CEBOLLA CANYON RESTORATION AREA
ALBUQUERQUE RESOURCE AREA
BUREAU OF LAND MANAGEMENT
NEW MEXICO

PRELIMINARY SMALL MAMMAL SURVEY

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S U M M A R Y

As part of the ongoing riparian restoration efforts in Cebolla Canyon, Cibola County, New Mexico, a preliminary small mammal survey was conducted on October 13, 2009, in three different habitats currently found in the canyon: a dry reach upstream of the spring dominated by rabbitbrush (*Ericameria nauseosa*; herein referred to as 'Reach 0'; Fig. 1), the wetland area near the spring (Wetland; Fig. 2), and a downstream reach dominated by willows (Willows; Fig. 3). Mist-netting for bats was also conducted in a downstream reach where water pooled sufficiently to provide a surface from which bats can drink (Fig. 4). A total of 50 rodents of a minimum of five species was captured, including *Neotoma stephensi*, *Onychomys leucogaster*, *Perognathus flavus*, *Peromyscus sp*., and *Reithrodontomy megalotis.* In addition, one Townsend's big-eared bat (*Corynorhinus townsendii*) - a federal species of concern – was captured. Maintenance and expansion of the wetland area in Cebolla Canyon could provide suitable habitat for riparian species that have historically been recorded in Cibola County, including *Microtus longicaudus, Microtus mogollonensis,* and *Sigmodon fulviventer,* as well as critical habitat for several of New Mexico's Species of Greatest Conservation Need, including the meadow jumping mouse, *Zapus hudsonius*, and the Arizona montane vole, *Microtus montanus arizonensis*, and the western red bat, *Lasiurus blossevillii.*

Fig. 1. Reach 0, one of the sites of small mammal trapping, upstream of the spring, dominated by rabbitbrush.

13 S 239542E 3840446N (WGS84)

Fig. 2. Wetland area near the spring where small mammal trapping occurred.

13 S 238817E 3841116N (WGS84)

Fig. 3. A line of Sherman traps used to survey small mammals in a Cebolla Canyon site dominated by willows.

13 S 234957E 3843786N (WGS84)

Fig. 4. Cebolla Canyon site where Townsend's big-eared bat was captured.

13 S 234718E 3845878N (WGS84)

B A C K G R O U N D

Riparian and wetland ecosystems throughout North America have suffered disproportionate degradation since European settlement, exemplified in New Mexico by its estimated loss of one third of its wetlands (Dahl 1990). Human settlement and associated river channelization is the primary driver of degradation in the large riparian areas of New Mexico, as seen along the Rio Grande, whereas overgrazing is the primary driver in many of the smaller systems (Kauffman & Krueger 1984), such as in Cebolla Canyon. Since these systems harbor disproportionately high

biodiversity, the consequences of degradation have been dramatic, with approximately 80% of all sensitive and specially classified vertebrate species in New Mexico dependent upon riparian or aquatic habitat (NMDGF 2006). Of these vertebrate species, the small mammals and bats that are considered Species of Greatest Conservation Need and highly dependent on high quality riparian and wetland habitat include the meadow jumping mouse, *Zapus hudsonius*, the Arizona montane vole, *Microtus montanus arizonensis,* and the western red bat, *Lasiurus blossevillii* (NMDGF 2006). Populations of these species are considered sensitive due to small population sizes coupled with declining populations resulting from the loss of wetland and riparian habitat and "improper grazing practices" (AZ Bat Conservation Strategic Plan 2003, NMDGF 2004).

The Cebolla Canyon riparian restoration efforts to date have successfully restored wetland vegetation around Cebolla Spring and should ultimately lead to a higher water table and thus more vegetation and consistent surface water availability. These components are key to restoring the sensitive species discussed above, as well as less sensitive species that may have been extirpated from the canyon due to the loss of habitat. Other small mammal species that are associated with riparian habitats that have been recorded in Cibola County (Arctos database query, accessed 1 November, 2009) include the long-tailed vole, *Microtus longicaudus,* the Mogollon vole, *M. mogollonensis,* and the yellow-bellied cotton bat, *Sigmodon fulviventer*.

