Translocation Plan

ELDORADO VALLEY

Clark County, Nevada

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Prepared by

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Purpose of translocation: Population Augmentation

Critical Habitat Unit: Piute-Eldorado

Recovery Unit: Eastern Mojave

Recipient site land ownership: Bureau of Land Management

Action permitted by federal and state wildlife agencies? (list permits, BOs): Yes
federal: TE-08592A-1 (Douglas G. Myers, Zoological Society of San Diego)
FWSDTRO-1 (Roy Averill-Murray, USFWS – Desert Tortoise Recovery Office)

state: S35185 (Allyson Walsh, Desert Tortoise Conservation Center)
S36694 (Edward Koch, USFWS)

BO: 2013-F-0273, 2013-F-0273.AMD1

Date of proposed translocation: Spring/Fall 2014

Source of translocatees: Desert Tortoise Conservation Center, Clark County, Nevada

Number of translocatees: Maximum 300 adults, 300 juveniles

Translocation Plan Narrative

Site description

The Eldorado Valley translocation site encompasses approximately 46,000 acres (185 km^2) of public lands managed by the BLM in Clark County (Figure 1). The site includes the portion of the designated Eldorado Valley Critical Habitat Unit that occurs on BLM lands and small portions of the Boulder City Conservation Easement west of U.S. 95. The site is bounded by the McCullough Mountains and Highland Range on the west and by U.S. 95 on the east. Tortoises will be released south of the Boulder City Conservation Easement; the southern boundary of the site is S.R. 164 and the town of Searchlight (Figure 2). The site comprises approximately 16% of designated critical habitat within Eldorado Valley, which includes approximately 285,000 acres (1153 km^2).

