

Eldorado Valley Desert Tortoise Monitoring (Year 2)
Clark County, Nevada

Final Project Report



Prepared By:
Dana Fernbach
Terry Christopher
The Great Basin Institute
7250 S Durango Dr STE 130
PMB #263
Las Vegas, NV. 89113
(702) 433-2600

CONTRACT TITLE: Eldorado Valley Desert Tortoise Monitoring (Year 2)
PROJECT NUMBER: 2013-GBI-1451A
REPORTING DATE: June 30, 2016
PI: Scott Cambrin, Senior Biologist, Desert Conservation Program
DELIVERABLE: Annual Project Report (D24)

EXECUTIVE SUMMARY

Project Number: 2013-GBI-1451A

Contract Title: Eldorado Valley Desert Tortoise Monitoring (Year 2)

This report documents the Eldorado Valley Mojave Desert Tortoise Monitoring (Year 2) project by the Great Basin Institute (GBI) in spring 2016. The Clark County Desert Conservation Program (DCP) and the U.S. Fish and Wildlife Service (FWS) translocated Mojave Desert tortoises (*Gopherus agassizii*) from the Desert Tortoise Conservation Center and monitored the short-term effectiveness of translocation efforts. GBI coordinated with the DCP to conduct transect and telemetry surveys for desert tortoises in Eldorado Valley prior to and after translocation.

In collaboration with FWS, GBI provided desert tortoise handling and field training, field data collection, logistical support, quality assurance/quality control (QA/QC) data checks, and GIS mapping. GBI hired a support staff consisting of a project coordinator responsible for QA/QC-GIS, and a field crew consisting of two crew supervisors, six survey technicians, and two telemetry technicians.

The study design included four survey plots (Release 1, Release 2, Control 1, and Control 2) of equal size. Each plot was 5 x 5 kilometer and contained 100-5 kilometer transects. Transect walkers surveyed two 5 km transects each day from 5 April through 19 May 2016. Tortoises found were equipped with paper tags with unique numbers, provided the tortoises were accessible and the ambient shaded temperature was below 35°C. Telemetry surveys began 5 April 2016 and ran concurrently with transects to capture expected visibility. The telemetry monitors collected information from multiple observations per day of a group of 15 radio transmitted tortoises at Piute-Mid, a site south the of the survey plots

Transect monitors observed 102 live tortoises and 97 carcasses during the field season. Of the live observations, 21 were recaptures and seven were opportunistic. Of the carcasses, 95 were found on transects while two were opportunistic, two had previously been tagged, and one had been notched. Telemetry monitors recorded 1,245 observations in 29 days of monitoring.

INTRODUCTION

Project Background

The Mojave desert tortoise (*Gopherus agassizii*) is federally listed as threatened under the Endangered Species Act (FWS 1990) and is a priority species for conservation under the Multiple Species Habitat Conservation Plan in Clark County, Nevada (Clark County 2000). The Clark County Desert Conservation Program (DCP) and the U.S. Fish and Wildlife Service (FWS) translocated tortoises from the Desert Tortoise Conservation Center (DTCC) to a population in Eldorado Valley, and monitored the short-term effectiveness of translocation efforts. In 2014 data were collected prior to any action (Year 0). Surveys were conducted post translocation in 2015 (Year 1) and 2016 (Year2).

Project Description

Beginning in 2014, the Great Basin Institute (GBI) coordinated with DCP to monitor the density of desert tortoises in Eldorado Valley at four study plots: two release plots, and two control plots. Project study plots are located within a Bureau of Land Management Area of Critical Environmental Concern at the north end of Eldorado Valley, which is southwest of Boulder City and bisected by Highway 95 (Figure 1). The two release plots (Plots 1 and 2) are between 1 and 8 km west of Highway 95, within 932 and 1,250 m elevation, with east to east-northeast aspects. The two control plots (Plots 3 and 4) are adjacent to release sites, and

between 758 and 1,250 m elevation, with a west and northeast aspect, respectively. An established telemetry site is located in Piute Valley (referred to as Piute-Mid), approximately 29 km south of the plots.

Crew training took place in March and April and surveys took place in April and May. GBI hired a qualified support staff including a project coordinator responsible for QA/QC-GIS, and a field crew consisting of two crew supervisors, six survey technicians, and two telemetry technicians. Data collection for Year 2 occurred 5 April through 19 May 2015. Monitors completed 100 transects per plot for a total of 400 transects, to monitor the success of the translocated tortoises in their new locations. Radio telemetry monitoring at Piute-Mid helped to determine daily behavior of the animals as well as to help build a detection curve for the surveyors.

