

BCCE Desert Tortoise Translocation Recipient Site Survey
Clark County, Nevada

Final Project Report

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EXECUTIVE SUMMARY

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Contract Title: BCCE Desert Tortoise Translocation Recipient Site Survey

This report documents Boulder City Conservation Easement (BCCE) Mojave desert tortoise (*Gopherus agassizii*) translocation recipient site survey done by the Great Basin Institute (GBI) in fall 2014. The Clark County Desert Conservation Program (DCP) and the U.S. Fish and Wildlife Service (FWS) plan to translocate tortoises from the Desert Tortoise Conservation Center (DTCC) to the calcid alluvial fan zones in the northeast portions of the BCCE. GBI coordinated with the DCP to conduct transect surveys, telemetry (G_0), and health assessments for desert tortoise in the BCCE prior to translocation efforts.

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 one crew supervisor, five survey technicians, one telemetry supervisor, and two telemetry technicians.

The study design included surveying ca. 1,000 km of transects across the translocation area. Transects were spaced 50 m apart, walked at cardinal bearings of 90° or 270°, and randomized in a walk order. Transect walkers surveyed two transects each day worked from 9 September through 3 October 2014. Tortoises found were equipped with a transmitter and paper tag with a unique number, provided the tortoise was accessible and the ambient shaded temperature was below 35°C. Telemetry surveys began 5 September 2014 then ran concurrently with transects to capture expected visibility. Complete health assessments, including collection of biological samples, began 19 September 2014 and followed standardized FWS protocols.

Transects teams found 17 live tortoises, 13 of which were equipped with permanent transmitters. Of the live observations none were recaptures and one was opportunistic. Transect walkers found 88 carcasses, none of which had been previously tagged. Telemetry was conducted using 22 animals, for a total of 371 observations. Full health assessments were completed on eleven tortoises.

INTRODUCTION

Project Background

The Mojave desert tortoise (*Gopherus agassizii*) is federally listed as threatened under the Endangered Species Act (USFWS 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) plan to translocate tortoises from the Desert Tortoise Conservation Center (DTCC) to a population in the Boulder City Conservation Easement (BCCE), and monitor the short-term effectiveness of translocation efforts. This document provides information on materials and methods employed during data collection and management as well as results for this study.

Project Description

Beginning 2014, the Great Basin Institute (GBI) coordinated with DCP to monitor the density of desert tortoises in the BCCE. The project study site was located at the northern end of the Eldorado Valley and includes 38,360 acres of BCCE land, which is owned by Boulder City, but managed under the auspices of a 50-year Conservation Easement Grant established with Clark County in 1995. An additional 12,458 acres of public land is managed by the

Bureau of Land Management. The entire conservation area occupies ca. 50,850 acres (206 km²) and lies east of U.S. Highway 95 and north of State Highway 165 (Clark County 2014). The land slopes gently towards the Eldorado Dry Lake Bed, and most of the translocation area lies at 1,800–2,500 feet elevation. The majority of the area consists of Mojave Desert scrub. Three soil types (Soil Survey Staff 2013) dominate the translocation area (Figure 1). Lower elevations generally are comprised of soils in the argid suborder, characterized by clay and, in some cases, sodium components. The mid-elevation alluvial fan is comprised of calcid soils which contain accumulations of calcium carbonate and higher perennial plant cover than the argid soils. The more topographically-diverse, actively-eroding uplands contain relatively undeveloped orthent soils (O’Farrell 2009, Clark County 2014).

The already established telemetry site, used to assess tortoise visibility, is located in Piute Valley, south of project sites, and covers roughly 44 km².

