, Mogollon Mountains				
Polygyridae	Ashmunella	tetrodon	FMIZC	199729	Dry Creek Canyon, Mogollon Mountains				
Polygyridae	Ashmunella	tetrodon	FMIZC	101173	Big Dry Creek, Mogollon Mountains				
Polygyridae	Ashmunella	tetrodon	FMIZC	131757	SW Slope of Mogollon Mountains in Big Dry Creek , in & above The "box"	Socorro Co.	Daniels, L.		
Polygyridae	Ashmunella	tetrodon	FMIZC	101171	Big Dry Creek, Mogollon Mountains				
Polygyridae	Ashmunella	thomsoniana	FMIZC	199847	Beulah				
Polygyridae	Ashmunella	thomsoniana	FMIZC	101174	Canen Diablo, near Rowe	San Miguel			
Polygyridae	Ashmunella	thomsoniana	FMIZC	101178	Sapello	San Miguel			
Polygyridae	Ashmunella	thomsoniana	FMIZC	101176	Upper Sapello Canyon, Beulah				
Polygyridae	Ashmunella	thomsoniana	FMIZC	541743	Tesuque Creek, Sangre de Cristo Mountains	Santa Fe	Ports, Mark	3/27/2000	
Polygyridae	Ashmunella	thomsoniana	FMIZC	484231	11 miles up Pecos Canyon from Pecos	San Miguel	W., M.	10/21/1951	
Polygyridae	Ashmunella	thomsoniana	FMIZC	484229	northeast of Santa Fe, Santa Fe Canyon, one half mile above gate		W., M.	10/21/1951	

Family	Genus	Species	Museum Acronym	Catalog No.	Locality	County	Collector	Date Collected	
Polygyridae	Ashmunella	thomsoniana	FMIZC	101175	Between Las Vegas and Truth Or Consequences				
Polygyridae	Ashmunella	thomsoniana	FMIZC	101177	Canyon Diabolo				
Polygyridae	Ashmunella	townsendi	FMIZC	485233	South bank Rio Bonita on Hwy. 380, 5.5 mi W of Lincoln	Lincoln	W., M.	10/19/1951	
Polygyridae	Ashmunella	townsendi	FMIZC	485177	s bank Rio Bonita, on Hwy. 380, 5.5 mi W of Lincoln	Lincoln	Hausman, Frank		
Polygyridae	Ashmunella	walkeri	FMIZC	200879	Florida Mountains	Luna Co.			
Polygyridae	Ashmunella	walkeri	FMIZC	101191	Florida Mountains	Luna Co.			
Polygyridae	Ashmunella	walkeri	FMIZC	131763	Florida Mountains	Luna Co.	Ferriss, J.		
Urocoptidae	Holospira	animasensis	FMIZC	296941	North end of Animas Mountains, 11 Air km Southeast of Animas, North Slope	Hidalgo	Worthington, R.	4/5/1998	
Urocoptidae	Holospira	bilamellata	FMIZC	50176	Hachete Grande Mts	Hidalgo			
Urocoptidae	Holospira	bilamellata	FMIZC	179725	Hachita, Grande Mountains	Hidalgo	Daniels, L.		
Urocoptidae	Holospira	bilamellata	FMIZC	486640	Hacheta Grande Mountains		Pilsbry, Henry; Ferriss, James; Daniels, Lorenzo	11/30/1909	
Urocoptidae	Holospira	bilamellata	FMIZC	50175	Hachete Grande Mts, Sheridan Canyon	Hidalgo			
Urocoptidae	Holospira	bilamellata	FMIZC	450373	Big Hatchet Mountains	Hidalgo	Coles, Brian	3/21/2005	
Urocoptidae	Holospira	cockerelli	FMIZC	159019	Near Chloride		Rusnov, L.		
Urocoptidae	Holospira	cockerelli	FMIZC	50181	R mi S of Chloride	Grant			
Urocoptidae	Holospira	cockerelli	FMIZC	179730	Hermosa		Ferriss, J.		
Urocoptidae	Holospira	crossei	FMIZC	50182	Big Hatchet Peak, Summit	Hidalgo			
Urocoptidae	Holospira	metcalfi	FMIZC	21814	Howells Ridge, Ca. 4 mi W Old Hachita, near Howells Ridge Cave, Under Cliffs on N-facing Slope of Ridge	Grant	Metcalf, A.	10/23/1971	
Urocoptidae	Holospira	metcalfi	FMIZC	255410	Howells Ridge, Ca. 4 mi W Old Hachita, near Howells Ridge Cave, Under Cliffs on N-facing Slope of Ridge	Grant	Metcalf, A.	10/23/1971	

Family	Genus	Species	Museum Acronym	Catalog No.	Locality	County	Collector	Date Collected	
Urocoptidae	Holospira	metcalfi	FMIZC	21813	Howells Ridge, Ca. 4 mi W Old Hachita near Howells Ridge Cave, Under Cliffs on N-facing Slope of Ridge	Grant	Metcalf, A.	10/23/1971	
Urocoptidae	Holospira	montivaga	FMIZC	36070	Guadalupe Mountains, Ledges above Devils Den Spring, North Facing Slope	Eddy	Metcalf, A.	3/2/1968	
Urocoptidae	Holospira	montivaga	FMIZC	179800	Mckittrick Canyon, Guadalupe Mountains, near Pine Springs	Culberson Co.	Cheatum, E.	10/23/1970	
Urocoptidae	Holospira	montivaga	FMIZC	179799	Guadalupe Mountains, N Fork North Mckittrick Canyon, 1 mi S Devils Den Spring	Eddy		3/2/1968	
Oreohelicidae	Radiocentrum	hachetana	FMIZC	209468	Big Hatchet Mountains, Summit of Hatchet Grande	Hidalgo			
Xanthonychidae	Sonorella	hachitana	FMIZC	131675	On W side at "spring Canyon"	Luna Co.	Ferriss, J.		
Xanthonychidae	Sonorella	hachitana	FMIZC	131669	Big Hatchet Mountains	Hidalgo	Webb		
Xanthonychidae	Sonorella	hachitana	FMIZC	103597	Florida Mountains		Ferriss, J.		
Xanthonychidae	Sonorella	hachitana	FMIZC	561616	Organ Mountains				
Xanthonychidae	Sonorella	hachitana	FMIZC	131671	Hachita Grande Mountains		Daniels, L.		
Xanthonychidae	Sonorella	hachitana	FMIZC	209646	Big Hatchet Mountains	Hidalgo			
Xanthonychidae	Sonorella	hachitana	FMIZC	131674	N/A	Grant	Ferriss, J.		
Xanthonychidae	Sonorella	hachitana	FMIZC	103595	Hachite Grand Mountains				
Xanthonychidae	Sonorella	hachitana	FMIZC	131670	Saddle Peak of Hachita Grande Mountains		Ferriss, J.		
Xanthonychidae	Sonorella	hachitana	FMIZC	131667	Roder	Grant	Ferriss, J.		
Xanthonychidae	Sonorella	hachitana	FMIZC	131668	Big Hatchet Mountains	Hidalgo	Webb		
Polygyridae	Ashmunella ashmundi (Dall, 1896)		FMNH	146255	Bland	Sandoval	E. H. Ashman		
Polygyridae	Ashmunella ashmundi (Dall, 1896)		FMNH	39892	Bland	Sandoval			
Polygyridae	Ashmunella ashmundi (Dall, 1896)		FMNH	39894	Bland	Sandoval			
Polygyridae	Ashmunella ashmundi (Dall, 1896)		FMNH	39924	Jemez Mountains				
Polygyridae	Ashmunella ashmundi (Dall, 1896)		FMNH	60524	El Rito de los Frijoles Canyon	Sandoval			
Polygyridae	Ashmunella ashmundi (Dall, 1896)		FMNH	60525	Bland	Sandoval			
Polygyridae	Ashmunella ashmundi (Dall, 1896)		FMNH	61971	El Rito de los Frijoles, 35 NW of Santa Fe	Sandoval	J. B. Henderson	1910	
Polygyridae	Ashmunella ashmundi (Dall, 1896)		FMNH	75848	El Rito de los Frijoles, NW of Santa Fe	Sandoval	J. B. Henderson		

