Final Report

Desert Upland Baseline Small Mammal Surveys

Boulder City, Nevada

June 2018

Prepared For:
Clark County Desert Conservation Program

desert conservation
PROGRAM

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1.0 SUMMARY

The Clark County Desert Conservation Program (DCP) has requested support in compiling a rodent species list through live trapping on the Boulder City Conservation Easement (BCCE) located in Boulder City, NV (Project). The BCCE covers 86,423 acres (39,974 hectares (ha)) of land owned by the City of Boulder City (Figure 1). The easement is held by Clark County and is managed by the DCP.

This final report describes the methods and results of 11 days of small mammal trapping done at 22 locations across the BCCE. Some adaptions to the methods described in the work plan were made to increase the effectiveness of trapping transects. In total 22 small mammals from 4 species were trapped at 13 separate transects.

2.0 PROJECT STAFFING, ROLES, AND RESPONSIBILITIES

Traps were set and baited for the first two days of the project by Biologist Tony Simonetti with remaining days completed by Biologist Marcel Gucu. Biologists listed below checked traps and identified the species captured. The Management Team was responsible for coordination with DCP staff, project management and report preparation.

Field Team

- Mr. Justin Romanowitz
- Ms. Elizabeth Leon
- Mr. Nathan Davenport
- Mr. Marcel Gucu
- Mr. Josh Torres