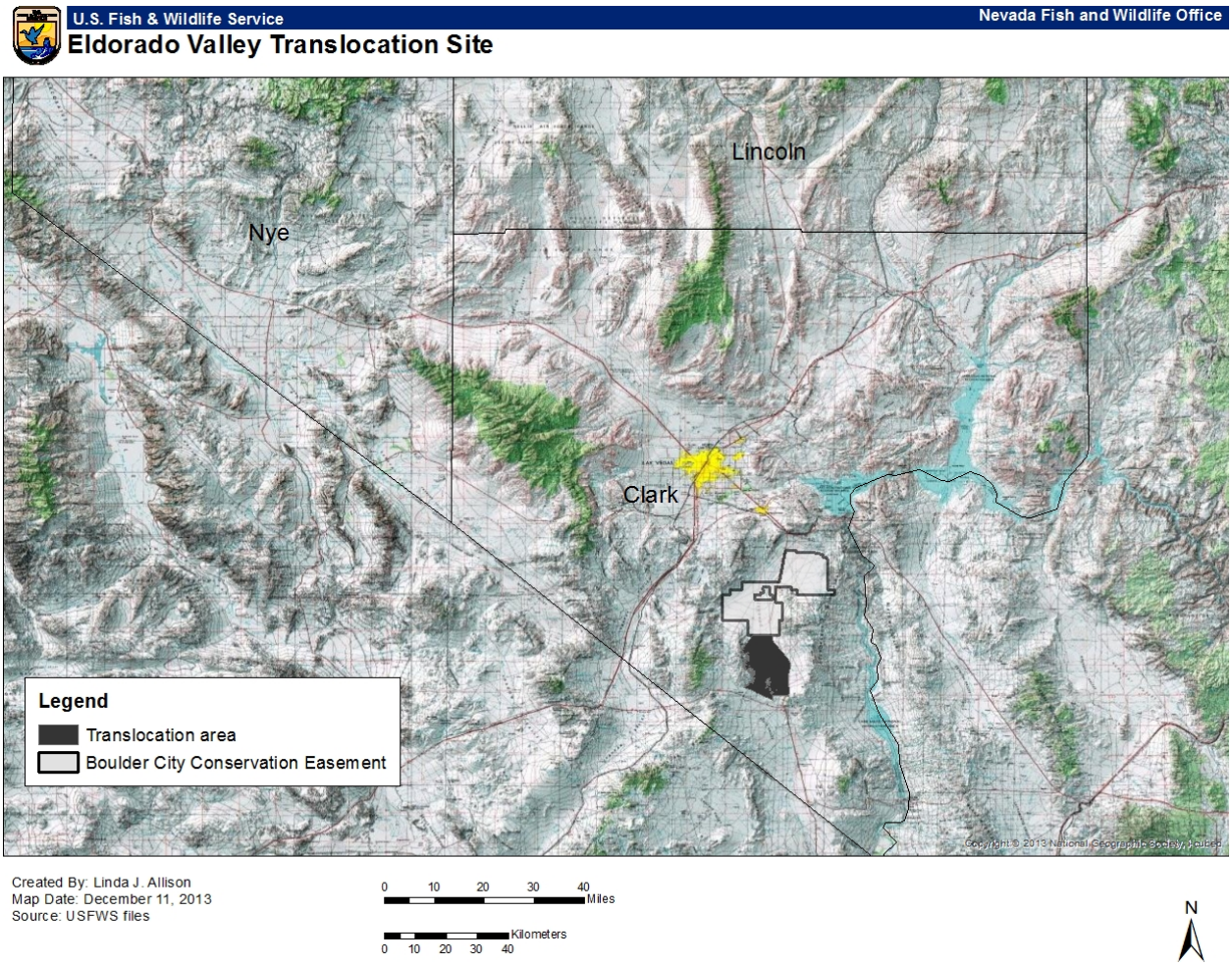

Figure 1. Location of proposed translocation site within Clark County, Nevada, relative to the Boulder City Conservation Easement.