The purpose of this preliminary study was to assess small mammal communities in three different reaches of Cebolla Canyon, to determine how species composition differed across available habitats and to determine if any species indicative of a healthy riparian system had yet recolonized the site. In addition, we conducted a preliminary hour of mist-netting to assess the composition of the bat community.

M E T H O D S

Three sites were identified for trapping: Reach 0, Wetland, and Willow (Figs. 1-3). On October 13, 2009, Sherman traps (H.B. Sherman, Tallahassee, FL, LFA 3x3.5x9") were placed in grids to survey the small mammals. At Reach 0, 10 rows, 10 m apart, of 20 traps, 5 m apart, were placed perpendicular to the canyon walls. At the Wetland site, 10 rows, 10 m apart, of 20 traps, 5 m apart, were placed parallel to the canyon walls. The remaining available traps (120) were placed

along the stream, downstream of the spring, in an area characterized by dense Willow vegetation. All traps were baited with oats, opened shortly before sunset, and removed shortly after sunrise the following morning. All captured individuals were processed shortly after sunrise, including identification to genus or species, assessment of reproductive condition, and a set of measurements, including weight, were taken, after which individuals were released near capture sites. To survey for bats, we placed a 6 m mist-net along the pool of water depicted in Fig. 4, and we opened it approximately one hour after sunset and monitored it for one hour. The captured individual was measured, photographed, and then released.

RESULTS

A total of 50 individuals was captured in the Sherman traps, as detailed in Appendix A. Five species of rodents were captured: Stephens's woodrat (*Neotoma stephensi*), northern grasshopper mice (*Onychomys leucogaster*), Deer mice (*Peromyscus sp.* including *P. maniculatus*), western harvest mice (*Reithrodontomys megalotis*), and silky pocket mice (*Perognathus flavus*; Fig. 5).