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Polygyridae	Ashmunella	ashmundi (Dall, 1896)	FMNH	90980	Bland	Sandoval			
Polygyridae	Ashmunella	ashmundi (Dall, 1896)	FMNH	97052	Bland	Sandoval			
Polygyridae	Ashmunella	ashmundi (Dall, 1896)	FMNH	97083	Bland	Sandoval			
Polygyridae	Ashmunella	ashmundi (Dall, 1896)	FMNH	99844	Bland	Sandoval	E. H. Ashman		
Polygyridae	Ashmunella	ashmuni (Dall, 1897)	FMNH	54134	Cloudcroft	Sandoval	G. Webb	2-Jul-47	
Polygyridae	Ashmunella	chiricahuana (Dall, 1896)	FMNH	146286	Sta. 15, Spring Creek, Black Range	Grant	J. H. Ferriss, H. A. Pilsbry	1915	
Polygyridae	Ashmunella	chiricahuana (Dall, 1896)	FMNH	158025	Sta. 55, Little Whitewater Canyon, Mogollon Mountains, Glenwood		J. H. Ferriss, L. E. Daniels	2-Sep-14	
Polygyridae	Ashmunella	cockerelli Pilsbry & Ferriss, 1917	FMNH	146246	Sta. 22, Sawyers Peak, Black Range	Grant	H. A. Pilsbry, J. H. Ferriss	1915	
Polygyridae	Ashmunella	cockerelli Pilsbry & Ferriss, 1917	FMNH	146257	Sta. 11, Silver Creek, Black Range	Grant	H. A. Pilsbry, J. H. Ferriss	1915	
Polygyridae	Ashmunella	cockerelli Pilsbry & Ferriss, 1917	FMNH	191721	Black Range	Grant	Walker		
Polygyridae	Ashmunella	cockerelli Pilsbry & Ferriss, 1917	FMNH	39895	Sta. 22, Sawyers Peak trail, Gr. Central Mine, Black Range	Grant			
Polygyridae	Ashmunella	danielsi Pilsbry & Ferriss, 1915	FMNH	146277	Cave Spring Canyon, ½ mi below Spring at Kitt's Cabin (St. 57), Mogollon Mts.	Catron	J. H. Ferriss, L. E. Daniels	9-Apr-14	
Polygyridae	Ashmunella	danielsi Pilsbry & Ferriss, 1915	FMNH	39896	Cave Spring Creek, Mogollon Mts.	Catron			
Polygyridae	Ashmunella	kochi Clapp	FMNH	60635	San Andreas Range	Dona Ana			
Polygyridae	Ashmunella	mearnsi (Dall, 1895)	FMNH	146270	Sta. 5, E side of Daniels Mt., Hacheta Grande Mountains	Grant	H. A. Pilsbry, L. E. Daniels	22-Aug-10	
Polygyridae	Ashmunella	mearnsi (Dall, 1895)	FMNH	39909	Sta. 5. Daniels Peak, Big Hatchet Mountains	Hidalgo			
Polygyridae	Ashmunella	mearnsi (Dall, 1895)	FMNH	61985	Sta. 10. Hacheta Grande Mt. H.G. Mts.	Hidalgo	H. A. Pilsbry, L. E. Daniels	25-Aug-10	
Polygyridae	Ashmunella	mearnsi (Dall, 1895)	FMNH	61986	Thompson Canyon, Hatcheta Grande Mountains	Hidalgo	H. A. Pilsbry, L. E. Daniels	27-Aug-10	
Polygyridae	Ashmunella	mendax Pilsbry & Ferriss, 1917	FMNH	146224	Sta. 2, Galina Creek, Black Range	Hidalgo	H. A. Pilsbry, J. H. Ferriss	1915	
Polygyridae	Ashmunella	mendax Pilsbry & Ferriss, 1917	FMNH	39910	Galina Canyon, Black Range	Hidalgo			

Family	Genus	Species	Museum Acronym	Catalog No.	Locality	County	Collector	Date Collected	
Polygyridae	Ashmunella	mogollonensis Pilsbry, 1905	FMNH	118200	Willow Creek, Mogollon Mountains	Catron	B. Walker		
Polygyridae	Ashmunella	mogollonensis Pilsbry, 1905	FMNH	118239	Willow Creek, 1.5 mi above Gordam's Ranch, Mogollon Mountains	Catron	J. H. Ferriss	15-Aug-14	
Polygyridae	Ashmunella	mogollonensis Pilsbry, 1905	FMNH	145894	Willow Creek, 1.5 mi above Gordam's Ranch, Mogollon Mountains	Socorro	J. H. Ferriss, L. E. Daniels	15-Aug-14	
Polygyridae	Ashmunella	mogollonensis Pilsbry, 1905	FMNH	146256	Sta. 79, Big Dry Creek, above the Box, Mogollon Mountains	Socorro	J. H. Ferriss, L. E. Daniels	7-Sep-14	
Polygyridae	Ashmunella	mogollonensis Pilsbry, 1905	FMNH	191717	Mogollon Mountains	Catron			
Polygyridae	Ashmunella	mogollonensis Pilsbry, 1905	FMNH	39912	Head Gulch, Montezuma Canyon	Catron			
Polygyridae	Ashmunella	mogollonensis Pilsbry, 1905	FMNH	39913	Willow Creek, Mogollon Mountains	Catron			
Polygyridae	Ashmunella	mogollonensis Pilsbry, 1905	FMNH	39914	Mogollon Mountains	Socorro			
Polygyridae	Ashmunella	mogollonensis Pilsbry, 1905	FMNH	58089	Sta. 46, Willow Creek, Mogollon Mountains	Catron	J. H. Ferriss, L. E. Daniels	15-Aug-14	
Polygyridae	Ashmunella	mogollonensis Pilsbry, 1905	FMNH	60559	Sta. 41, Silver Creek, Mogollon Mountains	Socorro	J. H. Ferriss, L. E. Daniels	1914	
Polygyridae	Ashmunella	mogollonensis Pilsbry, 1905	FMNH	60560	Sta. 42, Silver Creek, Mogollon Mountains	Catron	J. H. Ferriss, L. E. Daniels	1914	
Polygyridae	Ashmunella	mogollonensis Pilsbry, 1905	FMNH	60561	Sta. 43. Silver Creek, Mogollon Mountains`	Catron	J. H. Ferriss, L. E. Daniels	1914	
Polygyridae	Ashmunella	mogollonensis Pilsbry, 1905	FMNH	60562	Sta. 53, Willow Creek, Mogollon Mountains		J. H. Ferriss, L. E. Daniels	1914	
Polygyridae	Ashmunella	mogollonensis Pilsbry, 1905	FMNH	60564	Sta. 79, Dry Creek, Mogollon Mountains	Catron	J. H. Ferriss, L. E. Daniels	1914	
Polygyridae	Ashmunella	mogollonensis Pilsbry, 1905	FMNH	60566	Mineral Creek, Mogollon Mountains		J. H. Ferriss, L. E. Daniels		
Polygyridae	Ashmunella	mogollonensis Pilsbry, 1905	FMNH	90929	Willow Creek, Mogollon Mountains	Socorro	J. H. Ferriss, L. E. Daniels		
Polygyridae	Ashmunella	mogollonensis Pilsbry, 1905	FMNH	90953	Big Dry Creek, Mogollon Mountains		J. H. Ferriss, L. E. Daniels		
Polygyridae	Ashmunella	pseudodonta (Dall, 1897)	FMNH	135674	Capitan Mountains	Lincoln	E. H. Ashman		
Polygyridae	Ashmunella	pseudodonta (Dall, 1897)	FMNH	146283	Capitan Mountains, White Oaks	Lincoln			
Polygyridae	Ashmunella	pseudodonta (Dall, 1897)	FMNH	39893	Capitan Mountains	Lincoln			
Polygyridae	Ashmunella	pseudodonta (Dall, 1897)	FMNH	39918	White Oaks	Lincoln			