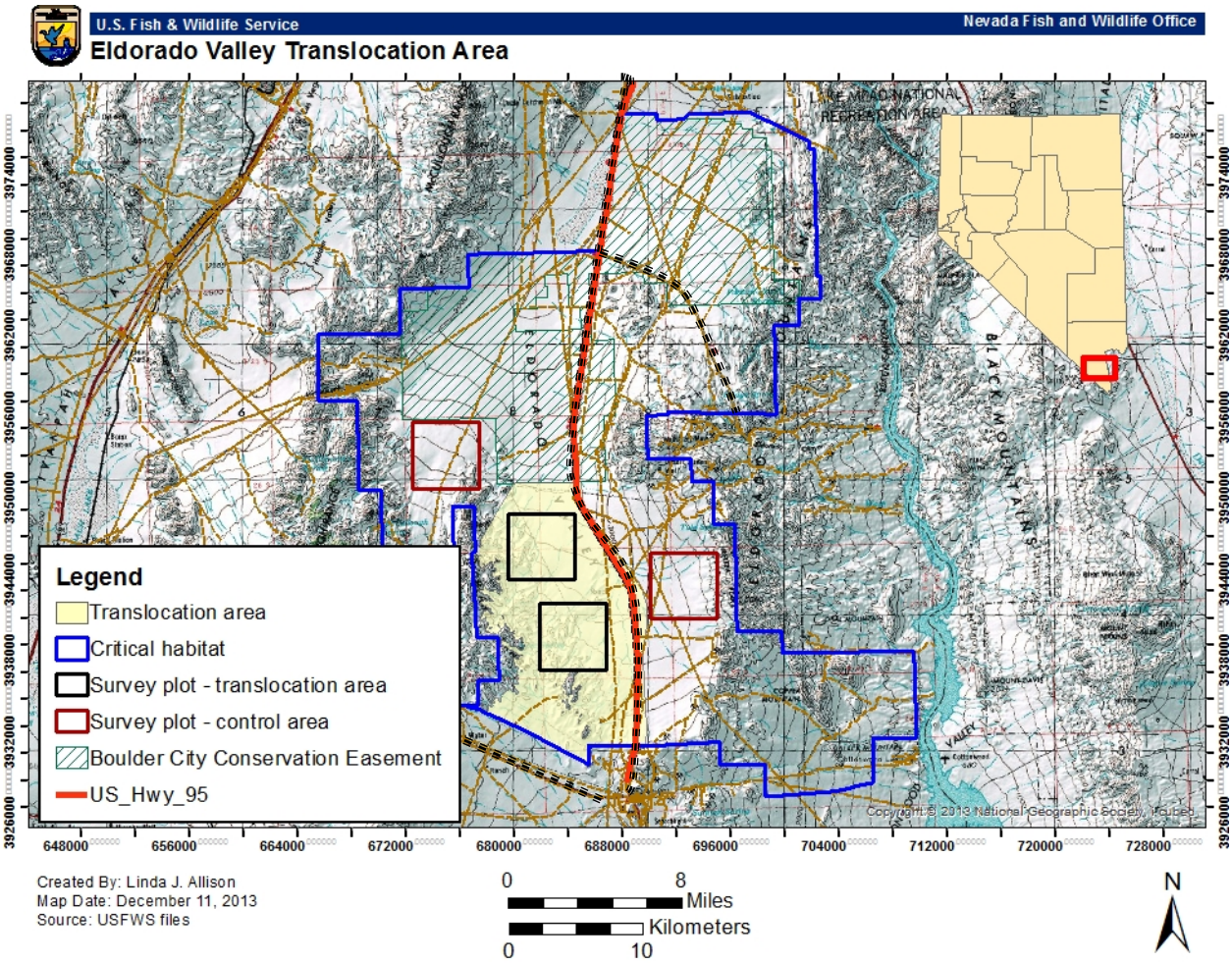

Figure 2. Locations of survey plots within translocation and control areas of Eldorado Valley north of Searchlight, Nevada. Fencing within critical habitat (black dashed lines) prevents tortoises from accessing the roadway.

The portions of U.S. 95, S.R. 164, and S.R. 165 that pass through critical habitat have been fenced with tortoise-exclusion fencing. There are several designated utility corridors, power lines, rights of way, and unpaved roads within the area. Off-highway-vehicle use within the area is restricted to designated roads and trails. The area surrounding Eldorado Valley is currently classified as experiencing “moderate drought” conditions (Palmer Drought Severity Index = -2.0 – -2.9; Tinker 2014). Since the beginning of 2012, this condition has been present in the area during May-July 2012, May-August 2013, and February 2014 (National Climatic Data Center 2014).

Specific release points will be selected close to the time of release and will take into account conditions at that time. The goal is to distribute tortoises throughout the site while minimizing risks to individuals by staying at least 6.5 km from unfenced portions of U.S. 95 just north of Searchlight that are not otherwise bounded by topographic features or other hindrances to

tortoise dispersal (most desert tortoises are expected to settle within 6.5 km of their release point; USFWS 2012b). Designated 4WD roads will be used to access different portions of the larger release area, and tortoises will be distributed broadly rather than released within one localized area.

Density/Trends of Resident Tortoise Population

A 2.6-km^2 study plot was surveyed in 1994 in the Eldorado Valley, approximately 3.2 km south of the McCullough substation and 4.8 km west of U.S. Highway 95 (Goodlett et al. 1994). The 60-person-day survey resulted in 11 encounters of 8 individual tortoises, only 4 of which were $\geq$180 mm midline carapace length (MCL). These limited data provided an abundance estimate of 4 adult tortoises on the plot. In contrast, 19 shell remains were found during the survey, 15 of which were $\geq$180 mm MCL. Three of the individuals were estimated to have died within the 4 previous years. The condition of the environment during and immediately preceding the survey was characterized as drought-stressed.

Before tortoise barrier fencing was installed along U.S. 95, S.R. 164, and S.R. 165 in 2002, Hoff and Marlow (2002) documented areas of depletion up to 4 km from these unfenced, heavy traffic-volume roads. Smaller areas of depletion were documented on roads in the valley with lower traffic volumes.