Management Team

- Mr. Ken MacDonald
- Mr. Justin Romanowitz
- Mr. Andrew Butsavich

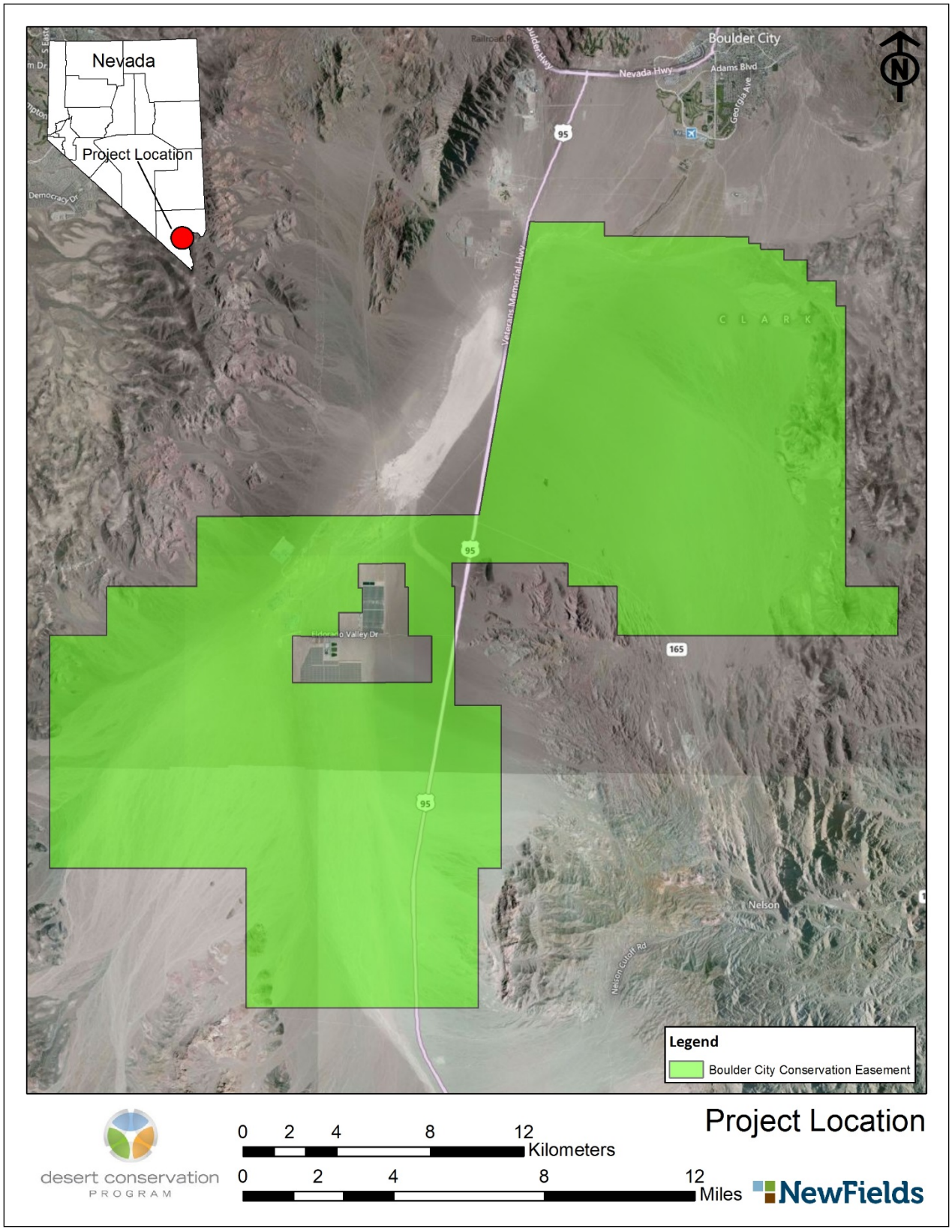

Figure 1. Project Area

3.0 COORDINATION AND SCHEDULE

The Management Team coordinates with the DCP via email and telephone. Table 1 displays the schedule for milestone and deliverable submittal and the current status of the project.

Table 1. Milestone/Deliverable Schedule

Due Date	Deliverable/ Milestone #	Item	Status
April 25, 2018	M01	Contract Award and Mobilization	Completed
April 30, 2018	M02	Project Kick-Off Meeting	
May 8, 2018	D01	Work Plan	
May 19, 2018	M03	Permits (if required)	
May 20, 2018	M04	Begin Surveys	
May 31, 2018	M05	End Surveys	
July 1, 2018	D02	Final Project Data	
July 15, 2018	D03	Final Project Report	
August TDB, 2018	M06	2018 Annual Project review Presentation (if requested)	Pending
August 15, 2018	D04	Final Project Review Summary Form and Claim Release	
September 15, 2018	N/A	Project Closeout	

4.0 ESSENTIAL EQUIPMENT, SUPPLIES, AND SOFTWARE

Software used on this project includes; ARC GIS®, Fulcrum® and Microsoft Office Suite® (Access, Word, and Excel).

The following is a list of equipment that was carried in the field:

- Copy of permits
- Flagging
- Small Mammal Bait
- Headlamps
- Handheld radios
- GPS receiver
- Pens
- Small Mammal Traps
- Gloves
- Smart Phone for data recording
- Hand sanitizer
- Batteries
- Disinfectant
- Clipboards
- Camera
- Garbage bags

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5.0 PROJECT ACTIVITIES AND METHODS

This section describes the methodologies and activities used in data collection.

Transect Selection

Transects for the small mammal survey were generated using QGIS software. QGIS has a research tool which randomly generated 30 points with the BCCE boundary. Eight points were then deleted to provide even distribution between the north and south portions of the BCCE, eliminate points too far from roads practicable for biologists carrying traps, and distribute points over different substrate types. Once the 22 transect locations had been selected the RAND function in Microsoft excels was used to generate a random number between 0 and 1, then multiplied by 360, and rounded to the nearest whole number, to create a compass direction to orient the transect over its length.