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Polygyridae	Ashmunella pseudodonta (Dall, 1897)		FMNH	60527	White Oak Mountain	Lincoln			
Polygyridae	Ashmunella pseudodonta (Dall, 1897)		FMNH	60528	Summit, Capitan Mountains	Lincoln	G. A. Solem, C. Philips		
Polygyridae	Ashmunella pseudodonta (Dall, 1897)		FMNH	90979	Capitan Mountains	Lincoln	E. H. Ashman, T. D. Cockerell		
Polygyridae	Ashmunella pseudodonta (Dall, 1897)		FMNH	90998	White Oaks	Lincoln			
Polygyridae	Ashmunella pseudodonta (Dall, 1897)		FMNH	96933	White Oaks	Lincoln			
Polygyridae	Ashmunella rhyssa (Dall, 1897)		FMNH	118236	Cloudcroft	Otero			
Polygyridae	Ashmunella rhyssa (Dall, 1897)		FMNH	118696	Cloudcroft	Otero	B. Shimek	12-Sep-06	
Polygyridae	Ashmunella rhyssa (Dall, 1897)		FMNH	146230	Cloudcroft	Otero	G. R. Webb	2-Jul-47	
Polygyridae	Ashmunella rhyssa (Dall, 1897)		FMNH	146232	Sacramento Mountains	Otero	B. Shimek	1-Sep-04	
Polygyridae	Ashmunella rhyssa (Dall, 1897)		FMNH	146233	Sacramento Mountains, Cloudcroft	Otero	J.A.C. Rehn, Viereck	1902	
Polygyridae	Ashmunella rhyssa (Dall, 1897)		FMNH	146244	Columbus & Pansy Canyons	Otero	A. G. Ruthwen		
Polygyridae	Ashmunella rhyssa (Dall, 1897)		FMNH	146274	South Fork, Sierra Blanca	Otero			
Polygyridae	Ashmunella rhyssa (Dall, 1897)		FMNH	146278	Sierra Blanca Mountains	Otero	E. H. Ashman		
Polygyridae	Ashmunella rhyssa (Dall, 1897)		FMNH	158952	Cloudcroft	Otero			
Polygyridae	Ashmunella rhyssa (Dall, 1897)		FMNH	29998	near Cloudcroft	Otero	W.L. Necker	15-Sep-48	
Polygyridae	Ashmunella rhyssa (Dall, 1897)		FMNH	39911	Sierra Blanco	Lincoln			
Polygyridae	Ashmunella rhyssa (Dall, 1897)		FMNH	39919	Cloudcroft	Otero			
Polygyridae	Ashmunella rhyssa (Dall, 1897)		FMNH	39920		Otero			
Polygyridae	Ashmunella rhyssa (Dall, 1897)		FMNH	39921	Cloudcroft	Otero			
Polygyridae	Ashmunella rhyssa (Dall, 1897)		FMNH	39922	Beulah	Otero			
Polygyridae	Ashmunella rhyssa (Dall, 1897)		FMNH	39923	Sierra Blanca Mountains	Otero			
Polygyridae	Ashmunella rhyssa (Dall, 1897)		FMNH	39925	Sierra Blanca	Otero			
Polygyridae	Ashmunella rhyssa (Dall, 1897)		FMNH	39926	Sierra Blanca	Otero			
Polygyridae	Ashmunella rhyssa (Dall, 1897)		FMNH	60530	Sierra Blanca, Cloudcroft	Otero			
Polygyridae	Ashmunella rhyssa (Dall, 1897)		FMNH	74500	Cloudcroft, Sacramento Mountains	Otero	G.H. Clapp	2-Oct-02	
Polygyridae	Ashmunella rhyssa (Dall, 1897)		FMNH	77187	Cloudcroft, Sacramento Mountains	Otero	C. R. Orcutt	24-Jul-26	
Polygyridae	Ashmunella rhyssa (Dall, 1897)		FMNH	86563	S fork Sierra Blanca	Otero	E. Jaeger, H. Little	Jul 1934	
Polygyridae	Ashmunella rhyssa (Dall, 1897)		FMNH	90967	Cloudcroft	Otero	F.L. Button		
Polygyridae	Ashmunella rhyssa (Dall, 1897)		FMNH	90970	Sierra Blanca Mountains	Otero			
Polygyridae	Ashmunella rhyssa (Dall, 1897)		FMNH	90978	Sierra Blanca Mountains	Otero			
Polygyridae	Ashmunella rhyssa (Dall, 1897)		FMNH	91258	Cloudcroft	Otero	F.L. Button		
Polygyridae	Ashmunella rhyssa (Dall, 1897)		FMNH	99843	Sierra Blanca Mountains	Otero	E. H. Ashman		