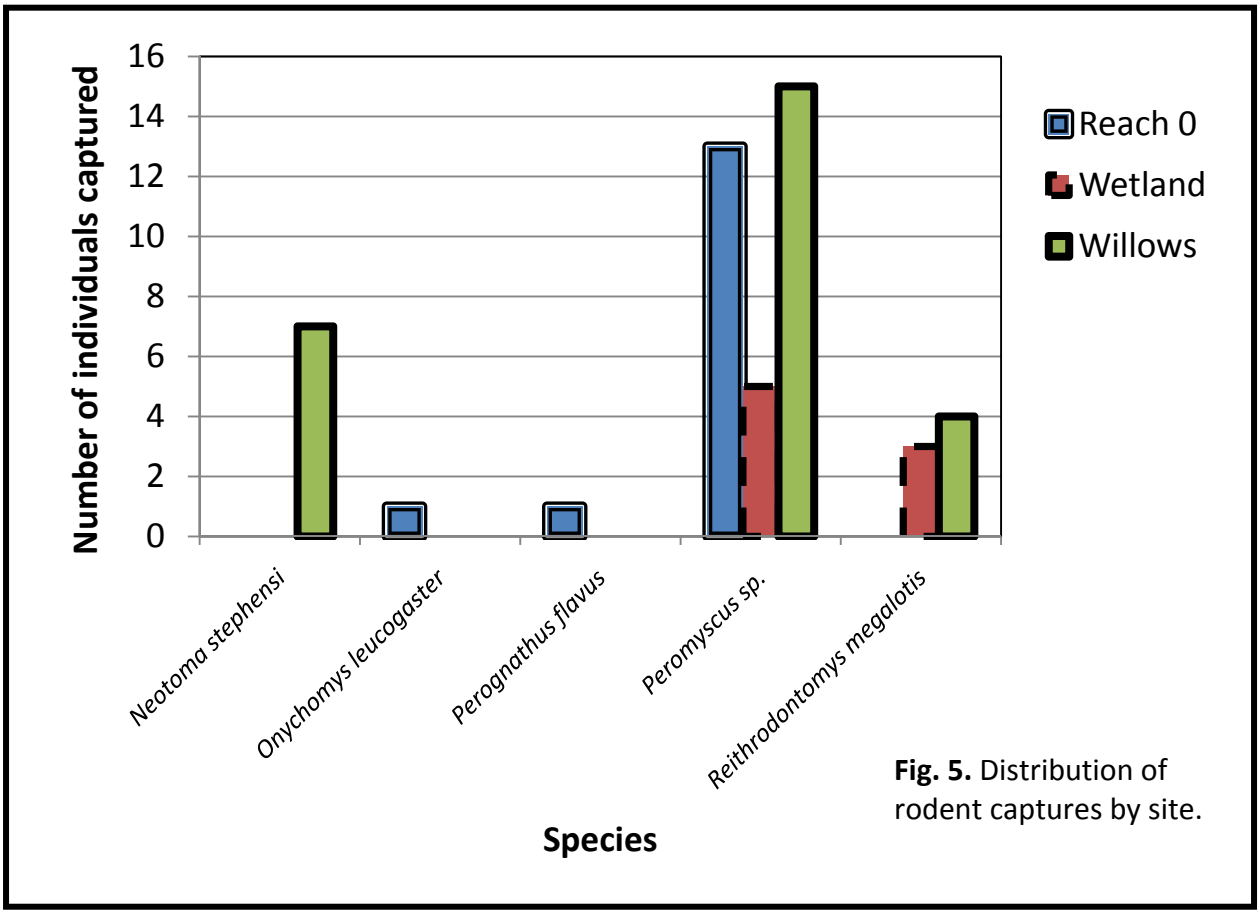

Fig. 5. Distribution of rodent captures by site.

Deer mice (*Peromyscus sp.*) are extremely difficult to distinguish in the field, and so we conservatively identified these to genus. We are reasonably confident, however, that at least 50% of these captures were of the North American deer mouse (*P. maniculatus*), a very common and widespread species with generalized feeding habits that is well adapted to disturbance. Therefore, it is not surprising that these mice were captured in all surveyed habitats of Cebolla Canyon.

Northern grasshopper mice and silky pocket mice were only captured in the desert scrub that characterized Reach 0. These are both widespread species through the western U.S. and are typically found in arid environments, as the former relies primarily on insects, small vertebrates, and seeds, while the latter relies heavily on seeds. Their presence in this habitat in this region of New Mexico is expected.

In contrast, the western harvest mouse was found in only the moist environments offered in Cebolla Canyon. This species is also common and widespread throughout the western and Midwestern regions of the U.S., and feeds predominantly on seeds and less so on insects. Although moist habitats are preferred, this species is often found in extremely arid desert scrub habitats. Thus, it may be present in Reach 0 as well, although not captured. It is therefore not surprising that two of the first species to recolonize a restored wetland would be habitat generalists such as the western harvest mice and deer mice.

Finally, Stephen's woodrat is a relatively rare species in this common and widespread genus, found only in extreme southern Utah, Arizona, and western New Mexico. It can be locally common in this restricted geographic range, as suggested for Cebolla Canyon by our capture data. This species feeds primarily on juniper and is most often found in mid-elevation piñon-juniper habitats. This species is thus not typically associated with riparian areas, but the willows in Cebolla Canyon may also provide food as well as nesting sites for this species.

Only one bat was captured during our hour of mist-netting, a male Townsend's big-eared bat, *Corynorhinus townsendii* (Fig. 6). Although widespread in the western U.S., this species is a federal species of concern due to its vulnerability to disturbance in the caves and mines in which it typically roosts.

Fig. 6. A photograph of the Townsend's big-eared bat captured in Cebolla Canyon, 13 October 2009.

R E C O M M E N D A T I O N S

1. **Additional trapping** for small mammals is recommended to garner more data on species composition throughout the canyon. In particular, additional trapping may reveal the presence of riparian rodents that are known to occur in Cibola County, namely *Microtus longicaudus*, *M. mogollonensis*, and *Sigmodon fulviventer*. If reintroductions are to be done, this step is critical to demonstrating with greater rigor the absence of these species.