Survey Schedule and Trapping Protocol

NewFields developed a Travel Management Plan that arranged the 22 plots within the BCCE into 11 day/pairs, however, due to rough roads, running out of daylight, and needing to adapt the plot schedule to allow for two nights of trapping the original plot schedule was adjusted. Early in the project, an inability to reach plots by vehicle caused delays when traps were not set or only one transect was set. Later in the project, four transects where being trapped each day, to allow for two nights of trapping, resulting in an altered schedule. Transects were set in the evening after temperatures began to cool, using 15 aluminum Sherman traps baited with Rocky Mountain Sweet Mix, a sweet grain and pellet mix that contains, wheat middlings, ground peanut hulls, corn gluten feed, cracked corn, distillers dried grains with solubles, cane molasses, calcium carbonate, salt, zinc sulfate, vitamin a supplement, manganese sulfate, zinc oxide, manganous oxide, ferrous sulfate, potassium iodide, sodium molybdate, cobalt carbonate, sodium selenite. The following morning at sunrise, a biologist checked traps at each transect to, document any small mammals encountered, and retrieve traps for the next evening. Figures 2 depicts the transect locations and orientation. Table 2 shows the revised survey schedule for transects.

Sherman Live Trap

Fieldwork began on Tuesday, May 17, 2018 and was completed on Tuesday, May 29, 2018

Changes to Survey Protocol

The first six transects of the survey trapped 4 animals of a single species. For this reason adjustments to the baits and number of nights traps were left in place were initiated. On May 21, 2018 new baits were

used in addition to the standard bait of a sweet feed, these included bacon bits, blue cheese, vanilla extract, and peanut butter on crackers. After two nights with no additional success the new baits were abandoned. On May 23, transects began being left out for two nights to allow animals to adjust to the presence of the traps. This showed immediate results and was continued to the end of the project as logistical constraints allowed.

Small Mammal Identification

A review of literature indicated that 22 small mammals have ranges that potentially occur within the BCCE. Field crews were familiar with these species and equipped with field guides and descriptions of these small mammals to aid with identification in the field. The 22 potential small mammal species are listed in Table 3.

Game Cameras

Game cameras were set at two locations known to have small mammal activity to determine whether animals that may have been difficult to capture in a Sherman live trap could be documented photographically. Game cameras were left in place for 11 days . Results are located in Appendix A.