Family	Genus	Species	Museum Acronym	Catalog No.	Locality	County	Collector	Date Collected	
Polygyridae	Ashmunella tetradon Pilsbry & Ferriss, 1915		FMNH	118232	Big Dry Canyon, Mogollon Mountains	Catron			
Polygyridae	Ashmunella tetradon Pilsbry & Ferriss, 1915		FMNH	146223	Sta. 60, Big Dry Creek, in the Box, Mogollon Mountains	Socorro	J. H. Ferriss, L. E. Daniels	6-Sep-14	
Polygyridae	Ashmunella tetradon Pilsbry & Ferriss, 1915		FMNH	146225	Cave Creek, Black Range	Grant	J. H. Ferriss, L. E. Daniels	1915	
Polygyridae	Ashmunella tetradon Pilsbry & Ferriss, 1915		FMNH	146231	Sta. 69, Dry Creek Canyon, Mogollon Mountains	Socorro	J. H. Ferriss, L. E. Daniels	7-Sep-14	
Polygyridae	Ashmunella tetradon Pilsbry & Ferriss, 1915		FMNH	146245	Sta. 72, Big Dry Creek, Mogollon Mountains	Socorro	J. H. Ferriss, L. E. Daniels	7-Sep-14	
Polygyridae	Ashmunella tetradon Pilsbry & Ferriss, 1915		FMNH	146263	Sta. 30, Black Range	Socorro	J. H. Ferriss, H. A. Pilsbry	1915	
Polygyridae	Ashmunella tetradon Pilsbry & Ferriss, 1915		FMNH	191718	Mogollon Mountains	Socorro	Walker		
Polygyridae	Ashmunella tetradon Pilsbry & Ferriss, 1915		FMNH	39915	Dry Creek Canyon, Mogollon Mountains	Catron			
Polygyridae	Ashmunella tetradon Pilsbry & Ferriss, 1915		FMNH	39927	Dry Creek Canyon, Mogollon Mountains	Catron			
Polygyridae	Ashmunella tetradon Pilsbry & Ferriss, 1915		FMNH	39928	Sta. 36, near McKnights Cabin, Black Range	Sierra			
Polygyridae	Ashmunella tetradon Pilsbry & Ferriss, 1915		FMNH	58090	Sta. 77, Big Dry Canyon, Mogollon Mountains	Catron	J. H. Ferriss	7-Sep-14	
Polygyridae	Ashmunella tetradon Pilsbry & Ferriss, 1915		FMNH	60540	Sta. 1, San Mateo Mountains	Catron	J. H. Ferriss	1915	
Polygyridae	Ashmunella tetradon Pilsbry & Ferriss, 1915		FMNH	90989	Big Dry Creek, Mogollon Mountains	Catron	J. H. Ferriss, L. E. Daniels		
Polygyridae	Ashmunella thomsoniana (Ancey, 1887)		FMNH	146221	Pecos	San Miguel	T. D. Cockerell		
Polygyridae	Ashmunella thomsoniana (Ancey, 1887)		FMNH	146226	Sapello Canyon	San Miguel	J. H. Ferriss		
Polygyridae	Ashmunella thomsoniana (Ancey, 1887)		FMNH	295108	Indian Creek, Santa Fe National Forest	San Miguel			
Polygyridae	Ashmunella thomsoniana (Ancey, 1887)		FMNH	39929	Beulah	San Miguel			
Polygyridae	Ashmunella thomsoniana (Ancey, 1887)		FMNH	39930	Las Vegas				
Polygyridae	Ashmunella thomsoniana (Ancey, 1887)		FMNH	39931	Corton				
Polygyridae	Ashmunella thomsoniana (Ancey, 1887)		FMNH	60522	Blakes Ranch	San Miguel			
Polygyridae	Ashmunella thomsoniana (Ancey, 1887)		FMNH	75842	Manzanares Valley, Rowe	San Miguel			
Polygyridae	Ashmunella thomsoniana (Ancey, 1887)		FMNH	75843	Diablo Canyon	San Miguel			
Polygyridae	Ashmunella thomsoniana (Ancey, 1887)		FMNH	75844	Blake's Ranch	San Miguel			
Polygyridae	Ashmunella thomsoniana (Ancey, 1887)		FMNH	86765	Las Vegas, Hot Springs	San Miguel	G. W. Sodner	2-Apr-03	
Polygyridae	Ashmunella thomsoniana (Ancey, 1887)		FMNH	86780	Cañon Diablo, near Rowe	San Miguel	G. W. Sodner	2-Apr-03	

Family	Genus	Species	Museum Acronym	Catalog No.	Locality	County	Collector	Date Collected	
Polygyridae	Ashmunella thomsoniana (Ancey, 1887)		FMNH	86906	Manzanares Valley	San Miguel	G. W. Sodner	2-Apr-03	
Polygyridae	Ashmunella thomsoniana (Ancey, 1887)		FMNH	86928	Maryanns Valley			20-Jan-02	
Polygyridae	Ashmunella thomsoniana (Ancey, 1887)		FMNH	90997	Sapello Canyon	San Miguel			
Polygyridae	Ashmunella thomsoniana (Ancey, 1887)		FMNH	91471	Beulah	San Miguel			
Polygyridae	Ashmunella thomsoniana (Ancey, 1887)		FMNH	97731	Canyon Diablo, near Rowe	San Miguel			
Polygyridae	Ashmunella townsendi Bartsch, 1904		FMNH	110195	5.5 mi W of Lincoln	Lincoln	M. Walton	19-Oct-51	
Polygyridae	Ashmunella walkeri Ferriss, 1904		FMNH	146247	Florida Mountains	Luna	H. A. Pilsbry	1906	
Polygyridae	Ashmunella walkeri Ferriss, 1904		FMNH	146279	Florida Mountains	Luna			
Polygyridae	Ashmunella walkeri Ferriss, 1904		FMNH	39933	Florida Mountains	Luna			
Polygyridae	Ashmunella walkeri Ferriss, 1904		FMNH	60637	Florida Mountains	Luna			
Urocoptidae	Holospira bilamellata Dall, 1895		FMNH	42164	Sta. 5, E side Daniels Mt. Big Hachet Mts.				
Urocoptidae	Holospira bilamellata Dall, 1895		FMNH	60705	St. 5, E side of Daniels Mountains Hachete Grande Mts.		H. A. Pilsbry, J. H. Ferriss, L. E. Daniels	22-Aug-10	
Urocoptidae	Holospira cockerelli Dall, 1897		FMNH	41799	4 mi S of Chloride				
Urocoptidae	Holospira cockerelli Dall, 1897		FMNH	60714	Cuchille Mts.				
Urocoptidae	Holospira cockerelli Dall, 1897		FMNH	60715	Black Range, S of Ocean Wave		H. A. Pilsbry, J. H. Ferriss		
Urocoptidae	Holospira cockerelli Dall, 1897		FMNH	60716	Black Ranch Little Paloma				
Urocoptidae	Holospira cockerelli Dall, 1897		FMNH	61991	Sta. 55, Ocean Wave Mine, Cuchillo Mts.		H. A. Pilsbry, J. H. Ferriss	1915	
Urocoptidae	Holospira cockerelli Dall, 1897		FMNH	61992	Sam's Cn. Chloride		J. H. Ferriss		
Urocoptidae	Holospira cockerelli Dall, 1897		FMNH	75301	Sam's Canyon, Chloride				
Holospiridae	Holospira crossei Dall, 1895		FMNH	41796	Big Hacheta Mt.				
Holospiridae	Holospira crossei Dall, 1895		FMNH	60717	Hacheta Grande Mts.				
Oreohelicidae	Oreohelix barbata Pilsbry, 1905		FMNH	40086	Dry Creek Canyon, Mogollon Mts.				
Oreohelicidae	Oreohelix barbata Pilsbry, 1905		FMNH	60179	Sta. 68 Sw. side of Mogollon Mts. N. M. {Dry Creek Canyon}				
Oreohelicidae	Oreohelix barbata Pilsbry, 1905		FMNH	60180	Sta. 71, Big Dry Canyon, Mogollon Mts.			7-Sep-14	
Oreohelicidae	Oreohelix barbata Pilsbry, 1905		FMNH	60181	Sta. 72, Dry Creek Canyon, Mogollon Mts.				
Oreohelicidae	Oreohelix barbata Pilsbry, 1905		FMNH	60182	Sta. 73, Dry Creek Canyon, Mogollon Mts.				
Oreohelicidae	Oreohelix barbata Pilsbry, 1905		FMNH	60183	Sta. 77, Dry Creek Canyon, SW side of Mogollon Mts.			7-Sep-14	

