Translocation Plan

STUMP SPRINGS

Clark County, Nevada

December 9, 2015

Prepared by Clark County and the U.S. Fish and Wildlife Service

Purpose of translocation: Population Augmentation

Critical Habitat Unit: none

Recovery Unit: Eastern Mojave

Recipient site land ownership: Bureau of Land Management

Action permitted by federal and state wildlife agencies?: Yes

1) Take of wild tortoises: Biological Opinion 1-5-00-FW-575, Permit TE-034927-0 (Clark County MSHCP)
2) Translocation: Environmental Assessment DOI-BLM-NV-S010-2012-0097-EA
3) Non-lethal take of resident tortoises during monitoring: FWSDTRO-1 (Roy Averill-Murray, USFWS – Desert Tortoise Recovery Office; *note: Clark County will obtain permit during HCP amendment*)

State permits: to be determined

Date of proposed translocation: Fall 2015 through 2020

Source of translocatees: Development sites within Clark County, Nevada

Number of translocatees: 50 adults/juveniles combined by Clark County through 2020; not to exceed 339 adults and 339 juveniles, in total

Translocation Plan Narrative

Site Description

The Stump Springs translocation area (refer to Table 1 for definitions of terms used in this document) lies within an undesignated multiple-use area managed by the BLM in the western portion of Clark County, Nevada. The Stump Springs area covers approximately 85,000 acres (344 square kilometers [km^2]) northwest of the town of Sandy Valley (Figure 1). It is bordered by State Route 160 (SR 160) to the northeast, Tecopa Road to the northwest, and California to the southwest, with the approximate 4,900-foot (1,500-meter) elevation line in the Spring Mountains generally forming the eastern boundary. The Greater Trout Canyon translocation area lies on the opposite (north) side of SR 160. The Stump Springs translocation area occurs outside of designated critical habitat, but it does lie within a block of contiguous desert tortoise habitat that may be valuable for population connectivity (i.e., between the Ivanpah Critical Habitat Unit, Death Valley National Park, and areas to the north; United States Fish and Wildlife Service [USFWS] 2012a). Several culverts provide potential connection between the Stump Springs and Greater Trout Canyon areas.