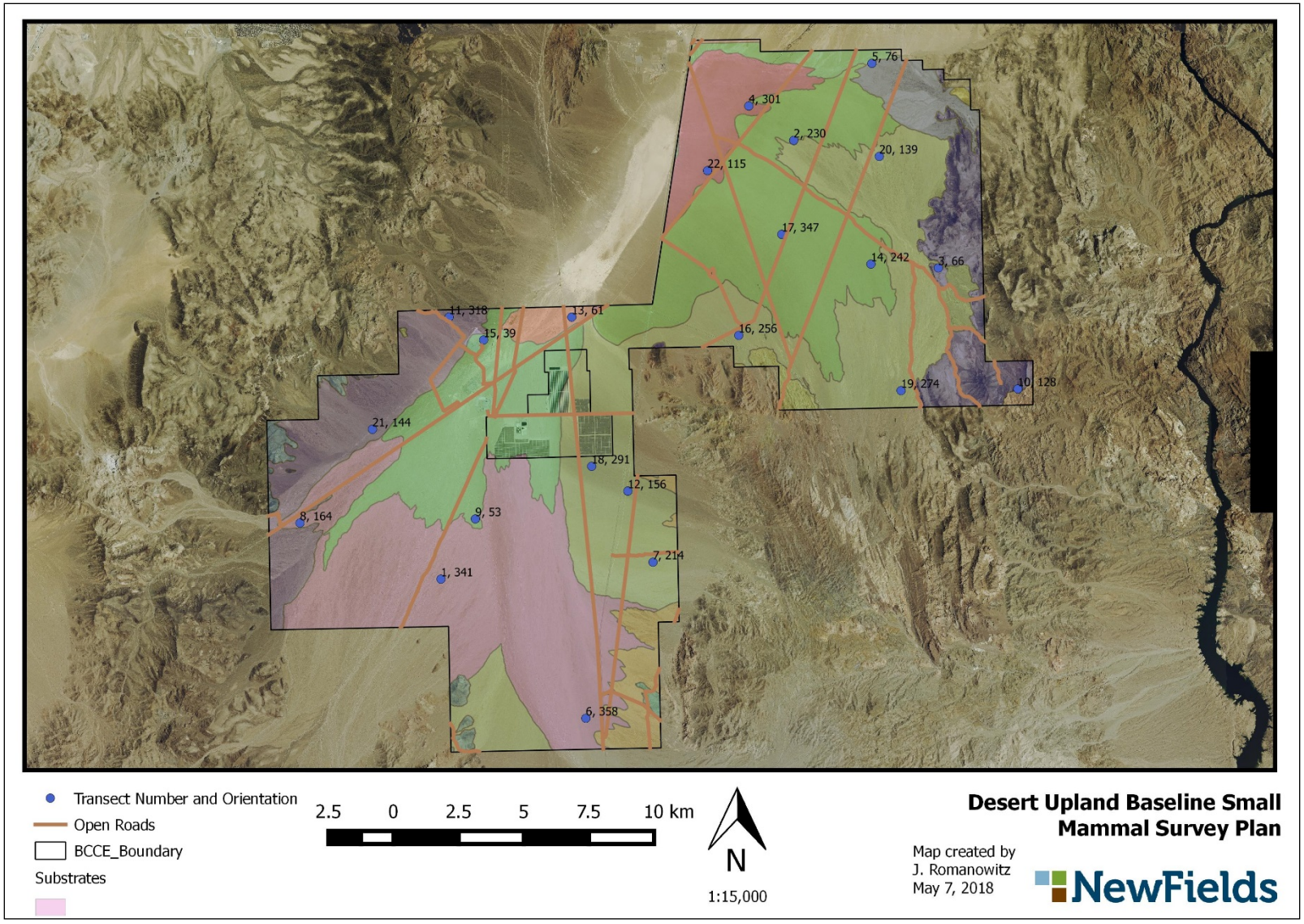

Figure 2. Transect Locations

Table 2. Transect Order, Starting Point and Compass Bearing

Day	Transect ID	Transect Starting Point	Compass Bearing (Degrees)
5/17/18	2	691863, 3973418	230
5/17/18	4	690137, 3974737	301
5/19/18	8	672902, 3958718	164
5/19/18	21	675683, 3962319	144
5/20/18	22	688554, 3972253	115
5/20/18	5	694865, 3976375	76
5/21/18	12	685493, 3959945	156
5/22/18	10	700469, 3963867	128
5/23/18	7	686458, 3957214	214
5/23/18	3	697415, 396851	66
5/23/18	1	678314, 3956565	341
5/23/18	9	679636, 3958876	53
5/25/18	17	691402, 3969807	347
5/25/18	20	695148, 3972802	139
5/27/18	6	683880, 3951218	358
5/27/18	18	684103, 3960897	291
5/27/18	14	694827, 3968663	242
5/27/18	19	695985, 3963805	274
5/28/18	11	678627, 3966629	318
5/28/18	15	679954, 3965749	39
5/29/18	13	683339, 3966628	61
5/29/18	16	689751, 3965926	256

Table 3. Potential Small Mammals on the BCCE

Common Name	Scientific Name
Merriam's shrew	*Sorex merriami*
Crawford's desert shrew	*Notiosorex crawfordi*
White-tailed antelope squirrel	*Ammospermophilus leucurus*
Round-tailed ground squirrel	*Spermophilus tereticaudus*
Rock squirrel	*Spermophilus variegatus*
Little pocket mouse	*Perognathus longimembris*
Great Basin pocket mouse	*Perognathus parvus*
Long-tailed pocket mouse	*Chaetodipus formosus*
Sonoran desert pocket mouse	*Chaetodipus penicillatus*
Desert kangaroo rat	*Dipodomys deserti*
Merriam's kangaroo rat	*Dipodomys merriami*
Chisel-toothed kangaroo rat	*Dipodomys microps*
Panamint kangaroo rat	*Dipodomys panamintinus*

