



Desert Tortoise Occupancy on the Boulder City Conservation Easement Annual Report

2019-BIO-1920B

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Prepared for:



Clark County Department of Air Quality
4701 West Russell Road, Suite 200
Las Vegas, NV 89118

Prepared by:



1400 Colorado Street, Suite C
Boulder City, NV 89005

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Contract Number: 2019-BIO-1920B

Date of Field Operation: March 25 through May 15, 2021

Deliverable: D25

Executive Summary

Bio Logical LLC was awarded contract 2019-BIO-1920B, Desert Tortoise Occupancy on the Boulder City Conservation Easement from Clark County and conducted the second year of work deliverables, summarized in this report.

The Desert Tortoise Occupancy project involves the survey of 70 individual plots three times each monitoring season. The data from this project was submitted to Clark County for analysis and utilized with previously collected data, in order to determine if there are increases or decreases in desert tortoise and other reptile occupancy over time. The goal of this project is to complete full coverage surveys of plots and collect data on all tortoises and active burrows found during surveys. A secondary objective is to record all reptile species of interest seen while doing surveys. The data from this project helps assess the population status and trends in order to bring clarity to management actions. This data, along with covariate tracking provides an insight to correlations that promote conservation of the species.

The start of field work began on March 30, 2021, following several administrative deliverables, and the two-day training. Field work encompassed the observation and recording of live desert tortoises, active burrows, listed reptiles and intact carcasses. Individual tortoises observed without tags were administered new tags with a numbering system provided by the county.

A total of 30 individual tortoises were recoded, and 17 new ID tags were placed. Eleven (11) reptiles were recorded, twenty-five (25) active burrows, and zero (0) articulated carcasses were observed. All field data was completed and delivered on time, and no major issues with management or data collection were brought to light. Minor adjustments for more efficient data collection in future seasons will be addressed.

Introduction

Description of the Project

The Desert Tortoise Occupancy project involves the survey of 70 individual plots three times each monitoring season (Generally April 1st(+/-) through May 15th). The data from this project will be submitted to Clark County for analysis and utilized with previously collected data, in order to determine if there are increases or decreases in desert tortoise and other reptile occupancy over time. The study locations will include samplings of the 87,205-acre (35,291 hectare) BCCE, located at the upper reaches of the Eldorado Valley and southwest of the populated area of Boulder City, NV. The goal of this project is to complete full coverage surveys of plots and collect data on all tortoises and active burrows found during surveys. A secondary objective is to record all reptile species of interest seen while doing surveys.

Background and Need for the Project

Since 1990, the desert tortoise has been listed as a Threatened Species under the Endangered Species Act. Desert tortoises are also protected by Nevada State law. In recent years, the desert tortoise has undergone drastic population declines throughout large portions of its range. These declines are likely due to several factors such as pet collection, increased predation by ravens, respiratory disease, and encroachment by humans into their habitat. These factors have caused the loss of both tortoises and habitat.

Much of Clark County, Nevada is good desert tortoise habitat. As a result, Clark County applied for and received a permit allowing the “take” of a limited number of desert tortoises under stipulated conditions. As a requirement, Clark County developed a Clark County Desert Conservation Program (DCP) and Desert Tortoise Conservation Program in partial fulfillment of those terms and conditions. The plan developed by the program was approved in July, 1995. A Multiple Species Habitat Conservation Program was also developed.

A multi-year pilot study using occupancy sampling to assess the status and detect long-term spatial trends for the Mojave Desert tortoise (*Gopherus agassizii*) in the Boulder City Conservation Easement (BCCE) was initiated by DCP. The MSHCP requires tracking the status and trends of covered species and the United States Fish and Wildlife Service (USFWS) addendum to the Habitat Conservation Plan Handbook recommends monitoring the effectiveness of uncertain mitigation practices. The data from this project helps assess the population status and trends in order to bring clarity to management actions. This data, along with covariate tracking provides an insight to correlations that promote conservation of the species.

Management Actions Addressed

After annual Project Kick-off Meeting, the Project Work Plan was reviewed and submitted. This plan includes a description of quality assurance and quality control (QA/QC) procedures for all data. The plan also details the software and collection system and how the digital and paper forms will work together. The work plan will identify specific actions needed to complete project milestones and deliverables given the Milestone/Deliverable/Invoicing Schedule Table, as submitted.