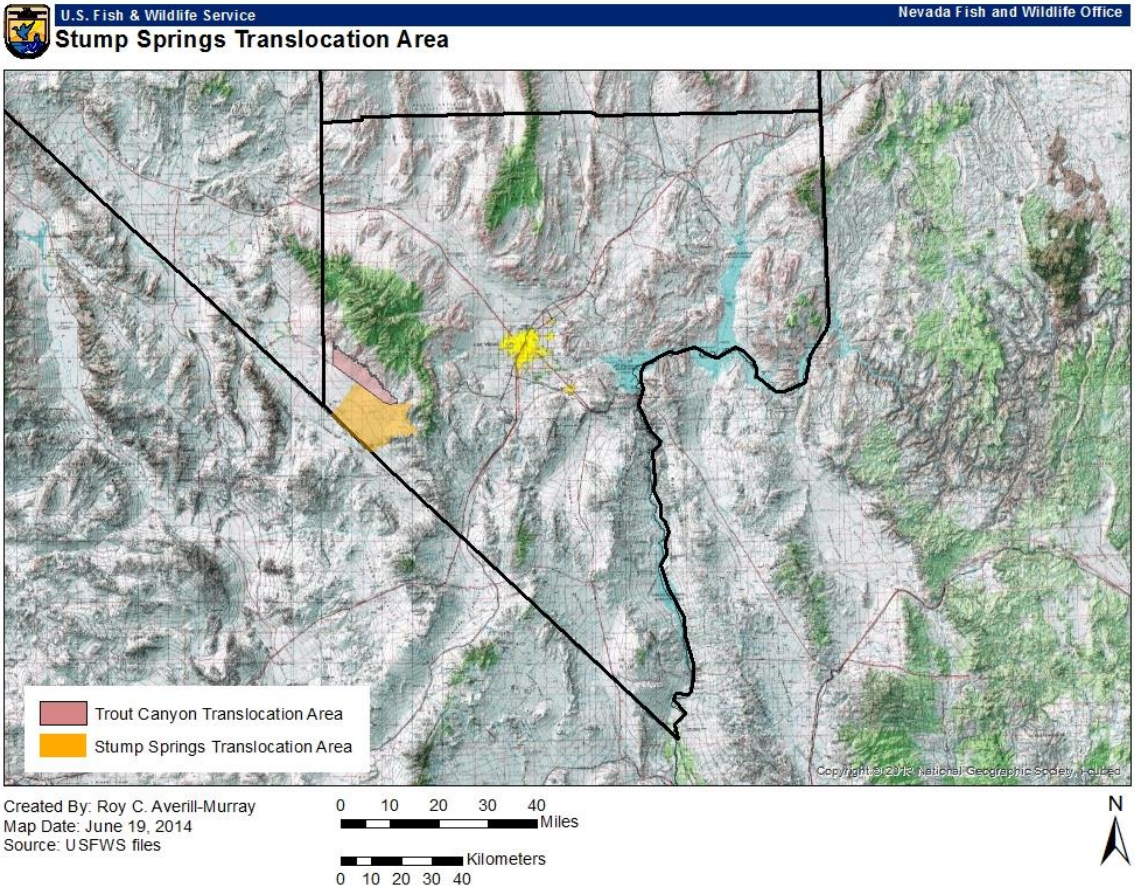

Figure 1. Stump Springs Translocation Area in relation to the Greater Trout Canyon Translocation Area and southern Nevada.

Table 1. Terms related to the Stump Springs translocation project (see also Figure 4).

(Full) Translocation Area	• The full translocation area extends from Tecopa Road to the 4900-foot elevation line, bounded by State Route 160 on the north and the California state line on the southwest. Tortoises released in the Release Area are expected to disperse across the Translocation Area, with few reaching the unfenced boundaries. • Approximately 85,000 acres • Maximum post-translocation abundance (resident + translocated tortoises) = 1,016 adults
Release Zone	• Area within which tortoises will be physically released if the full Translocation Area is utilized • Boundaries set 6.5 km from perimeter of the full Translocation Area where not bounded by topography or fencing • Approximately 21,000 acres
Priority Translocation Area	• The Priority Translocation Area was delineated to minimize overlap with pending solar applications. Subject to final determination of the number of tortoises available for translocation and the maximum number that can be added to the population, releases will occur so that most tortoise dispersal will be confined within the Priority Translocation Area. • Approximately 61,000 acres • Maximum post-translocation abundance (resident + translocated tortoises) = 700 adults
Priority Release Zone	• Area within which tortoises will be physically released if only the Priority Translocation Area is utilized • Boundaries set 6.5 km from perimeter of the Priority Translocation Area where not bounded by topography or fencing • Approximately 6,600 acres

Mojave Desert scrub dominates the site. Small amounts of salt desert scrub, gypsum soils, and mesquite/catclaw habitats occur on the valley floor in the southern portions of the site. Most of the site lies on the floor of Pahrump Valley at elevations of 2,600-3,000 feet (800-900 meters). Small, isolated hills and ridges occur in the southern portion of the site. The major drainage direction is northeast to southwest; major washes include Lovell Wash and Potosi Wash.

Several well-used unpaved roads cross the site, one of which connects SR 160 with the town of Sandy Valley. Two existing utility corridors bisect the area. The 3,500-foot wide West Wide Energy Corridor, established in 2009 as a component of the Energy Policy Act of 2005, runs approximately 18 miles through the area in a northwest-southeast direction. A second corridor,

designated in the BLM's Resource Management Plan (RMP), is 2,640 feet wide. It runs parallel but not contiguous to the 2009 corridor for most of its length; within the overall translocation area, the corridors are closest at Tecopa Road (0.18 miles apart). The only development within these corridors is a single line through the eastern portion of the RMP corridor.

Several solar-development applications overlap the translocation area (Figure 2). Each of these applications is considered "pending" under the programmatic solar environmental impact statement (U.S. Bureau of Land Management and U.S. Department of Energy 2012). All of the applications have been pending since 2011 or earlier, and none are being actively processed or analyzed under NEPA by the BLM. The two applications by Abengoa Solar primarily lie on the western side of Tecopa Road, and even though the application parcels overlap the road, development is not planned on the eastern side of the road. The Boulevard Associates application comprises 3,272 acres proposed for photovoltaic development, and the Brightsource Energy application comprises 6,787 acres proposed for concentrating solar ("power tower") development. Any future development of these applications must take into consideration desert tortoises and will accommodate translocated tortoises that have dispersed throughout the translocation area. However, in order to minimize future conflicts with potential solar development, a 61,174-acre (247.6-km^2) priority translocation area has been identified (Table 1; Figure 3). The priority translocation area overlaps Boulevard Associates' application by 3,272 acres (13.2 km^2) and Brightsource Energy's application by 16,818 acres (68.1 km^2). Initial translocations undertaken by Clark County's Desert Conservation Program (up to 50 tortoises) will focus on this priority area.