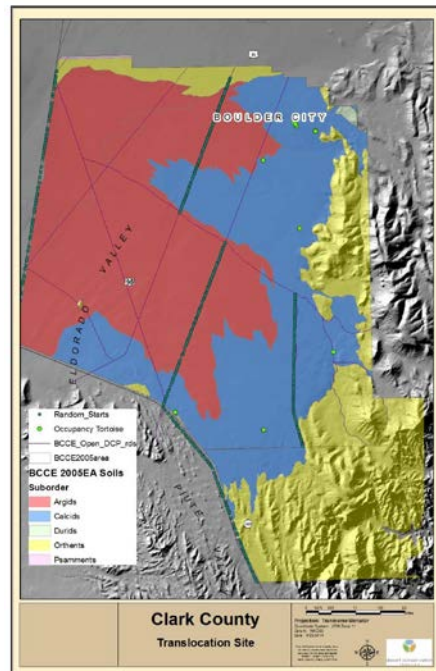


Figure 1. Location of the BCCE Translocation Recipient Site, including soil types, and tortoise occupancy data (Clark County 2014)

Preseason preparation took place in August, crew training in August and September, and surveys in September and October. GBI hired an experienced support staff including a project coordinator responsible for QA/QC-GIS, and a field crew consisting of one crew supervisor, five survey technicians, one telemetry supervisor, and two telemetry technicians. Data collection consisted of 239 transect surveys (for a total of ca. 1,000 km walked) to estimate density, radio-telemetry (G_0) to capture expected visibility, and health assessments.

Project Goals and Objectives

The overarching objectives of BCCE Translocation Recipient Site Surveys are to:

- Translocate tortoises from the DTCC to a low density population
- Determine an estimate of pre-translocation abundance
- Improve the effectiveness of translocation methods and monitoring procedures
- Provide baseline health assessment data on translocated and resident tortoises
- Increase the abundance of tortoises post-translocation

The specific goals of the desert tortoise transect surveys, G_0 , and health assessments are to:

- Record data on live tortoises and carcasses found to determine abundance
- Assess the visibility of tortoises in order to calibrate the results of transect surveys
- Record the health condition of resident tortoises

METHODS AND MATERIALS

Transects

The study design included surveying ca. 1,000 km of transects across the translocation area. Due to the shape of the BCCE, each transect was of variable length and walked at cardinal bearings of 90° or 270°. Transects were 50 m apart and randomized in a walk order; however each biologist completed a pair of neighboring transects in a standard work day and walked near another surveyor to increase safety. Surveys began 9 September 2014 and were conducted in September and October, beginning at 6:00 AM with progressively later start times as needed, but never before 30 minutes after sunrise. Biologists used a Garmin Global Positioning System (GPS), set to Universal Transverse Mercator (UTM), North American Datum 83 (NAD83), Zone 11 North to locate transect start points and record spatial data. 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.

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 attached a transmitter. 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 along with additional data, such as whether the carcass was intact or disarticulated, and MCL for intact carcasses.

Telemetry

Telemetered tortoises were monitored (Go) prior to transects (beginning 5 September 2014) in order to determine initial start times for surveys. Telemetry was also conducted each day transects were walked, with coordinated start and end times to ensure Go occurs simultaneously with surveys. During transect surveys telemetry monitoring began at or before transect start times and continued until all transects were completed or 4 PM, whichever came first. In Piute Valley, 22 presently radioed tortoises were monitored by two biologists, using a VHF receiver and directional antenna. Data were collected in both hardcopy and electronic format.

Health Assessment

Biologists qualified to conduct health assessments, including collection of biological samples, on Mojave desert tortoises, located animals found during transect surveys using the radio-frequency, transmitter information, and GPS coordinates from transect surveys. Health assessments began 19 September 2014 and followed standardized protocols that included body condition scoring, clinical signs of disease, palpation of the coelomic cavity, weight, MCL, presence of ectoparasites, blood samples, and oral cavity swabs (USFWS 2013). If a tortoise was more than 12 inches in a burrow, or otherwise inaccessible, two additional attempts were made to locate the animal.

Data Processing

At the end of every field day, biologists exchanged and reviewed paper and electronic data to verify and correct one another. Data download from each Juno into a Pendragon collection database occurred bi-weekly. Data were then uploaded from the Pendragon collection database into an Access correction database where they were verified, examined for errors, and corrected using automated QA/QC scripts and visual checks.