After approval of the data management plan and work plan, and before field work start, Bio Logical's project management and data team prepared for project deployment. Preparations included the project specific form set up for digital data collection, and training of field staff on proper collection of digital data specific to this project. The start of field work began on March 30th, 2021.

During the course of the field season, several data management objectives were discussed and clarified with Scott Cambrin of Clark County and Bio Logical. Unique ID numbers were assessed and reorganized for easier data usage for this season.

Picture Id's were also reformatted during the project, as the Collector system and the Samsung tablets did not link the pictures geospatially with the original methods created. All pictures were renamed and are fully associated with each corresponding unique ID.

Tablets, Garmin Glo receivers and various data hardware posed some issues at the beginning of the 2021 season, and some metadata was not recorded. This was corrected through QA/QC methods and by switching some of the data recording over to personal cell phones using Esri Collector app just as the software would be used on the tablet. Moving forward, Bio Logical is evaluating the best use of data management hardware/software to minimize technical issues.

As this is the second field season under this contract, as anticipated, there are less management issues to report as Bio Logical has taken the corrective actions from the previous season and streamlined some of the internal workflow to reduce errors.

Annual Project Data, including GIS data and spatial project data was submitted in the format described in the approved Data Management Plan at the conclusion of the season. After which a debriefing meeting took place to review the season and the submittals with Clark County and go over any problems or concerns that arose during the field season. That information will be utilized to inform the following season's updated work plan.

Goals and Objectives of the Project

The goal of this project is to complete full coverage surveys of plots and collect data on all tortoises and active burrows found during surveys. A secondary objective is to record all reptile species of interest seen while doing surveys.

The objectives for this project include: analyzing the status and change over time in occupancy/use of tortoise habitat using the indicators of live tortoises and active burrows, correlating the pattern and change in occupancy/use with habitat, habitat alteration, and management practices (covariates), as well as anecdotally assessing the demographic condition of the population from tortoise size classes and gender.

Methods and Materials

Teams consist of one Authorized Biologist and one Desert Tortoise Occupancy Assistant, with a minimum of two teams conducting surveys. Teams meet in Boulder City, where the Bio Logical office is located, and enter the easement from a location preselected based on the survey plots that will be covered by the team that day. Each team assigns themselves between 2 and 4 plots based on the temperature, accessibility and implemented order of plots. Bio Logical has crews work 5, 8-hour work days per week as a standard work week.

Teams surveyed plots (200 by 200 meters) to obtain 100% coverage of the area by walking 10-meter belt transects beginning at the nearest corner of the sample unit, and tracking movement on a Garmin GPS unit. Temperature, wind speed, and cloud cover measurements were taken at the beginning and end of each sampling each unit with ambient air temperatures between 18 degrees Centigrade (°C) and 35 (°C). Start date, time, and duration of the survey day changes in accordance with accommodating the temperature requirements. After recording all data and completing transects on an individual plot, the survey team travels between sampling units purposefully, continuing to track movement and walking 10-meters apart, recording any incidental observations.

During the plot surveys, tortoises that are located (both within the sample plots and while transecting between plots) are recorded, and are handled for measurements, tagging, and to determine sex. Handling takes place in accordance with the Desert Tortoise Field Manual and all necessary precautions for biosecurity are utilized. Specific methodologies for biosecurity, extracting tortoises from burrows, measuring, sexing, tagging and rehydrating tortoises are listed in the Scope of Work for this project, and are utilized in conjunction with methods listed in the Desert Tortoise Field Manual and associated documents.

Additional data was collected on active tortoise burrows over 150mm in width, tortoise carcasses tagged from a previous capture, and reptiles as listed in the Scope of Work provided by Clark County.

Each plot is surveyed once before a second survey of any plot is conducted. Over the course of the season, each plot is surveyed 3 times. The plot survey order changed with each set of surveys.

Data collection for the survey plots includes both paper and electronic data. Paper data is taken on the forms provided by Clark County. Digital is collected utilizing Esri's Collector. Collector attaches to field teams' assigned tablets and utilizes GPS, geospatial referencing and real time data collection and syncing. Forms were built to match paper logs so that records can be taken simultaneously, with the team working together to complete both paper and electronic data. Photos are also be logged directly into Collector to include geotags, and are linked to their associated record to prevent errors with photo sorting during the download process.