2. If these species are not found to be present, then **reintroduction** becomes a viable and desirable option. The Mogollon vole in particular is a relatively rare vole, as it is found only in isolated locales in Arizona and New Mexico typically at high elevations.

3. **Introduction** of the state-endangered species, the meadow jumping mouse and the Arizona montane vole, as a means of facilitating the restoration of the species may be an option as well, although a more rigorous analysis of their habitat needs and documented localities would be necessary. A riparian rodent recovery plan was recently drafted by the

New Mexico Department of Game and Fish (NMDGF 2008), which includes current information on the status of these species in NM, based primarily on the efforts of Dr. Jennifer Frey. According to this report, both the meadow jumping mouse and the Arizona montane vole prefer wet soils with tall, dense, grass-like vegetation, with the former preferring taller vegetation than the latter. Further recovery of the riparian system at Cebolla Canyon holds great potential for providing much-needed habitat for these species. This report also states that the Arizona montane vole is only found in NM in Catron Co., the next county south of Cibola, and the meadow jumping mouse is found in the Jemez Mountains in Sandoval Co., the next county north of Cibola. Moreover, other subspecies of montane vole are widely distributed north of Cibola Co., occurring also in the Jemez Mountains. Thus, both of these species occur in areas relatively close to Cebolla Canyon, and it is possible that if more historical data existed then records of these species in Cibola may have been acquired.

4. **Additional mist-netting** for bats is also recommended to determine what other species of concern, besides *C. townsendii*, may use the surface water provided in Cebolla Canyon, such as the fringed myotis, *Myotis thysanodes,* the Arizona myotis, *Myotis occultus,* the Southwestern myotis, *M. auriculus,* and the western red bat, *Lasiurus blossevilli*. The latter is a Species of Greatest Conservation Need (NMDGF 2006) and relies heavily on healthy riparian systems. Given the migratory nature of this species coupled with the distance to the nearest specimen record (~100 miles), reintroduction is not a recommended option.

5. Once the habitat becomes amenable**, reintroduction of beavers**, although beyond the scope of this report, would be desirable in terms of enhancing the habitat for bats, as well as for the meadow jumping mouse and Arizona montane vole.

6. Finally, riparian ecosystems provide important habitat for another group of small mammals, the shrews. **Surveying for shrews** requires different techniques (e.g., pitfall traps) than employed here, so directed survey efforts are needed to determine species composition of shrews. The restoration effort in Cebolla Canyon provides an important opportunity to support the persistence of shrews in New Mexico.

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Appendix A. Detailed capture data from Cebolla Canyon, NM.

M = Male, F = Female; Z = non-reproductive, M = minor scrotal development, P = pregnant, E = enlarged nipples