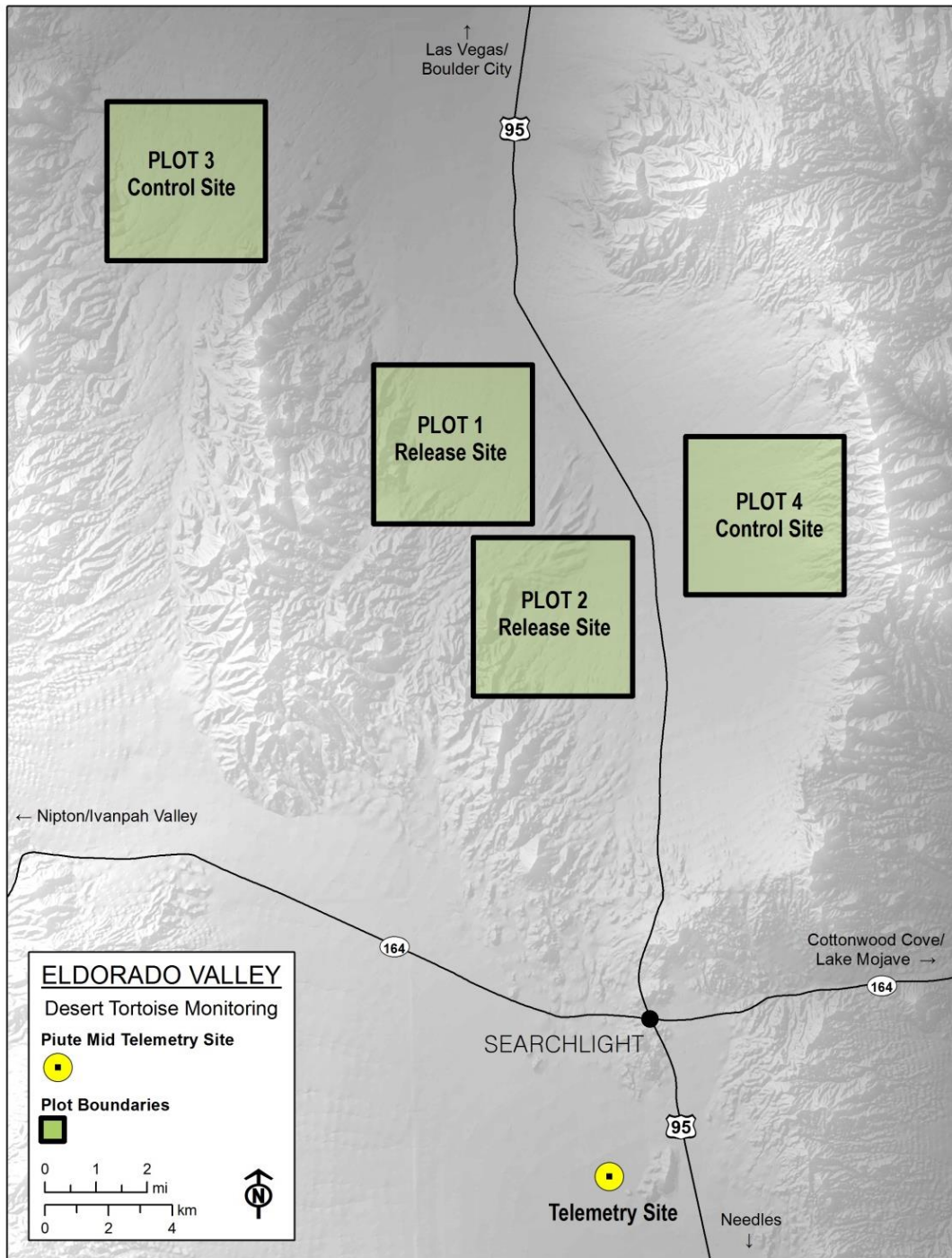


Figure 1. Location of Eldorado Valley monitoring plots and the Piute Valley telemetry site (GBI 2015)

Project Goals and Objectives

The overarching objectives of the Eldorado Valley Desert Tortoise Monitoring project are to:

- Monitor tortoises before and after translocation
- Improve the effectiveness of translocation methods and monitoring procedures
- Provide baseline health assessment data on translocated and resident tortoises
- Increase the abundance of tortoises over a two year period post-translocation

The specific goals of transect and telemetry monitoring are to:

- Complete 100 transects in each of the four survey plots
- Record data on live tortoises and carcasses observations
- Observe radio transmitter equipped tortoises at a site in conjunction with transect surveys