Family	Genus	Species	Museum Acronym	Catalog No.	Locality	County	Collector	Date Collected	
Oreohelicidae	Oreohelix barbata Pilsbry, 1905		FMNH	60184	Sta. 79, Dry Creek Canyon, Mogollon Mts.			1914	
Oreohelicidae	Oreohelix barbata Pilsbry, 1905		FMNH	60185	Cave Spring Canyon, Mogollon Mts.				
Oreohelicidae	Oreohelix barbata Pilsbry, 1905		FMNH	60186	Willow Creek, Mogollon Mts.				
Oreohelicidae	Oreohelix barbata Pilsbry, 1905		FMNH	60187	Little Whitewater Creek, Mogollon Mts.				
Oreohelicidae	Oreohelix barbata Pilsbry, 1905		FMNH	60189	Mogollon Mts., Silver Creek				
Oreohelicidae	Oreohelix barbata Pilsbry, 1905		FMNH	90532	Sta. 70, Big Dry Creek, Mogollon Mts.			1914	
Oreohelicidae	Oreohelix barbata Pilsbry, 1905		FMNH	90533	Station 71, Big Dry Creek, Mogollon Mts.			1914	
Oreohelicidae	Oreohelix metcalfei Cockerell, 1905		FMNH	111741	Sta. 11, Black Range		J. H. Ferriss	1915	
Oreohelicidae	Oreohelix metcalfei Cockerell, 1905		FMNH	147407	Black Range	Grant			
Oreohelicidae	Oreohelix metcalfei Cockerell, 1905		FMNH	147416	Silver Creek, Black Range				
Oreohelicidae	Oreohelix metcalfei Cockerell, 1905		FMNH	40084	Sta. 7, Silver Creek above Box Black Range Mt.				
Oreohelicidae	Oreohelix metcalfei Cockerell, 1905		FMNH	40085	Sta. 15, Spring Creek Black Range				
Oreohelicidae	Oreohelix metcalfei Cockerell, 1905		FMNH	40087	sta. 15, Spring Creek Black Range				
Oreohelicidae	Oreohelix metcalfei Cockerell, 1905		FMNH	60140	nr. Hillsboro		J. C. Kelly		
Oreohelicidae	Oreohelix metcalfei Cockerell, 1905		FMNH	60197	{sta. 53}, Sam's Canyon, S of Chloide				
Oreohelicidae	Oreohelix metcalfei Cockerell, 1905		FMNH	60218	Manzanaires				
Oreohelicidae	Oreohelix pilsbryi Ferriss, 1917		FMNH	40093	Oliver Mine near Chlorida				
Oreohelicidae	Oreohelix pilsbryi Ferriss, 1917		FMNH	60131	Black Range				
Oreohelicidae	Oreohelix strigosa (Gould, 1846)		FMNH	146596			S. Blatchley		
Oreohelicidae	Oreohelix strigosa (Gould, 1846)		FMNH	60097	Manzanores	San Miguel	M. Cooper		
Oreohelicidae	Oreohelix strigosa (Gould, 1846)		FMNH	62047	Pecos Canyon, Santa Fe				
Oreohelicidae	Oreohelix strigosa (Gould, 1846)		FMNH	62048	Pecos R., Santa Fe		J. H. Ferriss	1922	
Oreohelicidae	Oreohelix strigosa depressa (Cockerell, 1890)		FMNH	40112	Manzanares Valley, Las Vegas Range				
Oreohelicidae	Oreohelix subrudis (Reeve, 1854)		FMNH	111656	San Mateo Mts.				
Oreohelicidae	Oreohelix subrudis (Reeve, 1854)		FMNH	60269	10 mi E of Luna, San Francisco Mts.		J. H. Ferriss, L. E. Daniels	1914	
Oreohelicidae	Oreohelix subrudis (Reeve, 1854)		FMNH	60270	Sta. 36, Lisa Crk., San Francisco Mts.		J. H. Ferriss, L. E. Daniels	1914	

Family	Genus	Species	Museum Acronym	Catalog No.	Locality	County	Collector	Date Collected	
Oreohelicidae	Oreohelix subrudis (Reeve, 1854)		FMNH	60271	San Mateo Mts., Sta. 2		J. H. Ferriss	1915	
Oreohelicidae	Oreohelix subrudis (Reeve, 1854)		FMNH	60272	Sta. 39, Silver Creek near Mogollon City {Dutton's Springs, Animas Canyon Black		H. A. Pilsbry, J. H. Ferriss	1915	
Oreohelicidae	Oreohelix subrudis (Reeve, 1854)		FMNH	60273	Sta. 9 Aspen So. side Silver Cr., Sawyer Peak, Black Range		H. A. Pilsbry, J. H. Ferriss	1915	
Oreohelicidae	Oreohelix subrudis (Reeve, 1854)		FMNH	60274	Manzanaras	San Miguel			
Oreohelicidae	Oreohelix subrudis (Reeve, 1854)		FMNH	60275	Nogale Pk	Lincoln	Phillips		
Oreohelicidae	Oreohelix subrudis (Reeve, 1854)		FMNH	60276	Sta. 36, Salice Creek, Salice Mt., 20 miles N of Alma			7-Aug-14	
Oreohelicidae	Oreohelix subrudis (Reeve, 1854)		FMNH	60277	Sta. 39, Silver Creek, near Mogollon Mts.		J. H. Ferriss, L. E. Daniels		
Oreohelicidae	Oreohelix subrudis (Reeve, 1854)		FMNH	60278	Sta. 42, Bursam Rd., Mogollon Mts., Black Cn., Black River		J. H. Ferriss, L. E. Daniels	1915	
Oreohelicidae	Oreohelix subrudis (Reeve, 1854)		FMNH	60279	Willow Creek 1 ½ miles above Gordons Ranch, Mogollon Mts., Sta. 46		J. H. Ferriss, L. E. Daniels	15-Aug-14	
Oreohelicidae	Oreohelix subrudis (Reeve, 1854)		FMNH	60280	Sta. 48, Willow Creek below Gordans Ranch, Mogollon Mts.			22-Aug-14	
Oreohelicidae	Oreohelix subrudis (Reeve, 1854)		FMNH	60281	Sta. 52, Mineral Cr., near Bincan Road, Mogollon Mts.		J. H. Ferriss, L. E. Daniels	1914	
Oreohelicidae	Oreohelix subrudis (Reeve, 1854)		FMNH	60327	Sta. 45, Morgan Cr. Black Range		J. H. Ferriss	1915	
Oreohelicidae	Oreohelix subrudis (Reeve, 1854)		FMNH	60328	San Mateo Mts., Sta. 6		J. H. Ferriss	1915	
Oreohelicidae	Oreohelix subrudis (Reeve, 1854)		FMNH	62077	Sta. 1, San Mateo Mts.				
Oreohelicidae	Oreohelix swopei Pilsbry & Ferriss, 1917		FMNH	147434	Morgan Creek Canyon, Black Range				
Oreohelicidae	Oreohelix swopei Pilsbry & Ferriss, 1917		FMNH	40100	Sta. 45, Black Range				
Oreohelicidae	Oreohelix yavapai neomexicana Pilsbry, 1905		FMNH	40097	Manzanaras Valley, Las Vegas Range				
Oreohelicidae	Oreohelix yavapai Pilsbry, 1905		FMNH	40092	Red River	Taos			
Oreohelicidae	Oreohelix yavapai Pilsbry, 1905		FMNH	60216	Grants	Valencia			
Oreohelicidae	Oreohelix yavapai Pilsbry, 1905		FMNH	60217	N side Sandia Mts., nr. Golden		J. H. Ferriss		
Oreohelicidae	Oreohelix yavapai Pilsbry, 1905		FMNH	90378	La Paz Trail, Sandia Mts.	Bernalillo	E. Richards	9-Nov-47	

