

Boulder City Conservation Easement
Desert Tortoise Telemetry
Clark County, Nevada

Final Project Report



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CONTRACT TITLE: Boulder City Conservation Easement Desert Tortoise Telemetry
PROJECT NUMBER: 2017-GBI-1740A
REPORTING DATE: November 30, 2018
PI: Scott Cambrin, Senior Biologist, Desert Conservation Program
DELIVERABLE: Final Report (D70)

EXECUTIVE SUMMARY

This report documents Boulder City Conservation Easement Desert Tortoise Telemetry project by the Great Basin Institute (GBI) from 2014-2018. The Clark County Desert Conservation Program (DCP) contracted the Great Basin Institute (GBI) to provide desert tortoise telemetry on the Boulder City Conservation Easement (BCCE). The effort was part of a larger augmentation study for Clark County, and was conducted in coordination with the U.S. Fish and Wildlife Service (USFWS). The overarching goal of the project was to provide information to assist in determining survivorship and movement patterns of translocated and resident desert tortoises. GBI was responsible for collecting telemetry location data for up to 80 adult and 20 juvenile tortoises on the BCCE and/or surrounding areas.

INTRODUCTION

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). In an effort to study the populations of Clark County, the Clark County Desert Conservation Program (DCP) and the U.S. Fish and Wildlife Service (USFWS) contracted the Great Basin Institute (GBI) to perform desert tortoise telemetry on translocated tortoises in the Calcid alluvial fan zones in the Northeast portion of the Boulder City Conservation Easement (BCCE).

The BCCE encompasses 86,430 acres that is split by US 95 into north and south sections. The project took place in the northern sections which consists of approximately 39,280 acres. The area occurs within the northern end of the Piute-Eldorado Critical Habitat Unit. 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 ecosystem (Figure 1).

The translocated tortoises were from the Desert Tortoise Conservation Center (DTCC). A sample of 40 adult tortoises from the DTCC and 13 resident tortoises were tracked using radio-telemetry to evaluate behavior and survival over a 4 year monitoring period. Tortoises were observed once monthly November through February, and once weekly March through October.

METHODS AND MATERIALS

Prior to the start of this project, a survey was conducted to find resident tortoises in the BCCE project area. Biologists attached semi-permanent 14g radio transmitters to 13 resident tortoises. In addition, 40 tortoises from the DTCC were fitted with semi-permanent 14g radio transmitters and released into the project area. Each transmitter has a unique radio frequency that can be tracked using a unidirectional antenna and VHF radio receiver. Telemetered tortoises were monitored year-round in order to track movement patterns and survival. Each tortoise was observed at least once per month from November through February, and once per week from March through October.

The biologist would tune the receiver targeted frequency and the antenna was rotated in a 360° slow sweeping motion to detect the radio signal. A radio signal is strongest when the front of the antenna is pointed toward the targeted transmitter. Once the signal was located, the observer would sweep the antenna in a 180° arc and walk toward the strongest signal. The radio receiver gain or sensitivity was reduced as the observer gets closer to the transmitter. The observer tracked this radio signal until the tortoise or its burrow was located. As transmitter batteries ran out, transmitters were replaced following USFWS protocol. The project allowed for the addition of desert tortoises, for a total of up to 80 adult (no more than 40 resident tortoises and 40 translocated tortoises) and 20 juvenile tortoises.