RESULTS

Objectives Completed

During the fall 2014 monitoring season:

- 1,000 km of transect surveys were completed at the BCCE
 - 239 transect lines walked
 - Surveys occurred 9 September through 3 October 2014

- Data collected on live tortoises and carcasses found during transect surveys prior to translocation
 - 17 total live tortoises found
 - 16 transect live tortoise observations
 - One opportunistic tortoise observation
 - 88 carcasses found
- Visibility of resident tortoises in Piute-Mid conducted during transect surveys to calibrate results
 - 22 telemetered tortoises tracked (21 prior to transects, 20 concurrent with transects)
 - Monitoring took place 5 September through 3 October 2014
- Baseline health assessments completed on resident tortoises
 - Eleven health assessments completed
 - Health assessments began 19 September 2014

Transects

All transects were completed by 3 October 2014. The final database shows a total of 252 transects walked (Table 1). This total includes interrupted transects (labeled as “transect#.1”), which was sometimes due to terrain or time limitations. Occasionally, a transect was recorded as interrupted if it was started in the mid-line, but completed the same day. In this case, the transect is complete and not missing any sections.

Table 1. Summary of transects assigned and walked during the 2014 field season.

Transects Assigned	Total Number of Transect Walked	Number of Transects Interrupted	Number of Transects Interrupted due to Time or Terrain	Number of Transects Interrupted due to Start Point
239	252	13	4	9

Tortoises and Carcasses

A total of 16 live tortoises were observed on transect and one additional tortoise was observed opportunistically. Of the total number found none were recaptures (Table 2). Of the total handled, 14% voided (2 of 14).

Table 2. Tortoises observed by field crews while walking transects and opportunistically during the 2014 field season.

	Transect Tortoises	Opportunistic Tortoises	Recaptures
Telemetry Receiver Attached	13	0	0
No Telemetry Receiver Attached	3	1	0
Total	16	1	0

A total of 88 tortoise carcasses were observed by field crews while on transect (Table 3). Most (72%) were not disarticulated.

Table 3. Tortoise carcasses observed by field crews while walking transect during the 2014 field season.

	Carcasses without Existing Tags	Carcasses with Existing Tags
Intact Carcasses	63	0
Disarticulated Carcasses	25	0
Total	88	0

Both live tortoises and carcasses were found predominantly in calcid soils, with one resident tortoise in the argid soil, but near the calcid-argid edge. Two carcasses were also found along this edge, and six were scattered in the orthents soils in the southern portion of the Easement (Figure 2).

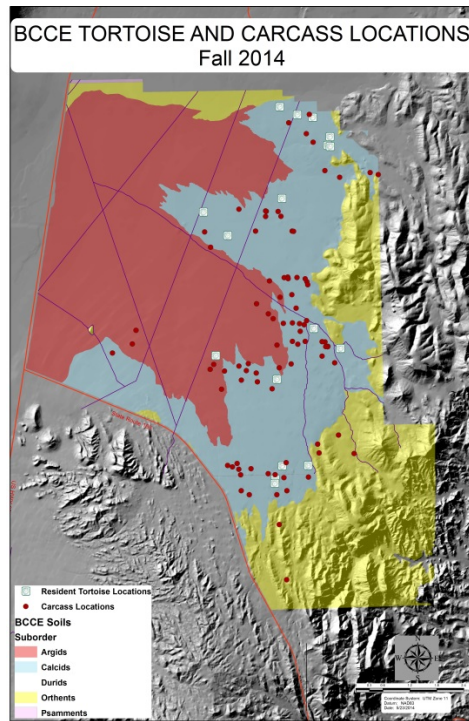


Figure 2. Locations of resident tortoises and carcasses found in BCCE Translocation Recipient Site (soils from Clark County 2014)

Telemetry

During the 2014 fall field season, 22 previously telemetered tortoises were monitored in Piute-Mid, which is located in Piute Valley, south of the BCCE study site (Table 4). Telemetry crews began G_0 on 5 September 2014, four days before transect surveys began, in order to determine initial transect start times. G_0 was then conducted in conjunction with transect surveys. Because two tortoises were a considerable distance from other focal animals, locations were only obtained once. These animals 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 for G_0 during the 2014 field season.