Family	Genus	Species	Museum Acronym	Catalog No.	Locality	County	Collector	Date Collected	
Oreohelicidae	Radiocentrum	ferrissi (Pilsbry, 1915)	FMNH	39934	Sta. 3, Cliffs opp. mouth of Sheridan Canyon, Big Hachet Mts.				
Oreohelicidae	Radiocentrum	hachetana Pilsbry, 1917	FMNH	40082	Summit Hacheta Grande, Big Hachet Mts.				
Oreohelicidae	Radiocentrum	hachetana Pilsbry, 1917	FMNH	40083	Big Hachet Mts.				
Helminthoglyptidae	Sonorella	caerulifluminis Pilsbry & Ferriss, 1919	FMNH	60386	Steeple Rock	Grant	J. H. Ferriss	1914	
Helminthoglyptidae	Sonorella	hachitana flora Pilsbry & Ferriss	FMNH	60331	Florida Mts.	Luna	J. H. Ferriss	1904	
Helminthoglyptidae	Sonorella	hachitana orientis Pilsbry, 1936	FMNH	118362	Hachita Grande Mts.				
Helminthoglyptidae	Sonorella	hachitana orientis Pilsbry, 1936	FMNH	158927	Florida Mts.	Luna	H. A. Pilsbry, J. H. Ferriss	1910	
Helminthoglyptidae	Sonorella	hachitana orientis Pilsbry, 1936	FMNH	158953	Skull Canyon, Peloncillo Mts.	Hidalgo	L. E. Daniels	15-Nov-07	
Helminthoglyptidae	Sonorella	hachitana orientis Pilsbry, 1936	FMNH	158954	Small Peak, Head of Thompsons Canyon (Sta. 8), Hacheta Grand Mts.	Grant	H. A. Pilsbry, L. E. Daniels	24-Aug-10	
Helminthoglyptidae	Sonorella	hachitana orientis Pilsbry, 1936	FMNH	60330	Sta. 7, Mt. at head of Thompson Canyon, Hachila Grande Mts.		H. A. Pilsbry, L. E. Daniels	24-Aug-10	
Helminthoglyptidae	Sonorella	hachitana orientis Pilsbry, 1936	FMNH	62025	Florida Mts.	Luna			
Helminthoglyptidae	Sonorella	hachitana orientis Pilsbry, 1936	FMNH	90969	Florida Mts.				
Urocoptidae	Holospira	animasensis	LACM		11 air km SE of Animas; north end of Animas Mountains				
Urocoptidae	Holospira	animasensis	LACM		11 air km SE of Animas; north end of Animas Mountains				
Urocoptidae	Holospira	metcalfi	LACM		about 4 mi. (7 km) W of Old Hachita; N facing slope of Howell's Ridge				
Helminthoglyptidae	Sonorella	hachitana flora	LACM		near Deming; Florida Mtns.				
Polygyridae	Ashmunella	danielsi dispar	LACM		in Little Whitewater Canyon; W slope of Mogollon Mountains				
Polygyridae	Ashmunella	tetrodon animorum	LACM		Black Canyon; 0.5 mi. S of Reed Cabin				
Polygyridae	Ashmunella	thomsoniana porterae	LACM		Canyon Beulah; Upper Sapello				

Family	Genus	Species	Museum Acronym	Catalog No.	Locality	County	Collector	Date Collected	
Oreohelicidae	Radiocentrum	hachetana	LACM		summit of Hacheta Grande Mountain				
Helminthoglyptidae	Sonorella	hachitana peloncillensis	LACM		where cyn. bends from N to E; about 2 to 2.5 mi above the mouth of Skull Cyn.				
Helminthoglyptidae	Sonorella	painteri	LACM		San Luis Mtns.; northeastern reach of Lang Canyon				
Helminthoglyptidae	Sonorella	painteri	LACM		San Luis Mtns.; northeastern reach of Lang Canyon				
Polygyridae	Ashmunella	ashmuni	MCZ	221645	White Oak		James Poling	8/21/2007	
Polygyridae	Ashmunella	ashmuni	MCZ	94838	S. of Jemes Sprs., San Diego Canyon		T. E. White	5/8/2009	
Polygyridae	Ashmunella	binneyi	MCZ	47127	Blade Range, Spring Creek, Sta. 15		Henry A. Pilsbry, James H. Ferriss	12/31/1915	
Polygyridae	Ashmunella	binneyi	MCZ	222103	Black Range, Spring Creek, Sta. 15		Henry A. Pilsbry, James H. Ferriss	12/31/1915	
Polygyridae	Ashmunella	carlsbadensis	MCZ	94402	S.W. of Carlsbad, Dark Canyon		[no agent data]	5/1/2009	
Polygyridae	Ashmunella	chiricahuana	MCZ	47076	Bland	Santa Fe	[no agent data]	8/19/2009	
Polygyridae	Ashmunella	cockerelli	MCZ	222105	Black Range, Silver Creek, Sta. 10		Henry A. Pilsbry, James H. Ferriss	12/31/1915	
Polygyridae	Ashmunella	cockerelli	MCZ	47124	Black Range, Trail towards Sawyer's Peak, 2nd ravine from Grand Central Mine, Sta. 22		Henry A. Pilsbry, James H. Ferriss	12/31/1915	
Polygyridae	Ashmunella	cockerelli	MCZ	47125	Black Range, Tributary of Silver Cr., Sta. 10		Henry A. Pilsbry, James H. Ferriss	12/31/1915	