During the project kick-off meeting and before the development of the Data Management Plan, Bio Logical discussed with Clark County any preferences for data collection applications, or legal or privacy requirements that Bio Logical is sure to uphold during the course of the project. GPS data and track logs were taken on Garmin or equivalent GPS units which have at least 5-meter accuracy.

Results and Evidence of the Results

Objectives Completed

Research objectives were completed as described in the aforementioned methodology. Results and tables of objective are discussed in sections below. Contract Objectives completed last year (2020) and the current year (2021) are as listed:

M09: Contract Award and Mobilization. County issued notice of award in writing, and Bio Logical began work

M10: Project Kick-off & Mobilization Meetings. Scott Cambrin, Sherri Mantanona and Jim Brinson were present.

D16: Permits. Bio Logical submitted copies of relevant permits to County.

D17: Quarterly Progress Reports. These reports were submitted to County on or before January 5, April 5, July 5, and October 5 of each calendar year for the term of this agreement. The format is provided by the county and executed as required by Bio Logical.

D15: Work Plan. This plan identifies specific actions needed to complete project milestones and deliverables given the Milestone/Deliverable/Invoicing Schedule Table of this Scope of Work.

M11: 2 Day Training. County typically provides two-day training course for the project consisting of one day in an office setting and one day in a field setting to go over expectations and field procedures. In 2020, Due to the Covid-19 pandemic restrictions, day one consisted of video conference training hosted by Scott Cambrin and day two of field training was executed by Bio Logical. In house and typical training resumed in 2021 per lighter restrictions and vaccinations.

M12: Start Field Work for each season resumed in a timely manner for each season respectively.

D18, D19, D20, D21: Data Deliverables. Data deliverables were submitted after data has gone through a proper QA/QC process in either Microsoft Excel or Access format. It was submitted upon completion of the following milestones: 30, 90, 150, and 210 plots completed.

M13: End Field Work. Field work was completed by May 15th for both seasons.

M07: Annual Project Review Presentation: This objective deliverable was canceled in 2020 by the County due to the Covid-19 pandemic, as such, Bio Logical did not produce this task order.

D24: 2021 Annual Project Data. GIS data and aspatial project data was submitted in the format described in the approved Data Management Plan deliverable for this project, or per Section J, Document Submittal.

M14: 2021 Debriefing Meeting. A meeting was held after the 2020 field season to go over any issues that have arisen during the field season. This meeting included Bio Logical's project manager, Alana Wise, and data manager, Sherri Mantanona.

D25: 2021 Annual and Final Project Report. This report serves as the submitted completion of the project in the format provided by the County.

Evidence Objectives

During the 2021 field season, the following Evidence objectives were completed as described in the Scope of Work provided by the County:

Live Tortoises

Measure the tortoise using the midline carapace length (MCL) from the nuchal to pygal scute using calipers, which provide the most accurate measurement. Measurements will be taken to the nearest millimeter (mm). The sex of tortoises less than 180 mm MCL cannot be accurately determined based on external characteristics. For larger tortoises, generally the following male characteristics differentiate them from females: (a) concave plastron; (b) longer, more curved gulars; (c) larger, well-developed chin glands; (d) longer, broader, more conical tail; and (e) shorter, thicker toenails. Pay particular attention to the gular projection and the shape of the plastron which are the two best features for differentiating the sexes. For very large tortoises, feel the concave (male) or flattened (female) plastron or see it by holding the tortoise at eye level without turning the tortoise on its back. When in doubt, record all other information and mark "sex unknown" on the data sheet.

Identification tags unique to county will be affixed to a scute of each unmarked tortoise. The tag number will be recorded. Select the 4th right or left costal scute to increase the likelihood of reading the tag when tortoises are in a burrow. Use a clean, disinfected toothbrush to remove dirt from the scute where the tortoise will be marked. Quick drying epoxy shall be used to affix tags to tortoises. Epoxy will be mixed on a file card or piece of paper, then transferred to the tag on the shell with something such as a toothpick, wooden coffee stirrer, or tongue depressor. Under no circumstances should epoxy touch the margins of the scutes where growth must occur. Extra precaution should be taken while placing epoxy and tags on juvenile tortoises. If the tag cannot be placed so that epoxy will not touch the margins of the scute then no tag should be placed on the individual. Tag number shall be recorded on the GPS unit and paper data sheet.