Annual distance sampling surveys conducted within the Eldorado Valley portion of the Piute-Eldorado Valley Critical Habitat Unit between 2004 and 2012 (except in 2006) indicate declining trends in densities of adult desert tortoises, with a current density estimate of 2.8 adult tortoises/km^2 (USFWS, unpubl. data). Between 2007 and 2011, 36 of 96 tortoise detections during range-wide monitoring in Eldorado Valley were of shell remains. This ratio of dead:live tortoises (0.60) exceeded the average for all other regular monitoring strata in Nevada (range = 0.16-0.42); only Pahrump Valley (0.93 in 2008) and an area north of Mormon Mesa (0.83 in 2008-09) exceeded the proportion of dead tortoises observed in Eldorado Valley (USFWS, unpubl. data).

The tortoise population within Eldorado Valley has suffered a recent decline, warranting the application of population augmentation. Despite the area currently experiencing drought conditions, the proposed translocation targets an area that is considered to have high tortoise habitat potential (Nussear et al. 2009). Furthermore, recent research has shown that survival of translocated tortoises is similar to non-translocated tortoises even under drought conditions (Esque et al. 2010; Nussear et al. 2012). Therefore, while overall survival may be lower than in wetter years, we expect augmentation to improve population status by providing a net increase in tortoise numbers. Delaying augmentation until a wetter year may increase individual survival, but inaction could be extended indefinitely given the uncertainty of future drought. Proceeding in 2014 increases the probability that additional tortoises will more immediately contribute to population recovery.

Specific Goal of Translocation

Population augmentation is an important tool for conservation of the Mojave desert tortoise (USFWS 2011). The goal for translocation to Eldorado Valley will be to increase the population in one portion of the valley, while comparing results elsewhere in the valley. Little to no information on specific habitat characteristics or measures of habitat quality exist relative to carrying capacity for Mojave desert tortoises (USFWS 2011). Therefore, we will use densities recently observed elsewhere in the recovery unit to set a conservative population-density target. In this area, we hope to increase density by up to one standard deviation. Densities described by a single standard deviation of the mean tortoise density for a recovery unit are not unusually high. Therefore, given appropriate habitat and tortoise management (i.e., within the designated Eldorado Valley Critical Habitat Unit) exist, maximum post-translocation density of adult tortoises should not exceed the 68% confidence interval of the mean density in the respective recovery unit (USFWS 2012b). For the Eastern Mojave Recovery Unit, this density is 5.8 adult tortoises/km^2.

Although there are almost 1160 km^2 in the northern portion of the Piute-Eldorado Critical Habitat Unit, only 185 km^2 are east of the Highland Range, west of U.S. 95, and south of the Boulder City Conservation Easement. Assuming that translocated tortoises will remain in this 185 km^2, we therefore plan to add between 100 and 300 adult tortoises to the estimated resident population of 518 adult tortoises. The planned release is thus $\leq$54% of the maximum limit (see Table for calculations).

By keeping augmentation expectations within the limit described above, a reasonable but ambitious recovery goal has been set. Limiting the translocation to the west side of U.S. 95 provides an opportunity to evaluate the results of the augmentation against conditions elsewhere within the critical habitat unit (see Monitoring, below). Specific limits have not been set for juvenile tortoises, given naturally higher mortality rates than adults, but this number should not exceed the number of adults released.