METHODS AND MATERIALS

Transects

The study included four square survey plots of equal size; two release plots and two control plots. Each plot measured five by five kilometers and contained 100 transects, stratified 50 meters apart, and randomized in a walk order. To increase safety, monitors were assigned neighboring transects so that there was never more than 50 m of separation between monitors. Transects were walked at cardinal bearings of 90° or 270° for a total of 500 kilometers surveyed per plot, and a grand total of 2,000 kilometers surveyed over four plots. All transects in one plot were completed before monitors began surveying in another plot. Plots were surveyed in this order: Release 1 (Plot 1), Control 2 (Plot 4), Control 1 (Plot 3), and Release 2 (Plot 2). Monitors used a Garmin Global Positioning System, set to Universal Transverse Mercator, North American Datum 83, Zone 11 North, to locate transect start points and record spatial data.

Transect start-times were determined by the project coordinator and FWS based on weather forecasts and observations from telemetry. Monitors were to begin walking transects at the determined start-time, not before and not after. At the beginning of the season, start-time was 8 AM. On 18 April it was changed to 7:30 AM, where it stayed for the remainder of the season.

Live tortoises were recorded as transect tortoises if they were found while the observer walked a transect line, or as opportunistic tortoises if they were observed elsewhere while working. For all tortoises, if the ambient shaded temperature was below 35°C, field staff recorded data on median carapace length (MCL), determined sex (provided the MCL was greater than 180 mm), and determined a body condition score (BCS). When possible, all live tortoises were marked using a paper tag with a unique FWS number. Tortoises were handled with minimal contact by one individual wearing gloves. All equipment that came into contact with the animal was disinfected with a chlorhexidine and water solution (one ounce concentrated chlorhexidine per one gallon of water). When tortoise carcasses were encountered, they were recorded as either transect or opportunistic observations. Monitors determined if the carcass was intact or disarticulated. If it was intact they measured the MCL. If it was disarticulated they estimated if the MCL was larger than 180 mm. Monitors also searched the carcass for evidence of an ID tag.

All data were collected in both hardcopy and electronic format. Electronic data were recorded on a Trimble Juno unit (Juno) set to UTM, NAD83, Zone 11 North.

Telemetry

During transect surveys telemetry began monitoring animals half an hour before transect start times and continued until all transects were completed, or until 4 PM, whichever came first. In Piute Valley, 12 to 15 previously radioed tortoises were monitored by two biologists, using a VHF receiver and directional antenna. Three of the 15 radioed tortoises were a considerable distance from the others, and were not monitored as often in an effort to maximize the number of observations per day. Data were collected in both hardcopy and electronic format using the same data collection devices as the transect monitors.

Data Processing

Data were recorded in the field on paper datasheets and in an electronic data collection device (Trimble Juno). At the end of each field day, teams exchanged and reviewed each other's paper and electronic data to verify consistency of data collection. At the end of each week, paper datasheets were collected and the electronic data was downloaded into a Pendragon collection database. Data were then uploaded from the Pendragon collection database into a Microsoft Access correction database where they were verified, examined for errors, and corrected using automated QA/QC scripts and visual checks. The correction database was then sent to FWS who reviewed the data further and sent back an assessment of data quality and protocol compliance.

RESULTS

Objectives Completed

During the spring 2016 monitoring season (Year 2):

- All transect surveys were completed within all plots (Plots 1 through 4):
 - Surveys occurred 5 April through 19 May 2016
 - Four plots were completed
 - 413 transect lines were walked
- Data collected on live tortoises and carcasses found during transect surveys prior to translocation:
 - 102 total live tortoise observations
 - 97 total carcass observations
- Visibility of resident tortoises in Piute-Mid conducted during transect surveys to calibrate results:
 - Monitoring took place 5 April through 19 May 2015
 - 12 to 15 telemetered tortoises were tracked
 - 1,245 observations

Transects

A total of 400 transects were assigned to be walked within the four plots in Eldorado Valley; 100 transects per plot. Transect surveys took place 5 April through 19 May 2016. The final database shows a total of 413 transects completed, including duplicate, interrupted, and shortened transects (Table 1). A transect is duplicated if weather or injury prevents the completion of the transect, or if the transect was not walked on the assigned bearing. In 2016, eight transects in Plot 1 were assigned twice due to an error in GIS. A transect is interrupted due to difficult terrain or road access. In 2016, several transects were interrupted due to road access; monitors walked half of the first transect, interrupted, walked the second transect in full, and then finished the first transect. A transect is shortened due to difficult terrain or an obstacle at the beginning or end of a transect.

Table 1 Summary of transects assigned and walked during the 2016 field season.