Site	Tortoises Tracked	Number of Days	Total Number of Observations	Average Number of Observations per Day
PM-prior to transects	21	2	25	12.5
PM-concurrent with transects	20	17	346	20.4
Total	20 to 21	19	371	19.5

Health Assessments

Of the 17 tortoises found during transect surveys, 13 were equipped with radio-transmitters (two could not be extracted from deep burrows and two were too small for radio-transmitters). Of these, health assessments were completed on eleven animals (Table 5). Three attempts were made by health assessment crews to locate an animal.

Table 5. Tortoise health assessments for the 2014 field season.

Tortoises for Health Assessment	Health Assessment Completed	Health Assessment not Completed	Radios To Remain
13	11	2	13

Body condition scores for tortoises ranged from 3 to 5, with an overall average of 4 (Table 6). Of the total handled, 27% voided (3 of 11).

Table 6. Tortoise body condition scores (BCS) for the 2014 field season.

BCS	Tortoises for Health Assessment
3	3
4	5
5	3
Total	11

Although the sample size was low (11 tortoises), all were negative for *Mycoplasma agassizii*. Ten were negative for *M. testudenum*, while only one was suspect (Table 7). Of the ten animals that tested negative for both, one had abnormal respiration along with periocular swelling and conjunctival redness, one had eroded nares, and two had serous eye discharge. The tortoise that tested suspect for *M. testudenum* had normal respiration, normal nares, and serous discharge from one eye at the time of examination.

Table 7. ELISA test results for the 2014 field season.

ELISA Result	<i>Mycoplasma agassizii</i>	<i>Mycoplasma testudenum</i>
Positive	0	0
Suspect	0	1
Negative	11	10
Total	11	11

DISCUSSION

Overall, crews were successful in implementing protocols and covering terrain in the BCCE. Over 1,000 km of transect were walked during the season, and of the 239 transects assigned only four were interrupted (shortened). No tortoises found were recaptures, and the low number of residents seen on transect may be indicative of a small resident population, or the product of survey season (fall versus spring). However, a relatively large number of carcasses were located. Almost $\frac{3}{4}$ of these carcasses were not disarticulated, implying they are fresher, and that there may have been a recent population decline. Additionally, live tortoise observations and carcasses were located north and south across the landscape. These observations were predominantly within calcid soils, indicating that this area is preferential for Mojave desert tortoises, which corresponds with previous studies in the BCCE on tortoise occupancy (Clark County 2014).

Telemetry observations corresponded well with transect surveys and were helpful in determining transect start times. G₀ biologists were able to track tortoises repeatedly throughout the day, and were able to monitor most focal animals repeatedly.

Every health assessment attempted was completed by the health assessment crew. Only animals that could be reached (85%) underwent a health assessment. As the season continued, low temperatures decreased the number of animals that were out of burrows, and two tortoises were unable to be reached. The ratio of live tortoises to carcasses was ca. 1:5; however, ELISA results indicate a low seroprevalence of *Mycoplasma agassizii* and *M. testudenum* in the population.

CONCLUSION

Over 1,000 km were effectively surveyed in the BCCE before the fall season concluded, with successful results. In an effort to reduce risk to transect walkers surveying alone in uneven terrain, in sometimes remote locations, transects were clustered to allow biologists to walk neighboring transects. Telemetry monitoring corresponded well with transect walk times and dates and was an effective tool in determining start times and tortoise visibility. Data transfer from transect walkers to health assessment crews was accomplished without complication. All health assessments attempted were fully completed and included all biological samples.

There were very few data collection errors this year, largely due to the training and experience of crew members. Data errors were corrected within the correction database and submitted to the DCP within the grace

period of the deliverable due date. Delays were due to a later project start time than anticipated and communicated to the DCP. All result deliverables were met on or before the deadline.

RECOMMENDATIONS

- Transects continue to be walked in pairs by two biologists as this increases safety in the field and provides an added measure of security for crew members
- Set up transect start points (for this or any future project) north to south, south to north, or west to east, avoiding east to west orientation, as this leads to biologists walking directly into the sun on the first transect of the day
 - East to west orientation can be walked in reverse, but this can be more logistically challenging, as time or terrain constraints may prevent transect walkers from reaching their initial transect start point
- Continue radio-telemetry of all 13 resident tortoises and all translocated tortoises on a regular basis until study completion
 - Remove all radio-transmitters upon project completion

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