Calculation of numbers of adult tortoises that may be released to the Eldorado Valley translocation site (185 km^2).	
Maximum post-translocation abundance	5.8/km^2 * 185 km^2 = 1073 adult tortoises
- Current abundance	2.8/km^2 * 185 km^2 = 518 adult tortoises
= Maximum number of new adult tortoises	555 adult tortoises
Planned release	~300 adult tortoises (54% of maximum limit)
Maximum estimated post-translocation density	(518 + 300)/185 km^2 = 4.4 adults/km^2

Health Considerations

Health in a population context can be thought of as the ability of a population to perform all of its ecological functions with typical efficiency (Hanisch et al. 2012). Inherent in this is the idea that healthy populations should be able to remain resilient and self-sustaining in the face of naturally occurring disease. It is neither possible nor desirable for organisms to be "parasite and disease free", so there is rarely cause to consider translocation unfeasible due to disease or parasites if reasonable precautions are taken (IUCN 2013). However, all aspects of the translocation process can cause stress-induced disease (but see Drake et al. 2012), so strict disease-prevention, quarantine, and handling/release protocols will be implemented based on the most recent guidance available (e.g., Woodford 2000; USFWS 2012b) and procedures described below.

Health status of resident tortoise population

One pathogen of long-standing concern is *Mycoplasma agassizii*, a bacterium known to cause upper respiratory tract disease. Seroprevalence of *M. agassizii* was recorded at levels up to 13% in the Eldorado Valley area (Sandmeier et al. 2013), so extensive disease screening for this pathogen is likely unnecessary (IUCN 2013). As described in the Monitoring section below, we plan to focus efforts on two 25km^2 core areas within Eldorado Valley. In Spring 2014, we will conduct pre-release surveys within each core area and conduct complete a health assessment according to standardized protocols (USFWS 2013), including collection of biological samples, on each tortoise found. The health assessment will take place in May, thus when tortoises are located during April surveys they will have radio transmitters temporarily affixed to facilitate location for assessments. For monitoring comparison purposes, we will also conduct complete health assessments and collect samples from tortoises found on two 25km^2 control plots (Figure 2) using the same approach.

Health status of translocatees

Current guidance developed for wild-to-wild translocation projects provides a structured approach for evaluating health status of individual desert tortoises prior to translocation (USFWS 2013; Figure 3). All tortoises to be translocated in this project will be selected from the collection residing at the Desert Tortoise Conservation Center (DTCC) in Las Vegas. The DTCC is operated by San Diego Zoo Global (SDZG), and comprehensive physical exam and sample collection protocols were developed by San Diego Zoo Global veterinarians in conjunction with other consulting veterinarians, scientists, and biologists. These protocols include health assessments that take into account body condition, clinical signs of disease, exam findings (e.g., coelomic masses or white mucous membranes), weight history, medical history while at the DTCC, presence of ectoparasites, concurrent illness in cohorts, and other factors determined to be important in appropriately assessing an individual's health and determining suitability for translocation. The protocols have been adapted from published recommendations (Berry and Christopher 2001) and IUCN guidelines (Woodford 2000). Quarantine before release is a basic disease-prevention precaution for translocation, and potential stress caused by confinement may usefully bring out latent infections (IUCN 2013). All tortoises to be released will have undergone a quarantine period of $\geq$90 days with repeated health evaluations (Woodford 2000).