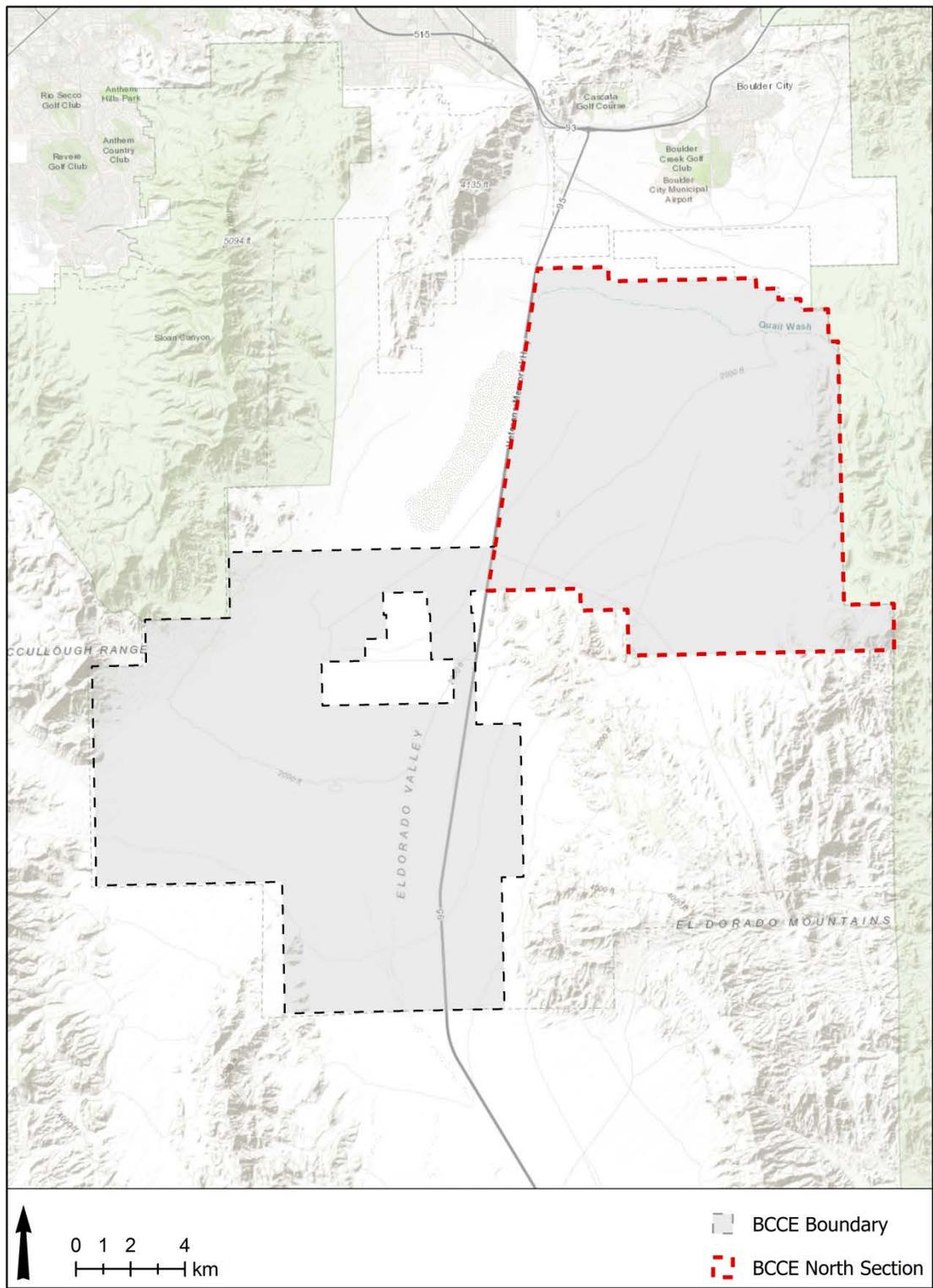


Figure 1 Overview map of BCCE (GBI 2018)

All data were recorded on paper datasheets, as well as in electronic format on Trimble Juno SB GPS (Juno) units loaded with Pendragon forms. The paper datasheets were a back-up version of the information recorded on the electronic forms. Pendragon forms were designed to eliminate errors in data collection by requiring some fields to be filled and providing drop-down menu options for other fields (table 1). Data from these forms was downloaded from each Juno into the collection database monthly. Data were then uploaded from the Pendragon collection database into an Access correction database, where they were verified, checked for errors using automated scripts and non-automated visual checks, corrected, and maintained in tabular format.