Common Name	Scientific Name
Western harvest mouse	*Reithrodontomys megalotis*
Canyon mouse	*Peromyscus crinitus*
Cactus mouse	*Peromyscus eremicus*
Deer Mouse	*Peromyscus maniculatus*
Southern grasshopper mouse	*Onychomys torridus*
Bushy-tailed woodrat	*Neotoma lepida*
Norway rat	*Rattus norvegicus*
Black rat	*Rattus rattus*
House mouse	*Mus musculus*

6.0 RESULTS

Trapping Results

In total 22 animals were captured on transect lines. These animals were captured at 13 different transect locations as show in Figure 3. The 22 animals consisted of four species, long-tailed pocket mouse (*Chaetodipus formosus*), desert kangaroo rat, (*Dipodomys deserti*), cactus mouse (*Peromyscus eremicus*), and bushy-tailed woodrat (*Neotoma lepida*). A fifth species was identified in the field as Little pocket mouse (*Perognathus longimembris*), however, review of photos suggested that the animal was miss identified due to a damaged tail and was actually a long-tailed pocket mouse. The long-tailed pocket mouse and Sonoran desert pocket mouse (*Chaetodipus penicillatus*) resembled each other closely enough that positive identification could not be made. Captured animals were documented with at least two photographs to aid in confirmation of identification, however, on two occasions animals escaped before photographs were taken. In both instances where the animal was able to escape prior to photographs the biologist was able to observe the animal well enough to make a confident identification. Table 4 shows details of transect trapping success, species trapped at each location, the date transects were set, and how many nights those transects were left in place.

Environmental Conditions

Vegetation throughout the study area was fairly uniform consisting primarily of cresote bush (*Larrea tridentata*) and white bursage (*Ambrosia dumosa*) with sparse amounts of grass and annual plants. While vegetation varied little across the study area, substrate varied greatly including, deep loose sand, hard packed silt, desert pavement, braided alluvial fans, rocky lava flows, and steep rocky mountainsides. While sample size is too small to draw strong conclusions, rocky, but not mountainous transect sites accounted for 10 of the 22 trapped animals in the study area.

Game Cameras

Game cameras captured a total of 23 photos that contained animals and 16 were of rodents. All but one of the rodent photos were captured at night. The sole positive identification of a rodent from game

camera photos was of a round-tailed ground squirrel (*Spermophilus tereticaudus*). Non-rodent species images captured on the game camera included: spotted skunk (*Spilogale gracilis*), American badger (*Taxidea taxus*), blacktail jackrabbit (*Lepus californicus*), and sideblotched lizard (Uta spp). Photos from the game cameras are located in Appendix A.

Table 4. Transect Trapping Results

Transect Number	Traps Set On	Number of Trapping Nights	Animals Trapped	Night of Capture
1	5/23/2018	2	Desert kangaroo rat	2
2	5/17/2018	1		
3	5/23/2018	2	Long-tailed pocket mouse	1
			Bushy-tailed woodrat	1
			Long-tailed pocket mouse	2
			Long-tailed pocket mouse	2
			Bushy-tailed woodrat	2
			Cactus mouse	2
			Bushy-tailed woodrat	2
			Cactus mouse	2
4	5/17/2018	1		
5	5/20/2018	1		
6	5/27/2018	2	Long-tailed pocket mouse	2
7	5/23/2018	2		
8	5/19/2018	1	Long-tailed pocket mouse	1
			Long-tailed pocket mouse	1
9	5/23/2018	2	Desert kangaroo rat	2
10	5/22/2018	1		
11	5/28/2018	2		
12	5/21/2018	1	Long-tailed pocket mouse	1
13	5/29/2018	1	Desert kangaroo rat	1
			Desert kangaroo rat	1
14	5/27/2018	1		
15	5/28/2018	2		
16	5/29/2018	1	Desert kangaroo rat	1
17	5/25/2018	2	Desert kangaroo rat	1
18	5/27/2018	2	Long-tailed pocket mouse	2
19	5/27/2018	1	Long-tailed pocket mouse	1
20	5/25/2018	2	Desert kangaroo rat	2
21	5/19/2018	1	Long-tailed pocket mouse	1
22	5/20/2018	1		