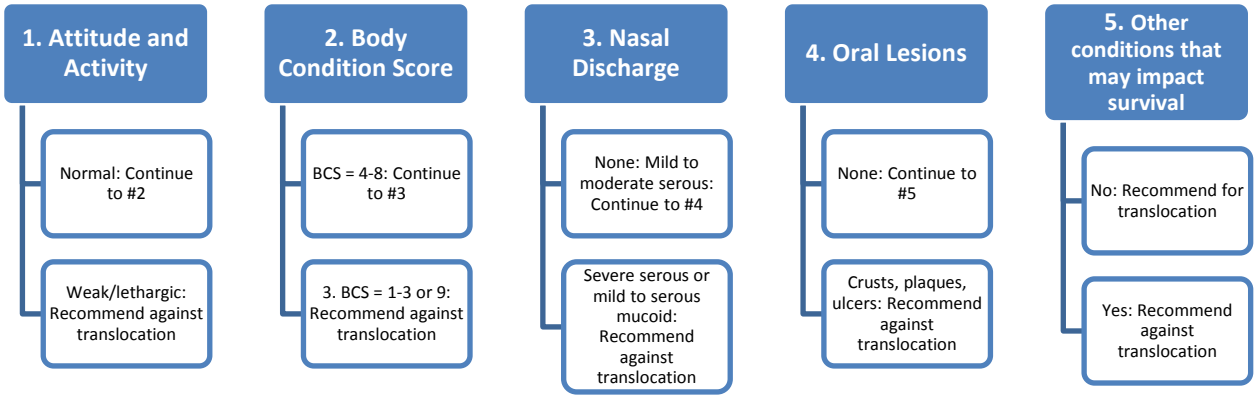

Figure 3. Algorithm for evaluating if desert tortoises are suitable for translocation, taken from USFWS (2013) guidance for wild-to-wild translocation projects. BCS = body condition score.

Given the particular condition of using captive tortoises for population augmentation, additional health-related eligibility criteria will be applied beyond those depicted in Figure 3 (Attachment 1; these criteria may be modified to incorporate new information). For example, individuals housed together in pens will be disqualified collectively and subjected to additional quarantine if a single individual shows signs of disease. Additional individual criteria to minimize risks to individual translocated tortoises, as well as to the resident population in Eldorado Valley, include screening for bladder stones and ectoparasites and ensuring that each translocated tortoise has a history of maintained or increased weight (Attachment 1). Health-history documentation of all release candidates will be evaluated, and all release candidates will be assessed according to current protocols. The history of repeat evaluations increases the chances of observing an abnormal condition and minimizes the chance of releasing a sick individual. Only tortoises that pass the DTCC's comprehensive health screening will be released.

Genetic Considerations

Eldorado Valley is located approximately 50 km southeast of the DTCC. Moving tortoises within 175 km of the DTCC ensures that the vast majority of released tortoises will remain in a genetic unit equivalent to that of their origin (actual locality of genetic origin, not that of the area immediately surrounding the DTCC) (USFWS 2012a). Additionally, the risk of inducing outbreeding depression in desert tortoises is low and would only manifest itself on a time scale of 600 years or more (Averill-Murray and Hagerty, in press). As a result, we consider genetic analysis of individuals as a means of selecting tortoises to be translocated to be unnecessary. If any translocated individuals originate from a more distant population, they may be poorly adapted to conditions at Eldorado Valley and may not successfully integrate into the resident population (Edwards and Berry 2013). This would further limit potential negative genetic effects, however large numbers of mortalities unknowingly related to poor adaptation to the release site could compromise the evaluation of translocation success (Averill-Murray and Hagerty, in press).

Monitoring

We primarily will use changes in density of adult tortoises to assess the success of this translocation. (*Note: a minimum of 100 adult tortoises will be translocated, subject to availability of eligible tortoises at the DTCC, but not to exceed 300 adults, as described above. If fewer than 100 tortoises are available, the project will not occur due to reduced ability to detect effects under the planned monitoring design.*) We will survey 2 square, 25km^2 plots in the translocation area and 2 similar plots in control areas unaffected by the translocation (Figure 2). By surveying control and augmentation plots before the translocations, we can compare starting densities, then use changes in density assessed after the translocation to describe whether populations have increased from their baseline before translocation and whether these changes are greater than any changes seen due to natural year-to-year fluctuation on the control plots. One of the 2 control plots will be northwest of the translocation area, between the McCullough Mountains and the Highlands Range. The second control plot will be just east of the translocation area, but inaccessible to the translocated tortoises because it is on the east side of U.S. 95.