GPS locations were acquired via Junos and verified using handheld Garmin GPS 76 (Garmin) units. If either the easting or the northing differed by more than 20 meters the coordinates were considered invalid and biologists attempted to acquire satellites again, for a minimum of three attempts, at which point the coordinates collected with the Garmin were recorded in both the electronic and paper forms. The Garmin coordinates were always recorded on the paper forms as a means of a back-up to the information collected by the Junos. Photos were taken using Junos and were linked to GPS coordinates within forms and databases.

Table 1 Data fields and field types with options listed where applicable

Field	Attribute(s)
Tortoise Number	Free Text
Time	Time
Tortoise Visible	Yes, No
Distance to Burrow	Integer
Frequency	Integer
Tortoise Environment	Open Scrub, On/Above Gentle Slope, On/Above Steep Slope, Dirt Road, Within Wash Rim, Desert Pavement
Tortoise Location	Burrow, Pallet, Open, Vegetation, Rock
Burrow Visibility	High, Medium, Low, Not Visible
Tort in Burrow Visibility	High, Medium, Low, Not Visible
Tortoise Visibility	High, Medium, Low, Not Visible
Behavior	Unknown, At Rest/Active, Moving, Basking, Eating, Mating, Agnostic, Digging
GPS Easting	Integer
GPS Northing	Integer
GPS Grab Valid	Yes, No
Comments	Free Text

RESULTS AND EVIDENCE OF RESULTS

Tortoise observations were recorded from December 2014 to October 2018. During this project, biologists recorded 6,255 observations over 558 days. At the project start, there were 53 translocated tortoises on the tracking list (13 resident and 40 translocated). During the four years of the project several animals were lost; the transmitters of three tortoises fell off naturally, six tortoises went missing, and 23 were found dead (Tables 2 and 3). In the first year of observations, a translocated tortoise left the study area and traveled a fair distance. After discussion with DCP, it was decided to remove this animal from the project. At that time, the transmitter was removed and no further data was collected on this animal. With to the reduction of translocated tortoise and in an attempt to maintain an adequate sample size, GBI coordinated with DCP to add tortoises to the tracking list, both resident and translocated. In the fall of 2017, a group of research animals (38) from the USGS were translocated at the BCCE. A subset of these translocated tortoise (16) were translocated and added into the project tracking list. A total of 29 tortoises were added at different times throughout the four years. Two of these tortoises have been found dead (Table 4). At the conclusion of this project, a total of 47 tortoises remain on the tracking list, three of which are missing.

In addition to the adult desert tortoises monitored, GBI supported the monitoring of 20 translocated juvenile desert tortoises. In April 2015, the San Diego Zoo (SDZ) translocated 20 juvenile tortoises from the Desert

Tortoise Conservation Center to the BCCE. GBI monitored these tortoises from April 2015 through June 2016. In June of 2016, the SDZ resumed monitoring of the 20 individuals. During that time, GBI recorded 708 observations that are not included in Table 2. Additional data on these juvenile desert tortoises has been reported on by the San Diego Zoo.

Multiple individuals have supported this project including a project manager, data specialist and telemetry biologists. In addition to the primary biologist, 17 other biologists contributed to observations over the course of the project.

Table 2 Tortoise observation and associated data for observations recorded between December 2014 and October 2018 excluding juvenile and opportunistic tortoise observations

	Resident	Translocated	Total
Tortoises tracked at start	13	40	53
Tortoises tracked at end	17	30	47
Missing Tortoises	1	5	6
Dead Tortoises	3	20	23
Dropped Transmitters	0	3	3
Removed Transmitters	0	1	1
Added Tortoises	9	20	29
Observations	2,239	3,299	5,538

Table 3 Table 3 Status of tortoises that were tracked at the start of the project

	Resident	Translocated	Total
Alive	8	10	18
Dead	3	22	25
Missing	2	4	6
Dropped Transmitter	0	3	3
Removed Transmitter	0	1	1
Total	13	40	53

Table 4 Table 4 Status of tortoises that were added into tracking over the course of the project

	Resident	Translocated	Total
Alive	9	18	27
Dead	0	2	2
Total	9	20	29

RECOMMENDATIONS

Based upon the life history parameters of the desert tortoise, we recommend that this project continue to gain a further understanding of the survivorship and movement patterns of both translocated and resident desert tortoises.