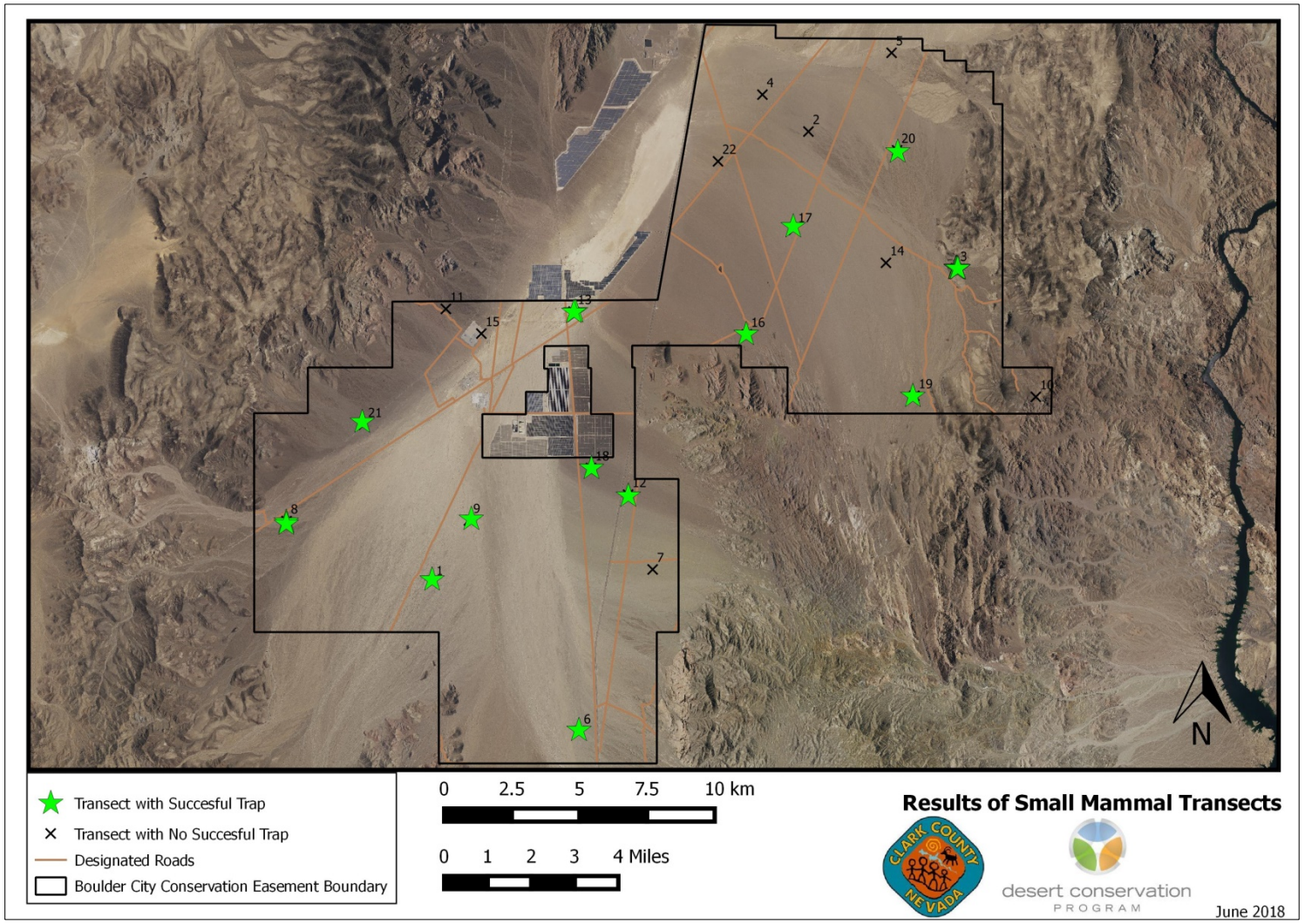

Figure 3. Transect Trap Success

7.0 DISCUSSION AND RECOMMENDATIONS

Four of the 22 small mammal species that were identified as having potential range overlap with the BCCE were successfully trapped, and one additional species photographed. Due to a lack of physically defining characteristics within genera, it is possible that more than one species of pocket mouse or kangaroo rat were captured during the study, however, to distinguish between these species would require far more extensive handling, measurement, and potentially genetic testing. It is also possible that several other species exist in the study area that would require different techniques to trap. Round-tailed ground squirrel (*Spermophilus tereticaudus*) were photographed by game cameras and observed frequently in the study area by biologists setting and retrieving traps, however, no individuals were captured during the study. It is possible that this was a result of the diurnal nature of the round-tailed ground squirrel and the nocturnal focus of the study, however, transects that were left in place for two days were left open during the day between the two nights of trapping and did not capture any round-tailed ground squirrels.

A key take away from this study is the importance of leaving traps in place for more than a single evening. On the first night of trapping at each of the 22 transects a total of 11 animals were captured. Only 10 transects were left out for a second night, however, an additional 11 animals were captured on the second night. Another way of looking at this is that at the 10 transects left for two nights 4 animals were trapped on the first night, while the same transects captured 11 animals on the second night. It is likely that rodents were at first cautious about the new additions to their environment and were only willing to explore the traps after having time to adjust to them. For this reason it is recommended that any future trapping projects leave traps in place for longer periods of time. These long periods could increase trap success and potentially could trap species that were too cautious to enter the trap on the second night.