Focused data collected from these 4 study plots during the initial 2 years will provide a short-term indication of translocation success (and identify any immediate complications for resolution). These data will be integrated with longer-term data collected from range-wide monitoring within Eldorado Valley, with the goal of showing a stable enhanced effect of the translocation on population size. Additional funding also will be sought to conduct repeated, intensive surveys of the sample plots over time. Plans for more specific, longer-term monitoring will be informed by results of the initial monitoring plan, as well as results of other ongoing translocation projects. Archived blood samples of all translocated tortoises will be available for comparison with resident tortoises if particular questions about health or genetics arise in the future. Other monitoring topics that may be pursued in the future include long-term changes in prevalence of upper respiratory tract disease, as measured by observation of clinical signs of disease, and correlates of population change with respect to habitat characteristics or threats in the translocation and control areas.

<u>Field and Analytical Approach</u>

We will conduct surveys within each study plot during the spring of 2014 before translocation releases as well as during the spring of 2015 following translocation releases. Surveys will be conducted on 100 5km-long transects in each plot to meet preproject survey protocol guidance to provide for the detection of 20 tortoises per plot (the protocol recommends a survey effort of at least 446 km in the Eastern Mojave Recovery Unit; USFWS 2010). This number of tortoise detections will be adequate to 1) develop encounter rate estimates for each plot individually and to 2) estimate the detection probability of these cryptic animals by developing a distance sampling detection curve. Detection probabilities are used to adjust raw encounter rates to account for tortoises that were visible but not seen because tortoises become more cryptic the farther they are from the transect walker (Buckland et al. 2001).

Each surveyor will use a GPS unit to walk pairs of parallel strip transects, first surveying one transect then returning to the vicinity of their starting point at the end the second transect (i.e., the end point of the second transect will be near the start point of the first transect). Surveys will start after the first week of April. All tortoises that are found will be measured, sexed, scored for body condition, and given a permanent mark (numbered paper tag and matching marginal scute notching). A transmitter will be temporarily attached until a telemetry specialist can locate and more securely affix the transmitter within 48 hours of the initial encounter with the resident tortoise. These transmitters will only remain on the tortoises until health assessments can be completed (see Health Considerations, above).

To adjust for the number of tortoises that could not be detected because they were deep underground in burrows, we will make behavioral observations on radio-outfitted tortoises in a nearby population to estimate the proportion that are not detectable while surveys are conducted on transects (USFWS 2012c). A population of tortoises is already outfitted with these transmitters at a site approximately 19 km south of the center of the proposed translocation area, in Piute Valley (tortoises in the translocation and control plots that have transmitters attached to facilitate location for health assessments will not be used for this purpose to avoid biasing detectability estimates that may arise as a result of handling).

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Attachment 1

Health Eligibility Criteria
2014 Translocation from DTCC to Eldorado Valley

Initial Assessment of Pen Group Eligibility

- Assess **all** individuals occupying pen concurrently.
- The pen group is preliminarily deemed eligible if no tortoises in the pen have signs of disease.
- If one or more tortoises in the pen show mild to moderate signs of disease, the pen is not eligible for release, and all tortoises in pen will be treated and observed with re-assessment for eligibility after 3 months.
- If one or more tortoises in the pen has a Body Condition Score $\leq$ 3 and/or moderate to severe signs of disease, those individuals receive a follow-up health assessment immediately, and the pen is quarantined for 30 days.

Individual Eligibility

- Pre-release comprehensive health assessment, which includes a full physical exam and collection and banking of biological samples (blood, choanal swab, cloacal swab, nasal lavage) conducted
- Normal behavior for season and time of day
- Normal bodily functions
- No active signs of communicable disease
- Serous 1 nasal and/or ocular discharge **does not disqualify** a tortoise from eligibility if there is no scarring or missing scales around the nares and no other health issues
- No oral lesions
- No white oral cavity
- No bladder stones
- No ectoparasites
- No generalized skin conditions
- Body Condition Score 4-7
- History of maintained or increased weight
- 4 legs and normal ambulation
- No gross disfigurements such as severely flattened carapace, unusually domed or peaked carapace, or grossly enlarged carapace
- Midline carapace length $\leq$ 330 mm

Final approval for release will be given by the DTCC's Conservation Program Specialist or DVM after review of assessments.