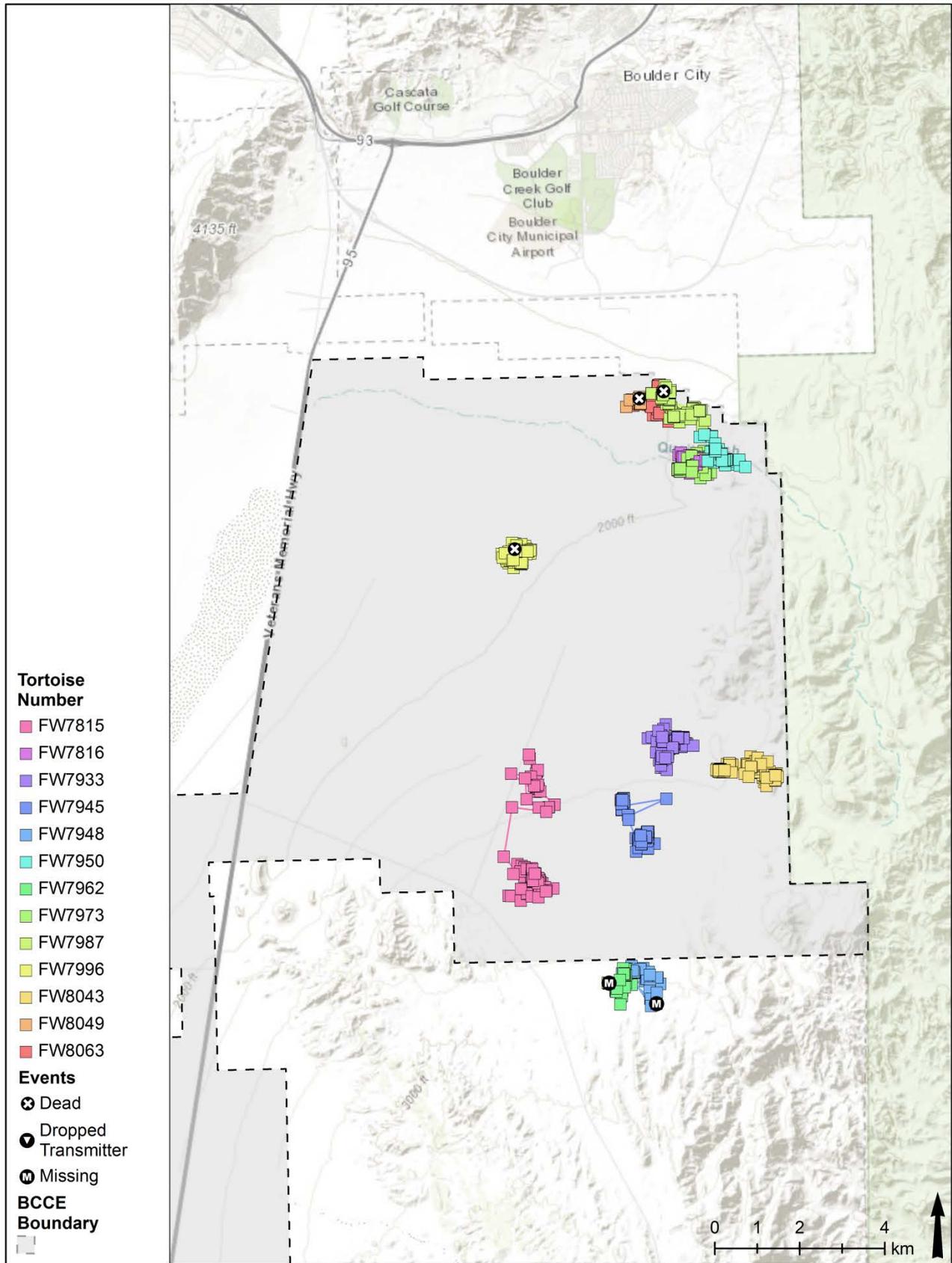


Figure 2 Map of originally tracked resident tortoise observations December 2014 – October 2018

