Status and Distribution of Terrestrial Snails in Southwestern New Mexico

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Interim Report to:
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Share With Wildlife Program

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New Mexico talussnail (Florida Mountains)
(*Sonorella hatchitana 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 the 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 is 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.

Methods

Preparation for 2020 field surveys of SGCN terrestrial snails 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 in separate Microsoft Excel spreadsheets. In preparation for 2021 surveys, I reviewed reports that were unavailable in 2020 (e.g., Lang 2005, 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 Florida Museum of Natural History, Field Museum of Natural History Chicago, and Museum of Comparative Zoology Harvard); these new records were added to the respective 2020 spreadsheets. 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 land snails in southwestern New Mexico from the late 1980's to the early 2000's.

In 2021, I continued to coordinate with knowledgeable individuals from the USFS and BLM familiar with the landscape 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 BLM-managed lands in Chaney Canyon in the Big Hatchet Mountains and Mahoney Park in the Florida Mountains.

I surveyed for snails using visual encounter surveys (VES) that targeted micro-environments that 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 vs. rocky talus). The actual survey approach at any given site is dictated by on-site conditions and varies widely among sites and species.

All data, including presence of snail species (including live snails, shells, or shell fragments), site GPS coordinates, land manager and district, and county will be provided to NMDGF in an Excel spreadsheet compatible with existing NMDGF databases. I photo-vouchered live specimens and shells and photographed representative habitat at each site.

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.

Preliminary Results

In preparation for 2021 field surveys, I used an iterative approach that included revisiting historical localities extracted and mapped from reports, articles, and museums[1] 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.

Field Surveys

Field surveys occurred during 21-28 June 2021. Survey results are summarized in ***Table 1***. I found snails and/or shells of target species at all surveyed areas.

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

Table 1. Terrestrial snail survey results for target areas in southwestern New Mexico, June 2021.

Locality	Mountain Range	County	Sites Surveyed[a]	Species Observed[b] (live snails/shells/fragments)
Howell's Ridge	Little Hatchet Mtns.	Grant	6	*Holospira metcalfi* (1/188/46); *Radiocentrum ferrissi* (fossil) (0/1/0)
Chaney Canyon	Big Hatchet Mtns.	Hidalgo	7	*Ashmunella hebardi* (1/64/50); *Holospira crossei* (1/>1000+/na)[c]
Cooke's Peak	Cooke's Range	Luna	7	*Ashmunella macromphala* (0/14/59); *Pupoides albilabris* (0/9/0); *Helicodiscus* spp. (0/5/0)
Mineral Creek	Black Range	Sierra	10	*Oreohelix pilsbryi* (312/>100/na)[d]
Baldy Peak, NW slope	Florida Mtns.	Luna	4	*Sonorella hatchitana flora* (1/7/11)

[a] Sites surveyed relates to unique and/or separate habitat features within a given locality
[b] Species identifications are considered preliminary until further collections and comparisons are made.
[c] Hillslopes were literally littered with shells; due to abundance of whole shells, shell fragments were not noted (na).
[d] Due to ideal survey conditions, surveys focused on counts of live snails only; shells were abundant on slopes, fragments were not noted (na).

Howell's Ridge in the Little Hatchet Mountains consists of several, discreet limestone outcrops. In 2020, we found that the central outcrop appears to be the most robust, extant population of Metcalf Holospira (*Holospira metcalfi)* based on the number of live, aestivating snails observed there. The large outcrop to the southeast and the eastern portion of the outcrop to the northwest of this central outcrop were devoid of shells in 2020. In 2021, I surveyed the western portion of the latter outcrop and found only bleached shells of Metcalf Holospira; no live snails were observed. I also surveyed an approximately 100 meter (m) (328 feet (ft)) outcrop further northwest of the above outcrops and found shells to be common and one live snail. There appears to be another potentially suitable outcrop to the northwest of the latter that I will target later in 2021 and I will resurvey previously surveyed outcrops during wetter periods (if the occasion arises) to better understand which outcrops of Howell's Ridge represent extant populations.

I surveyed Chaney Canyon in the northwest portion the Big Hatchet Mountains below Big Hatchet Peak. Cross Holospira (*Holospira crossei*) shells were first encountered at 1829 m (6000 ft) and became more abundant as elevation increased into the pinyon pine (*Pinus edulis*) zone. I first encountered Hacheta Grande woodlandsnails (*Ashmunella hebardi*) at 1935 m (6350 ft) and their occurrence also increased with increasing elevation in the pinyon zone. One live, aestivating Hacheta Grande woodlandsnail was observed beneath a flat limestone slab. I will continue surveys in Chaney Canyon and other areas in the Big Hatchet Mountains (e.g., Daniels Mountain in Thompson Canyon and vicinity of Big Hatchet Peak).

Survey results for Cooke's Peak woodlandsnail (*Ashmunella macromphala*) in talus slides impacted by the BLM 2014 controlled burn were like those of 2020. Excavations of rocks along

the talus-Gambel's oak (*Quercus gambelii*)[2] interface yielded bleached shells and fragments, possible mortalities from direct or indirect fire/heat effects, embedded in a matrix of burned/charred organic matter. One recent shell (i.e., periostracum still intact) was observed. I also surveyed rocky hillslopes and the center of exposed talus slides (i.e., away from the talus-oak interface) to search other potential habitats. No sign of Cooke's Peak woodlandsnail were detected during surveys in these areas. Going forward, I will continue to focus surveys along the talus-oak 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, thus providing a better understanding of its' current population status.

In 2020, I reported that live, aestivating Mineral Creek mountainsnails (*Oreohelix pilsbryi*) were relatively abundant and easily detected (Wallace 2021). Surveys in 2021 occurred immediately prior to, during, and following a rainstorm of approximately 13 millimeters (mm) (0.5 inches[3]). As such, survey conditions were optimal for snail surface activity, and I observed at least an order of magnitude more live snails of all life stages than in 2020. This underscores the necessity to survey under ideal weather conditions when snails are surface active to ascertain the current population status of a species.

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) report 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 114 live snails (78 adults, 36 juveniles). As both up-canyon and up-slope surveys ended with detections, there is no question that this species occurs beyond these points. Future surveys will continue to delineate the extent of the Mineral Creek mountainsnail's geographic range.

I surveyed for New Mexico talussnails (Florida Mountains; *Sonorella hachitana flora*) below the northwestern slope of Baldy Peak above Mahoney Park. Survey conditions were good as the area received ≥ 8 millimeters (0.3 in) of rain the previous day[4]. Soils were saturated and some rock exposures were wetted and there was a light to steady rain during surveys. I targeted sites where shells had been observed in 2020; several more shells were observed this year. One live, active, juvenile snail was observed apparently foraging on a small, dried bunch grass.

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[2] At present, the oaks are sucker-sprouting and the "crowns" are about a third the height (~ 1-2 m) of the former canopy.

[3] As reported from the nearest National Weather Service (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 sufficient to cause a small flash flood in the canyon.

[4] As reported from the nearest NWS station at Deming, NM approximately 24 airline km (15 mi) northwest of Mahoney Park. Based on field experience at this site, the mountain received more rain than the valley bottom hence the " ≥ ."

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