Four grazing allotments in the area are currently closed. There are numerous mining claims that potentially impact the site. Most of these are concentrated in the Spring Mountain foothills on an approximate 6,000-acre block in the southeast corner of the area. Validity exams have not been conducted on any of the claims, most of which are held by three entities. The BLM has designated one community mineral materials site for commercial sales within approximately 6,400 acres located near Sandy Valley. The last recorded use of this site was in 1994. Off-highway-vehicle use within the area is restricted to existing roads and trails. One motorized event occurs within the unit, the Barstow-to-Las Vegas dual-sport event. This event has been held annually in late November for the last 30 years and is expected to continue. The event is a non-speed-based event and involves street-legal motorcycles traveling on existing roads and trails. Through the translocation area, the event uses Sandy Valley Road.

Nevada Department of Wildlife (NDOW) Hunt Management Unit 262 includes and surrounds the translocation area. Portions of two Wild Horse and Burro Herd Management Areas (HMA) are located within the area. The Red Rock HMA includes 25,000 acres within the area and has an Appropriate Management Level (AML) of 29-49 burros and 16-27 horses. The Wheeler Pass HMA includes about 22,000 acres in the area and has an AML of 47-66 horses and 20-35 burros. Based on past BLM herd monitoring and utilization studies, the portions of the HMAs that overlap the proposed translocation area are infrequently used by either horses or burros. Instead, horses and burros more frequently use areas north of SR 160 and areas on the eastern

slopes of the Spring Mountains south of SR 160. Therefore, competition for forage within the translocation area is expected to be negligible.

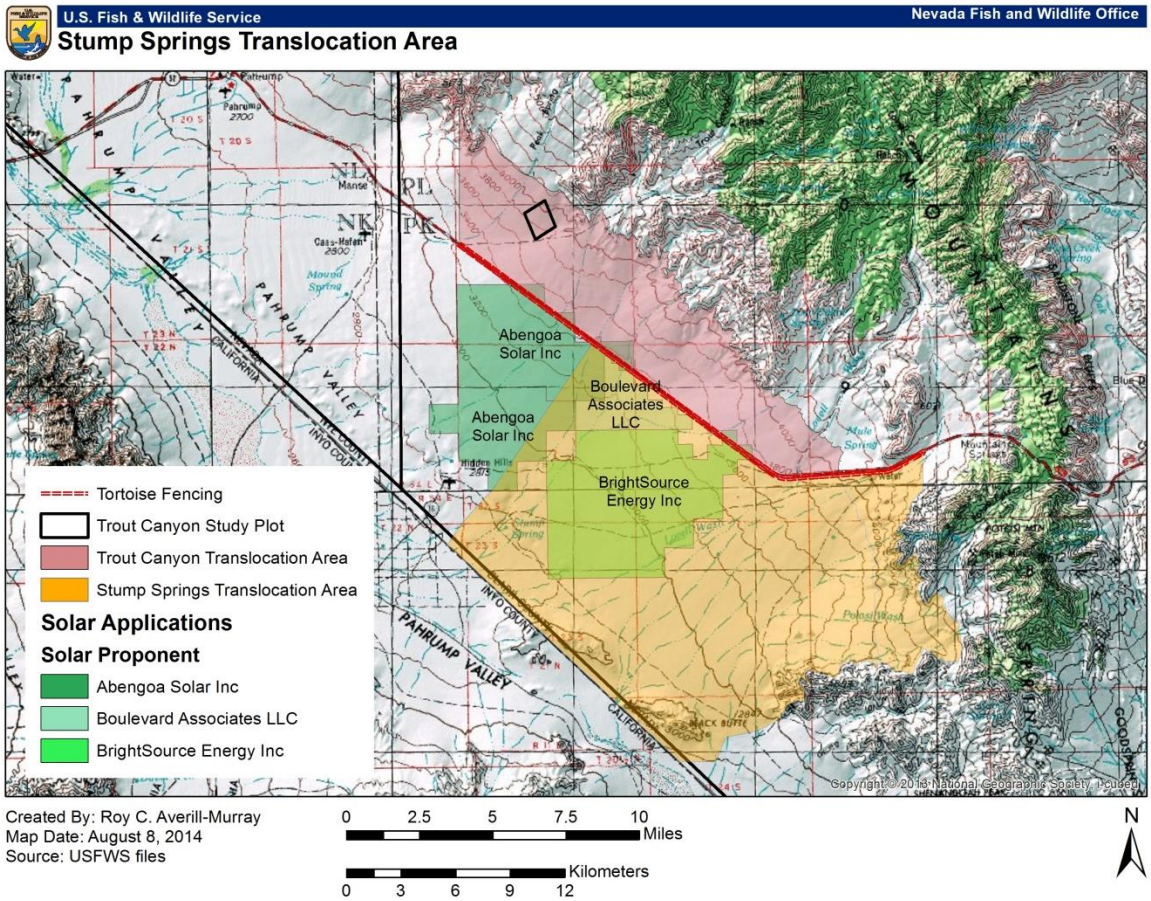

Figure 2. Stump Springs Translocation Area relative to pending solar-development applications and the Trout Canyon study plot.