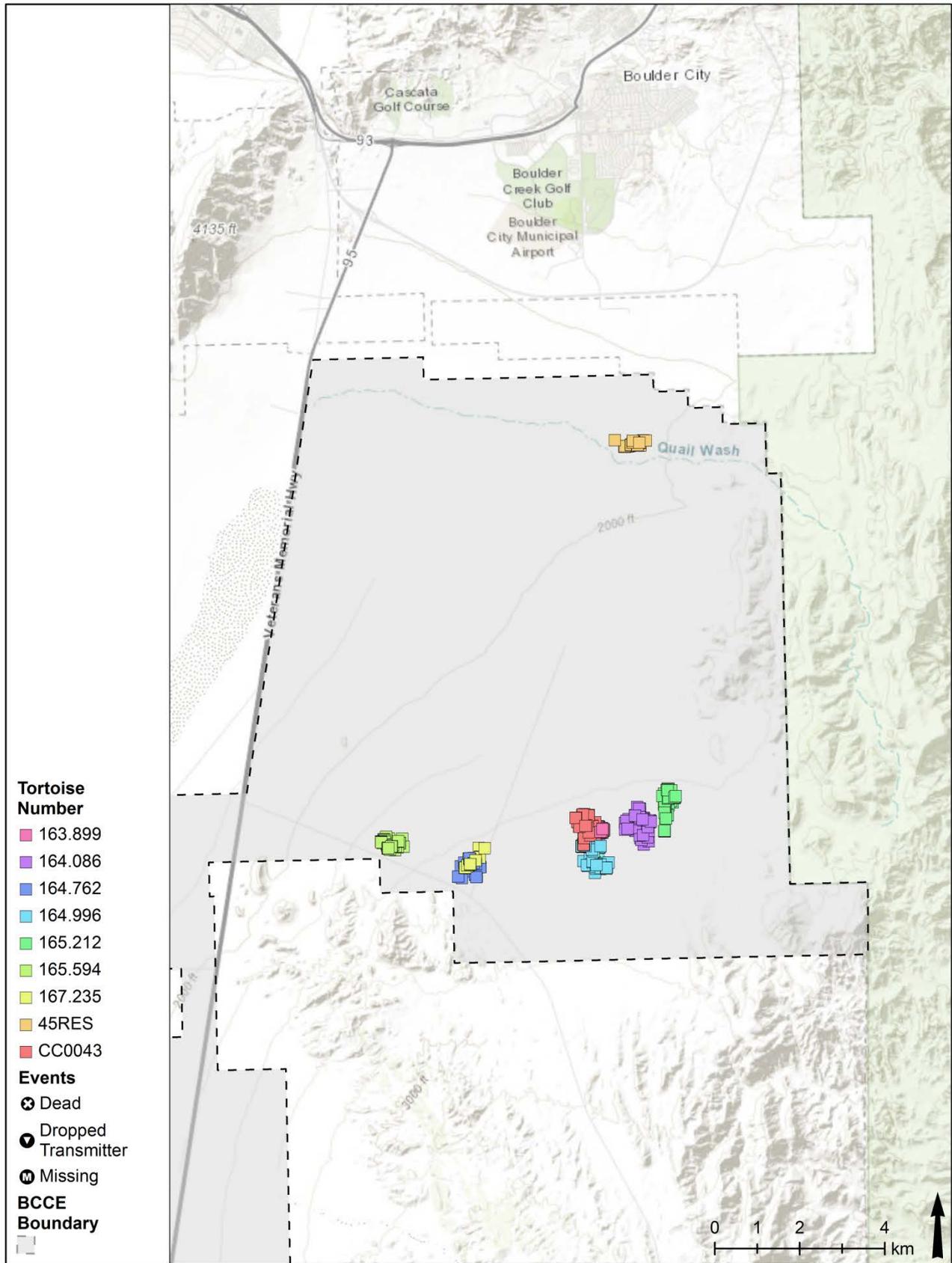


Figure 3 Map of added resident tortoise observations December 2014 – October 2018