Tortoise Burrows

Data shall be collected for active tortoise burrows greater than 150mm in width. Active tortoise burrows within the sample unit will be mapped and surveyors will record data. Active tortoise burrows encountered while traveling between sample units shall also be mapped and observers shall record data, but these burrows shall be noted as incidental observations. Active tortoise burrows are defined as burrows occupied by a tortoise or with recent tortoise activity (e.g., scat, tracks). Potential burrows and caliche dens will be inspected using a hand mirror (or high-powered flashlight on overcast days) to assess presence of tortoises. Presence of a tortoise in a burrow will be considered as occupancy by a live tortoise and an active tortoise burrow.



Tortoise Carcasses

Tortoise carcasses will only be recorded if they still retain a tag from a previous capture.

Reptile Identification

Biologists shall identify and record all occurrences of reptiles of interest. See Appendix 4 for a list of reptiles of interest. Biologists record location data, species, observer, photograph if possible, and plot number or the term ‘INC’ (if it’s an incidental occurrence).

Tables & Figures of Data

Throughout 2021, temperatures were seasonally low for in the region. In the Occupancy Easement area, where the occupant tortoises reside, temperatures are typically varied slightly from the records in Boulder City.

Figure 1. Monthly Average Temperature for Boulder City area, NV. Data obtained from Accuweather.

	April	May
Max 2021 Temp (F)	95	97
Min 2021 Temp (F)	46	54
Historical Average High Temp (F)	80	92
Historical Average Low Temp (F)	52	58

Table 1 Overview of Live tortoise recordings- including Sex, Size (mcl) and tagging information.

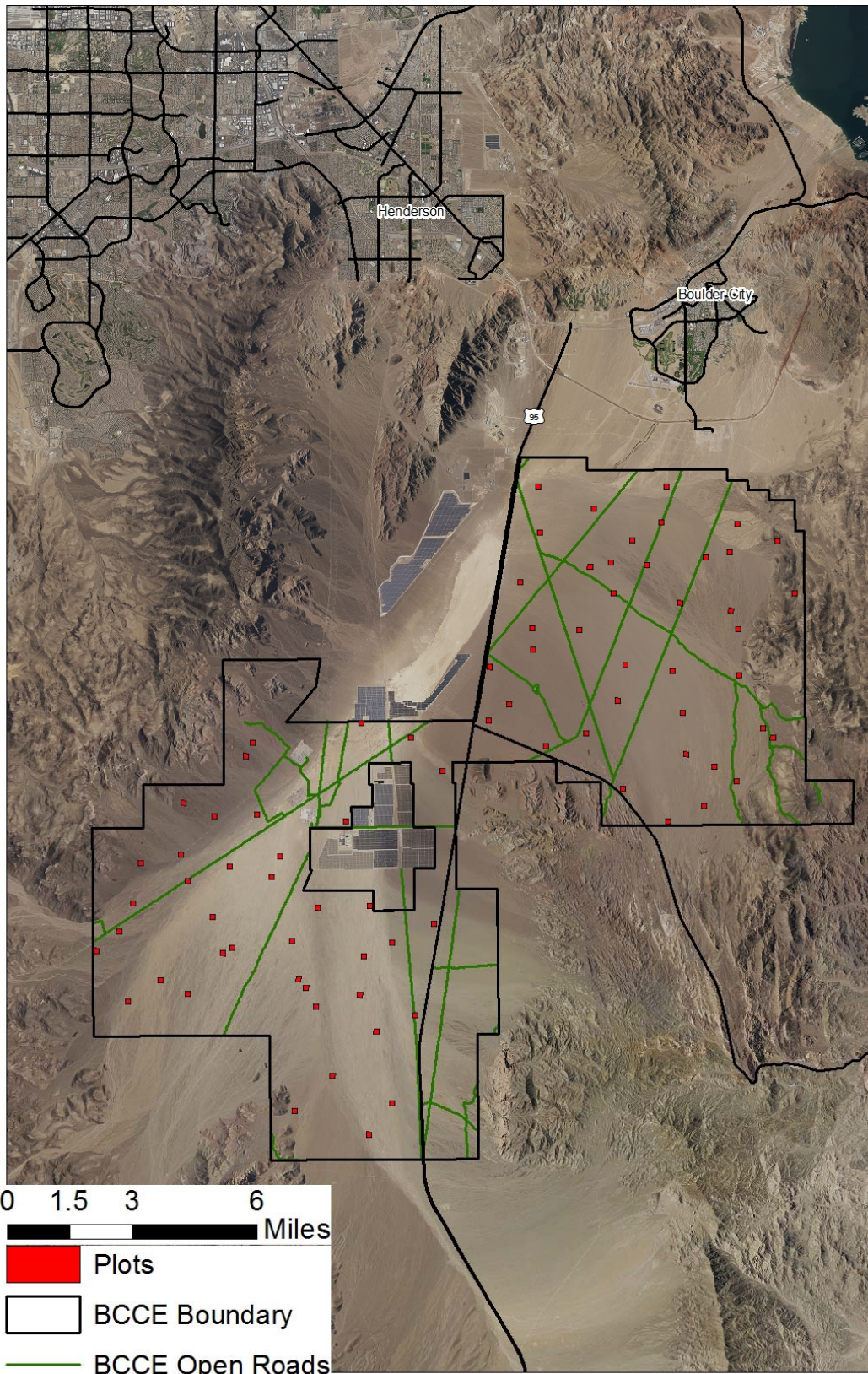
	Live torts	Male	Female	Unknown	Largest MCL	Smallest MCL	Average MCL	Already Tagged	New Tags	No Tags
Totals	30	11	10	9	294	115	197	10	17	3
Male					294	181	228	3	8	
Female					230	165	207	5	5	
Unk					194	115	139.7	2	4	
New Tags Placed					252	131	207	201		