A wide variety of baits, such as bacon, peanut butter, blue cheese, and vanilla extract were used to attempt to increase trap success rates, however, they made no discernible difference. Trap placement was also adjusted, with traps being placed in the open, under bushes, and near openings to rodent burrows that appeared to be active, this also made no noticeable impact on trap success rates.

The use of game cameras had mixed results. The camera had difficulty capturing photos at night and the rodent night photos are either of such a small portions of animals that they are unidentifiable, or the image quality was such that a positive identification could not be made. However, game cameras were successful at capturing photographs of the round-tailed squirrel when Sherman live traps were unsuccessful. Game cameras were also very successful at capturing images of large rarely seen mammals that are largely nocturnal such as badgers and spotted skunk.

8.0 REFERENCES

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9.0 ACKNOWLEDGMENT

This work was supported by the Clark County Desert Conservation Program and funded by mitigation fees associated with Section 10 of the Endangered Species Act as project # 2017-NEWFIELDS-1730D, to further implement or develop the Clark County Multiple Species Habitat Conservation Plan.

APPENDIX A. GAME CAMERA PHOTOS

Camera 1 Unidentifiable Rodent

Camera 1 Unidentifiable Rodent

Camera 1 Unidentifiable Rodent

Camera 1 Unidentifiable Rodent

Camera 1 American badger

Camera 1 Unidentifiable Rodent

Camera 1 Unidentifiable Rodent

Camera 1 Unidentifiable Rodent

Camera 1 Spotted skunk

Camera 1 Black-tailed jack rabbit

Camera 1 Unidentifiable Rodent

Camera 1 Unidentifiable Rodent

Camera 1 Unidentifiable Rodent

Camera 1 Unidentifiable Rodent

Camera 1 Unidentifiable Rodent

Camera 1 Uta spp lizard

Camera 1 Round-tailed ground squirrel

Camera 1 Unidentifiable Rodent

Camera 1 Unidentifiable Rodent

Camera 1 Unidentifiable Rodent

Camera 1 Unidentifiable Rodent

Camera 1 Black-tailed jack rabbit

Camera 2 American Badger