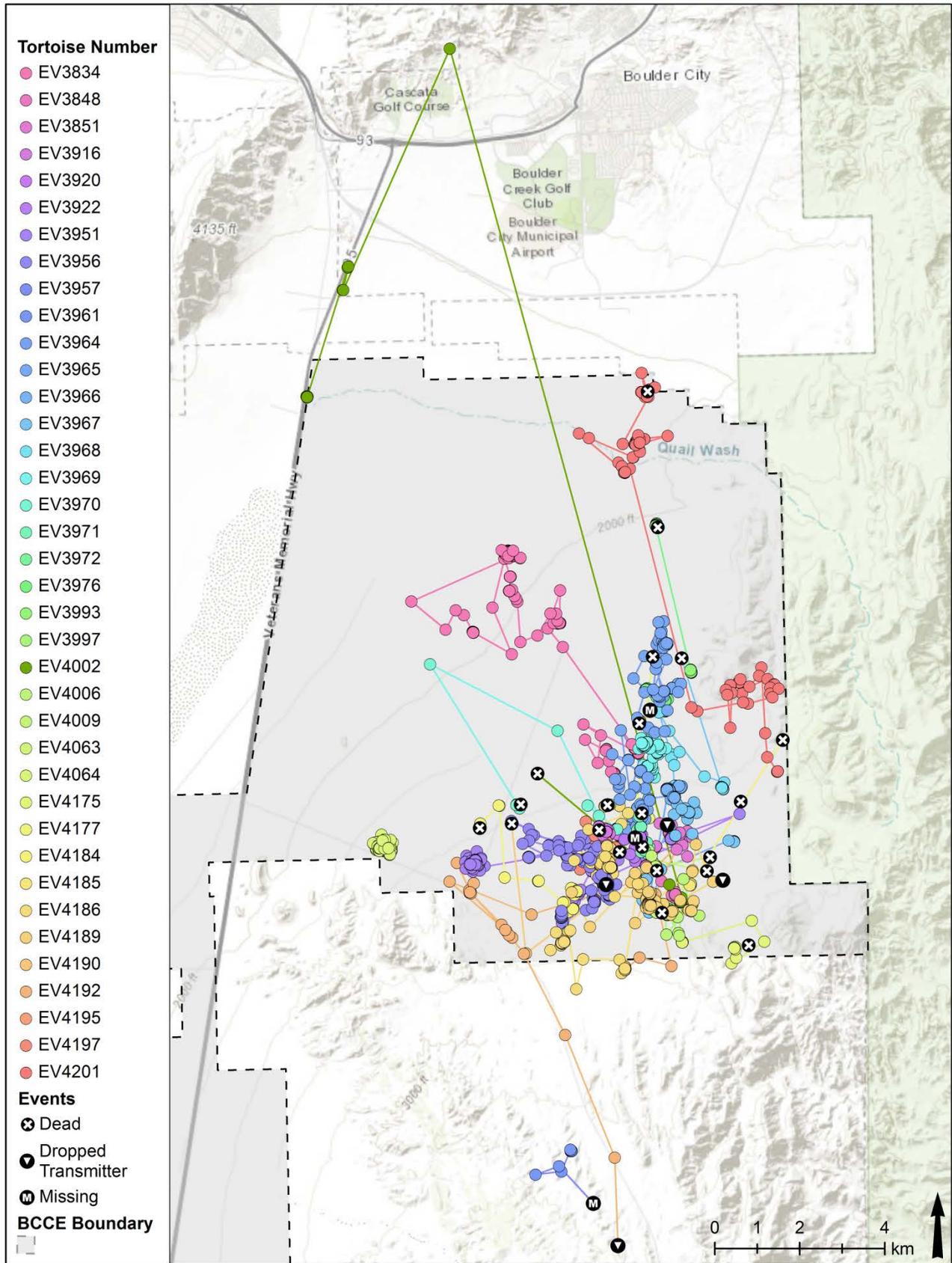


Figure 4 Map of original translocated tortoise observations December 2014 – October 2018