Table 2: Overview of Reptiles recorded

Type	Count	Notes
Desert Iguana	3	
Desert Horned Lizard	1	
Leopard Lizard	1	
Coachwhip	1	
Sidewinder	3	
Mojave Rattlesnake	0	
Western Patch-Nosed Snake	1	
Other		1 Red Racer
Total	11	
INC	3	
In Plots	8	

**Map of the BCCE
From EXHIBIT A SCOPE OF WORK**

Maps



Evaluation & Discussion of Results

During the 2021 field season, a total of 30 tortoises were observed and recorded. Of the 30, Eleven (11) were male, ten (10) were female, and a total of nine (9) were listed as “unknown”. The overall carapace MCL measurements ranged from 294 mm to 115 mm, with an average of 197 mm.

Of the 11 male tortoises, 3 individuals already had tags, while 8 new tags were administered. The largest male recorded was an individual from plot 022 and an old tag “4235” was already administered, though it was hardly visible and ID was based on notching. The smallest individual was 181 mm, from plot 048, with a new tag placed. The average measurement for the male tortoises was 228 mm, and were primarily observed in the “burrow” as classified by the county data descriptions.

For female tortoises, 5 of the observations recorded already having tags, while 5 new tags were placed. The largest female of 230 mm was an INC observation, and a new tag was placed. The smallest female was measured at 165 mm, INC with a tag newly administered. The average female size was 207.3 mm, and 6 of the 10 total observations were outside of plot groups and listed as INC. The females were observed almost exclusively in their burrows as well.

Tortoises of unknown sex (adolescents) totaled 9 in counts, the sizes ranging from 115-194 mm for MCL. Two of these individuals had previously placed tags, while 4 tortoises received new tags. The remainder of individuals were noted to be unable to be removed from their burrows for tagging. Two (2) of the 9 observations were listed as INC, with the whole data set being well mixed in locations observed.

Twenty-five (25) active burrows were recoded, with 12 of them being listed as INC observations. Twenty-two (22) of the burrows recorded contained a tortoise.

Reptiles observed during this season were Desert Iguana, Desert Horned Lizard, Leopard Lizard, Coachwhip, Sidewinder, Western Patch nosed Snake and one “other”, noted to be a Red Racer. Of the 11 observations in this category, 8 observations were made within the plots, while 3 were INC.

No intact carcasses were recorded during the 2021 season.

The lowest start temp for the 2021 season was 18° c and the highest recorded temperature was 36° c. All tortoises were handled within the appropriate temperatures as described by the field protocol and scope of work.

Conclusion

Bio Logical is confident in the 2021 season, with only minor data corrections and software streamlining to be addressed in the future seasons of this contract. We look forward to continuing the work with Clark County for the Occupancy Sampling in the Boulder City Conservation Easement.

No new objectives are suggested at this time.

Recommendations

No recommendations are suggested at this time.

Literature Cited

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