Date	Site	Transect	Trap	Species	Sex	Repro. Cond.	HF (mm)	Ear (mm)	Mass (g)	Tail (mm)
10/13/2009	Reach 0	7	3	*Peromyscus sp.*	M	Z	19	15	18	59
10/13/2009	Reach 0	7	13	*Onychomys leucogaster*	M	M	20	n/a	29	
10/13/2009	Reach 0	5	2	*Peromyscus maniculatus*	F	Z	20	15	17	62
10/13/2009	Reach 0	1	7	*Peromyscus maniculatus*	F	E	19	16	19	63
10/13/2009	Reach 0	9	11	*Peromyscus maniculatus*	M	Z	19	16	13	60
10/13/2009	Reach 0	4	5	*Peromyscus sp.*	F	Z	18	16	16	
10/13/2009	Reach 0	6	17	*Peromyscus maniculatus*	F	Z	20	17	18	59
10/13/2009	Reach 0	9	5	*Peromyscus sp.*	F	P	19	16	22	59
10/13/2009	Reach 0	9	4	*Peromyscus maniculatus*	M	Z	19	17	17.5	58
10/13/2009	Reach 0	9	19	*Peromyscus maniculatus*	M	Z	19	16	16	63
10/13/2009	Reach 0	3	3	*Peromyscus sp.*	M	Z	19	16	14	54
10/13/2009	Reach 0	9	20	*Perognathus flavus*	F	Z	16	n/a	7	
10/13/2009	Reach 0	1	11	*Peromyscus sp.*	F	E	18	17	21	58
10/13/2009	Reach 0	7	4	*Peromyscus maniculatus*	F	Z	20	14	19	59
10/13/2009	Reach 0	10	6	*Peromyscus sp.*	F	E	20	17	16	56
10/13/2009	Willows	N/A	8	*Peromyscus maniculatus*	F	Z	19	15	15.5	56
10/13/2009	Willows	N/A	14	*Peromyscus maniculatus*	F	Z	20	15	14	61
10/13/2009	Willows	N/A	10	*Peromyscus maniculatus*	M	M	20	16	18.5	62
10/13/2009	Willows	N/A	2	*Peromyscus maniculatus*	M	Z	20	15	17	61
10/13/2009	Willows	N/A	12	*Peromyscus maniculatus*	M	Z	20	16	15	54
10/13/2009	Willows	N/A	11	*Peromyscus maniculatus*	M	Z	19	15	14	57
10/13/2009	Willows	N/A	10	*Peromyscus maniculatus*	M	M	20	15	19	67
10/13/2009	Willows	N/A	11	*Peromyscus maniculatus*	M	Z	20	16	18	62
10/13/2009	Willows	N/A	7	*Peromyscus maniculatus*	F	E	19	16	21	76
10/13/2009	Willows	N/A	14	*Peromyscus maniculatus*	M	M	21	17	23	64
10/13/2009	Willows	N/A	1	*Reithrodontomys megalotis*	F	P	16	n/a	13	68
10/13/2009	Willows	N/A	12	*Reithrodontomys megalotis*	F	P	16	n/a	20	70
10/13/2009	Willows	N/A	2	*Peromyscus maniculatus*	F	P	19	15	16	58
10/13/2009	Willows	N/A	6	*Reithrodontomys megalotis*	F	P	17	n/a	15	74
10/13/2009	Willows	N/A	4	*Peromyscus maniculatus*	F	Z	19	15	20	61
10/13/2009	Willows	N/A	10	*Peromyscus maniculatus*	F	Z	19	15	15.5	56
10/13/2009	Willows	N/A	9	*Peromyscus maniculatus*	M	Z	19	16	16	60

10/13/2009	Willows	N/A	1	*Reithrodontomys megalotis*	M	M	16	n/a	10.5	65
10/13/2009	Willows	N/A	12	*Peromyscus maniculatus*	F	Z	19	15	15	55
10/13/2009	Willows	N/A	3	*Neotoma stephensi*	M	M	33	26	100	116
10/13/2009	Willows	N/A	13	*Neotoma stephensi*	F	Z	31	25	100	128
10/13/2009	Willows	N/A	12	*Neotoma stephensi*	F	E	32	26	150	140
10/13/2009	Willows	N/A	7	*Neotoma stephensi*	F	Z	29	26	125	134
10/13/2009	Willows	N/A	1	*Neotoma stephensi*	M	M	33	26	165	145
10/13/2009	Willows	N/A	8	*Neotoma stephensi*	F	E	33	29	130	144
10/13/2009	Willows	N/A	11	*Neotoma stephensi*	F	Z	32	29	160	
10/13/2009	Wetland	3	11	*Peromyscus maniculatus*	M	Z	20	15	16.5	55
10/13/2009	Wetland	4	12	*Reithrodontomys megalotis*	F	P	16	16	13.5	76
10/13/2009	Wetland	7	11	*Peromyscus maniculatus*	M	Z	20	15	20	61
10/13/2009	Wetland	1	8	*Peromyscus maniculatus*	F	P	19	16	17	68
10/13/2009	Wetland	1	3	*Peromyscus maniculatus*	F	Z	19	15	15	59
10/13/2009	Wetland	2	2	*Reithrodontomys megalotis*	F	E	16	n/a	13	66
10/13/2009	Wetland	2	6	*Peromyscus maniculatus*	M	Z	19	15	15.5	59
10/13/2009	Wetland	9	16	*Reithrodontomys megalotis*	F	Z	17	n/a	11.5	73