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Polygyridae	Ashmunella	danielsi	MCZ	47133	Cave Spring Canyon	Socorro	James H. Ferriss, Daniels	12/31/1914	
Polygyridae	Ashmunella	danielsi	MCZ	221137	Mogollon Mts, Little Whitewater Creek		James H. Ferriss, Daniels	12/31/1914	
Polygyridae	Ashmunella	kochi	MCZ	106449	Guadalupe Mts., Pine Spring Canyon		[no agent data]	1/15/2009	
Polygyridae	Ashmunella	kochi	MCZ	47126	Organ Mtns., Sta. 237		Henry A. Pilsbry, James H. Ferriss	8/19/2009	
Polygyridae	Ashmunella	kochi	MCZ	106447	Guadalupe Mts., East of Orange, Canyon South of Px Trail		Henry A. Pilsbry, James H. Ferriss	1/15/2009	
Polygyridae	Ashmunella	kochi	MCZ	106448	Guadalupe Mts., East of Orange, East side butte on canyon		Henry A. Pilsbry, James H. Ferriss	1/15/2009	
Polygyridae	Ashmunella	levettei	MCZ	368432	Santa Fe Canyon		[no agent data]	9/27/2010	
Polygyridae	Ashmunella	mearnsi	MCZ	151947	Summit Hachita, Grande Mt.		Henry A. Pilsbry	5/28/2008	
Polygyridae	Ashmunella	mearnsi	MCZ	47132	Big Hatchet Mtns., Sta. 5		Henry A. Pilsbry, L. E. Daniels	12/31/1910	
Polygyridae	Ashmunella	mearnsi	MCZ	222102	Hacheta Grande Mountains, Daniels Mountain, Sta. 5		[no agent data]	7/22/1910	
Polygyridae	Ashmunella	mearnsi	MCZ	180456	Big Hatchet Mts., Thompson Canyon		[no agent data]	9/26/2007	
Polygyridae	Ashmunella	mendax	MCZ	222104	Black Range, Gallina Canyon, Sta. 2		Henry A. Pilsbry, James H. Ferriss	12/31/1915	
Polygyridae	Ashmunella	mendax	MCZ	47128	Blade Range, Gallnias Canyon		Henry A. Pilsbry, James H. Ferriss	12/31/1915	

Family	Genus	Species	Museum Acronym	Catalog No.	Locality	County	Collector	Date Collected	
Polygyridae	Ashmunella	mogollensis	MCZ	47005	Mogollon Mts., 16 mi. from Mogollon		Daniels	8/18/2009	
Polygyridae	Ashmunella	mogollonensis	MCZ	221197	Willo Creek, Mogollon Mts		James H. Ferriss, Dan	12/31/1914	
Polygyridae	Ashmunella	mogollonensis	MCZ	47134	Cave Spring Canyon	Socorro	James H. Ferriss, Daniels	12/31/1914	
Polygyridae	Ashmunella	nhysoa	MCZ	108153	Clouderaff		Lee R. Dice	12/31/1927	
Polygyridae	Ashmunella	nogalensis	MCZ	75230	Canyon 4-5 mi. S. W. of Nogal Park		[no agent data]	11/19/2009	
Polygyridae	Ashmunella	organensis	MCZ	101816	above Dripping Spring, Organ Mts.		Henry A. Pilsbry	12/31/1922	
Polygyridae	Ashmunella	pseudodonta	MCZ	8426	Capitan Mts.		[no agent data]	2/5/2010	
Polygyridae	Ashmunella	rhyisia	MCZ	75240	Sierra Blanka, W. flank of Nogal Park		Henry A. Pilsbry	11/19/2009	
Polygyridae	Ashmunella	rhyssa	MCZ	180452	Sacramento Mts., Clouderaff		[no agent data]	9/26/2007	
Polygyridae	Ashmunella	rhyssa	MCZ	180453	Sierra Blanca		[no agent data]	9/26/2007	
Polygyridae	Ashmunella	rhyssa	MCZ	118484	South Fork Sierra Blanca		Jaeger, Little	12/31/1934	
Polygyridae	Ashmunella	rhyssa	MCZ	8429	Sierra Blanca Mts.		[no agent data]	1/14/2010	
Polygyridae	Ashmunella	rhyssa	MCZ	245541	Sacramento Mountains, 2 miles S of Clouderaff, Pine Forest Camp, 8600 ft	Otero	Joseph C. Bequaert	12/31/1961	
Polygyridae	Ashmunella	rhyssa	MCZ	167613	Box Canyon		[no agent data]	6/2/2008	
Polygyridae	Ashmunella	rhyssa	MCZ	167614	Clouderaff, Columbine and Pansy Canyons		[no agent data]	6/2/2008	
Polygyridae	Ashmunella	rhyssa	MCZ	47135	Sacramento Mts., James Canyon, Cloudcroft		Rebun, Viereck	12/31/1902	
Polygyridae	Ashmunella	rhyssa	MCZ	8427	Sierra Blanca Mts.		[no agent data]	1/14/2010	
Polygyridae	Ashmunella	rhyssa	MCZ	13758	Sacramento Mts., Clouderaff		[no agent data]	2/22/2010	
Polygyridae	Ashmunella	rhyssa	MCZ	8428	Sierra Blanca Mts.		[no agent data]	1/14/2010	
Polygyridae	Ashmunella	rhyssa	MCZ	246686	ca. 9000ft., near cloud crost	Otero	Harry K. Clench	7/20/1963	

Family	Genus	Species	Museum Acronym	Catalog No.	Locality	County	Collector	Date Collected	
Polygyridae	Ashmunella	rhyssa	MCZ	167621	Cloudcroft		[no agent data]	11/13/2008	
Polygyridae	Ashmunella	rhyssa	MCZ	180451	Sacramento Mts., Cloudcroft		[no agent data]	9/26/2007	
Polygyridae	Ashmunella	rhyssa	MCZ	185535	Sacramento Mts at Cloud craft		Charles Russell Orcutt	12/31/1926	
Polygyridae	Ashmunella	rhyssa	MCZ	54783	Cloudcroft, Sacramento Mts.		[no agent data]	5/14/2009	
Polygyridae	Ashmunella	ryhssa	MCZ	245584	Sacramento Mountains, 7 mi. NE of Clouderoft, Silver Springs Canyon	Otero	Joseph C. Bequaert	12/31/1961	
Polygyridae	Ashmunella	tetradon	MCZ	47123	Black Range, Head of Las Animas Canyon, Holdens Spring		Henry A. Pilsbry	12/31/1915	
Polygyridae	Ashmunella	tetradon	MCZ	47136	San Mateo Mtns., Sta. 1		James H. Ferriss	8/20/2009	
Polygyridae	Ashmunella	tetrodon	MCZ	47167	Dry Creek	Socorro	James H. Ferriss, Daniels	12/31/1914	
Polygyridae	Ashmunella	tetrodon	MCZ	222110	SW side of Mogollan Mountains, Big Dry Creek, Sta. 80		James H. Ferriss, Daniels	12/31/1914	
Polygyridae	Ashmunella	thompsonia	MCZ	99409	Santa Fe National Forest, Indian Creek, banks		[no agent data]	2/6/2009	
Polygyridae	Ashmunella	thompsoniana	MCZ	69224	Santa Fe Canyon		H. P. Mera	4/29/2009	
Polygyridae	Ashmunella	thomsoniana	MCZ	47172	Las Vegas Hot Springs	San Miguel	Mary Cooper	8/20/2009	
Polygyridae	Ashmunella	thomsoniana	MCZ	31752	Beulah		[no agent data]	3/6/2011	
Polygyridae	Ashmunella	thomsoniana	MCZ	254590	Sangre de Cristo Mts.	San Miguel	J. P. Miller	12/31/1956	
Polygyridae	Ashmunella	thomsoniana	MCZ	23368	Pecos	San Miguel	R. V. Chamberlin	9/14/2007	
Polygyridae	Ashmunella	thomsoniana	MCZ	180457	Manzanares Valley	San Miguel	[no agent data]	9/26/2007	
Polygyridae	Ashmunella	thomsoniana	MCZ	180399	Sapello Canyon	San Miguel	[no agent data]	9/25/2007	
Polygyridae	Ashmunella	thomsoniana	MCZ	8430	Beula		[no agent data]	1/14/2010	
Polygyridae	Ashmunella	thomsoniana	MCZ	47137	Sapello Canyon	San Miguel	Henry Skinner	12/31/1901	