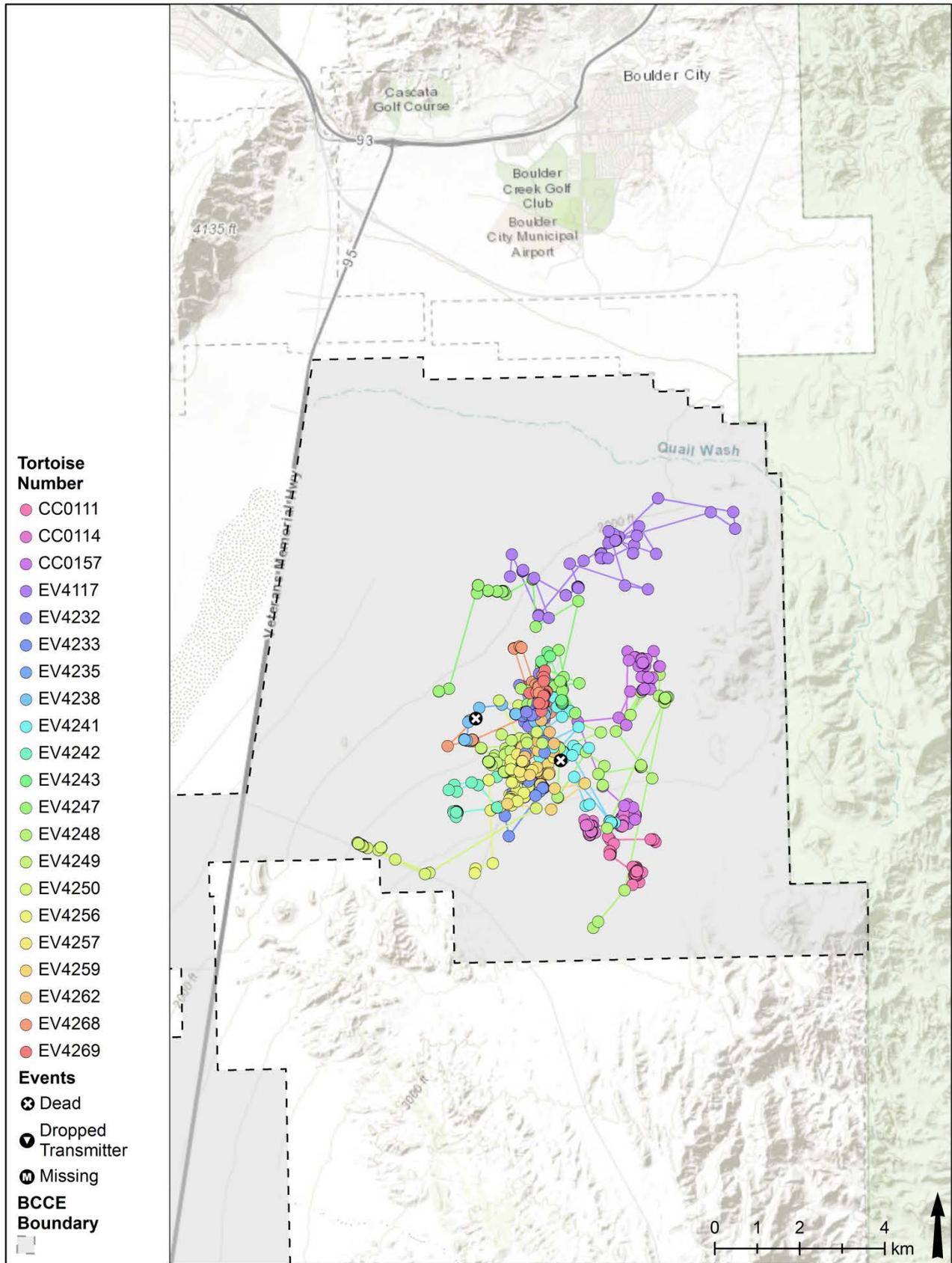


Figure 5 Map of added translocated tortoise observations December 2014 – October 2018