Plot Number	Transects Assigned	Transects Walked	Transects Duplicated	Transects Interrupted	Transects Shortened
Plot 1	100	111	11	49	17
Plot 2	100	100	0	46	1
Plot 3	100	102	2	27	5
Plot 4	100	100	0	26	0
Total	400	413	13	148	23

Tortoises and Carcasses

A total of 95 live tortoises were observed on transects and seven additional tortoises were observed opportunistically (Table 2). Of the total observed, five were not handled because they were too deep in the burrow, and two were too small to affix with tags. Of the total handled, 18 voided, each of which were offered fluids; ten accepted fluids, three did not, and it could not be determined if the remaining five accepted fluids. Of the total observed, 21 had an MCL measurement of less than 180 millimeters.

Table 2 Tortoises observed by field crews while walking transects and opportunistically during the 2016 field season.

Plot Number	Transect Tortoises	Opportunistic Tortoises	Recaptures	Total (including recaptures)	Total (excluding recaptures)
Plot 1	17	2	1	19	18
Plot 2	39	1	16	40	24
Plot 3	17	3	3	20	17
Plot 4	22	1	1	23	22
Total	95	7	21	102	81

A total of 95 tortoise carcasses were observed by field crews while on transects. Two carcasses were observed opportunistically (Table 3).

Table 3 Tortoise carcasses observed by field crews while walking transects and opportunistically during the 2016 field season.

Plot Number	Transect Carcasses	Opportunistic Carcasses	Total	Carcasses with Existing Tags
Plot 1	32	1	33	0
Plot 2	16	0	16	2
Plot 3	39	1	40	0
Plot 4	8	0	8	0
Total	95	2	97	2

Telemetry

During the 2016 spring field season, 12 to 15 previously telemetered tortoises were monitored in Piute-Mid, located in Piute Valley, 29 km south of the Eldorado study site (Table 4). Telemetry monitoring was conducted in conjunction with transect surveys. Because three of the 15 tortoises were a considerable distance from other focal animals, they were not regularly monitored during the field season in an effort to increase the number of observations in a day.

Table 4 Observations of tortoises by telemetry during the 2016 field season.

Site	Tortoises Tracked	Number of Days	Total Observations	Average Observations/Day
PM-concurrent with transects	15	29	1,245	42.9

DISCUSSION

Overall, crews had success this year in properly implementing protocols and finding tortoises on the transect line. Plots 2 and 4 had higher numbers of live observations (40 and 23, respectively) than Plots 1 and 3 (19 and 20, respectively). However, Plots 1 and 3 had higher numbers of carcass observations (33 and 40, respectively) than Plots 2 and 4 (16 and 8, respectively).

Telemetry observations corresponded well with transect surveys and were helpful in determining transect start times. Telemetry monitors were able to track tortoises repeatedly throughout the day and had a high number of average observations. Removing outliers from the standard focal group proved effective in increasing the average number of observations made in a day by roughly 40%.

CONCLUSION

All transects assigned were effectively surveyed before the spring season concluded, with successful results. Telemetry monitoring corresponded well with transect walk times and dates and was an effective tool in determining transect start times and tortoise visibility.

In an effort to reduce risk to transect walkers surveying alone in uneven terrain and sometimes in remote locations, transects were grouped in pairs so two biologists could walk adjacent transects. Spring 2016 was an injury-free season, which can be attributed in part to the strong emphasis placed on safety during the training provided at the beginning of the season.

Data errors were corrected within the correction database and submitted to the DCP in accordance with the deliverable due date, with the exception of the first deliverable of the season which was sent in with the second deliverable (D18 and D19). All other deliverables were met on or before the deadline.

RECOMMENDATIONS

For future surveys of this style in Eldorado Valley, it is recommended that transects continue to be walked in pairs of two monitors as this increases safety in the field and provides an added measure of security for monitors.

LITERATURE CITED

Clark County. 2013. Desert Tortoise Pre- and Post- Translocation Monitoring Plan; Augmentation of a Mojave desert tortoise (*Gopherus agassizii*) Population, Eldorado Valley, Clark County, Nevada. November 2013.

Clark County. 2000. Final Clark County Multiple Species Habitat Conservation Plan and Environmental Impact Statement for Issuance of a Permit to Allow Incidental Take of 79 Species in Clark County, Nevada. September 2000.

U.S. Fish and Wildlife Service. 2013. Health assessment procedures for the Mojave desert tortoise (*Gopherus agassizii*): a handbook pertinent to translocation. Desert Tortoise Recovery Office, U.S. Fish and Wildlife Service, Reno, Nevada.

FWS (U.S. Fish and Wildlife Service). 1990. Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for the Mojave Population of the Desert Tortoise. Federal Register 55:12178–12191.