Family	Genus	Species	Museum Acronym	Catalog No.	Locality	County	Collector	Date Collected	
Polygyridae	Ashmunella	townsendiana	MCZ	75232	Sierra Blanca, Water Canyon, W. flank of Nogal Park		Henry A. Pilsbry	12/31/1922	
Polygyridae	Ashmunella	walkeri	MCZ	151934	Florida Mts.		Henry A. Pilsbry, James H. Ferriss	3/5/2009	
Polygyridae	Ashmunella	walkeri	MCZ	180454	Florida Mts.	Luna	Bryant Walker	9/26/2007	
Polygyridae	Ashmunella	walkeri	MCZ	47131	Florida Mtns.		Henry A. Pilsbry	12/31/1906	
Polygyridae	Ashmunella	walkeri	MCZ	134052	Florida Mts.		James H. Ferriss	3/5/2009	
Polygyridae	Ashmunella	walkeri	MCZ	86835	Florida Mts.		[no agent data]	3/5/2009	
Urocoptidae	Holospira	bilamellata	MCZ	221192	Sta 5., Hachets Grande Mts., Daniels Mts		Henry A. Pilsbry, Daniels	8/1/2007	
Urocoptidae	Holospira	bilamellata	MCZ	70386	Hatchita Grande		ex E.E. Hand	5/15/2009	
Urocoptidae	Holospira	bilamellata	MCZ	47012	Hachete Grande Mts., E. side Daniels Mt.		Daniels	8/18/2009	
Oreohelicidae	Oreohelix	barbata	MCZ	221196	Mogollon Mts		[no agent data]	8/1/2007	
Oreohelicidae	Oreohelix	barbata	MCZ	165890	Mogollon Mts., St. 71, Big Dry Cr.		[no agent data]	5/14/2008	
Oreohelicidae	Oreohelix	barbata	MCZ	167611	S.W. side of Mogollon Mts., Big Dry Cr.		[no agent data]	9/7/1914	
Oreohelicidae	Oreohelix	barbata	MCZ	167716	1/2 mi. above Gordon's Ranch, Willow Creek		[no agent data]	6/2/2008	
Oreohelicidae	Oreohelix	barbata	MCZ	184784	Cave Spring Canyon, west side of Mogollen Mountains		[no agent data]	12/31/1914	
Oreohelicidae	Oreohelix	hachetana	MCZ	222101	Hacheta Grande Mountains, Big Hatchet Mountain		[no agent data]	8/25/1910	
Oreohelicidae	Oreohelix	metcalfei	MCZ	99408	Santa Fe National Forest, near Tererro		[no agent data]	2/6/2009	
Oreohelicidae	Oreohelix	metcalfei	MCZ	221193	Sta 1+2 Cuchillo Mts		James H. Ferriss	12/31/1915	

Family	Genus	Species	Museum Acronym	Catalog No.	Locality	County	Collector	Date Collected	
Oreohelicidae	Oreohelix	metcalfei	MCZ	165897	Sta 16 Iron Cr. Black Range		[no agent data]	5/14/2008	
Oreohelicidae	Oreohelix	metcalfei	MCZ	165880	W. side Sawyer Pk., Black Range		[no agent data]	5/14/2008	
Oreohelicidae	Oreohelix	metcalfi	MCZ	222107	Black Range, Spring Creek, Sta. 15		Henry A. Pilsbry, James H. Ferriss	12/31/1915	
Oreohelicidae	Oreohelix	metcalfi	MCZ	222106	Black Range, Silver Creek, Sta. 3		Henry A. Pilsbry, James H. Ferriss	12/31/1915	
Oreohelicidae	Oreohelix	pilsbryi	MCZ	165905	Nr. Chlorne, Mineral Cr., nr. Oliver Mine, Sta 52	Sierra	[no agent data]	5/14/2008	
Oreohelicidae	Oreohelix	strigosa	MCZ	167612	20 mi. N. of Alma, Salice Mts., Salice Cr.		[no agent data]	7/8/1914	
Oreohelicidae	Oreohelix	strigosa	MCZ	180550	nr. Rowe, Canyon Diablo	San Miguel	G. W. H. Soelner	10/1/2007	
Oreohelicidae	Oreohelix	strigosa	MCZ	176166	5 miles S of James Springs, San Diego Canyon	Bernalillo	T. E. White	11/26/2007	
Oreohelicidae	Oreohelix	strigosa	MCZ	178064	6 mi. E of Canjilon	Rio Arriba	W. S. White, B. F. Merriam	7/25/1934	
Oreohelicidae	Oreohelix	strigosa	MCZ	213518	Saugre de Cristo Mts.		J. P. Miller	4/11/2007	
Oreohelicidae	Oreohelix	swopei	MCZ	222108	Black Range, Morgan Creek, Sta. 45		Henry A. Pilsbry, James H. Ferriss	12/31/1915	
Helminthoglyptidae	Sonorella	animasensis	MCZ	101817	Animas Rouge, above Black Bill Spg.	Hidalgo	Henry A. Pilsbry, Harvey	3/16/2009	
Helminthoglyptidae	Sonorella	hachitana	MCZ	47165	Big Hachet Mtns., Station 7		Henry A. Pilsbry, Daniels	12/31/1910	
Helminthoglyptidae	Sonorella	hachitana	MCZ	221184	Peloncillo Mts., Skull Canyon		James H. Ferriss, Daniels	12/31/1910	

Family	Genus	Species	Museum Acronym	Catalog No.	Locality	County	Collector	Date Collected	
Helminthoglyptidae	Sonorella	hachitana	MCZ	47151	Florida Mtns.		James H. Ferriss, Henry A. Pilsbry	12/31/1906	