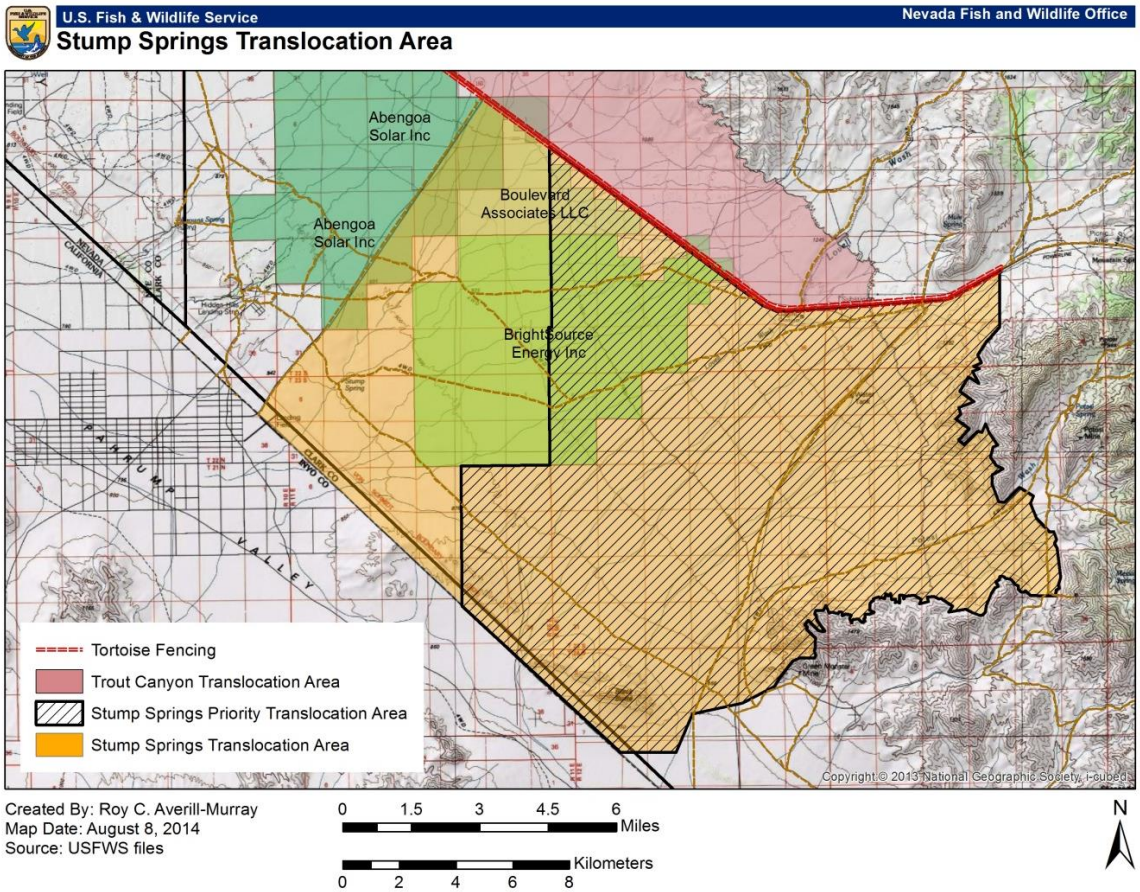

Figure 3. Stump Springs priority translocation area.

The area surrounding Stump Springs is currently classified as experiencing "severe drought" conditions (Palmer Drought Severity Index = -3.0 – -3.9; Fuchs 2015). Since the beginning of 2012, moderate or worse drought conditions have been present in the area during May-July 2012, May-July 2013, and February 2014-June 2015 (National Climatic Data Center 2015). Precipitation outlooks for the area suggest that three-month rainfall totals may exceed the 1981-2010 average by up to 0.2 inches between September and November 2015 (NOAA/National Weather Service 2015).

Translocation will have no effect on current multiple use of the site. For example, future grazing of the site will be managed in accordance with BLM's RMP relative to allotments that occur outside designated critical habitat and Areas of Critical Environmental Concern. Potential conflicts with increased numbers of desert tortoises and human activities will be accommodated through planning, monitoring, and consultation between the BLM and USFWS.

<u>Selection of release sites</u>

Tortoises translocated by Clark County's Desert Conservation Program will be released within an approximately 6,569-acre (26.6-km^2) priority release zone within the priority translocation area (Table 1; Figure 4). If the full translocation area is used by new projects in the future,

releases will occur within a larger 21,150-acre (85.6-km^2) release zone (Table 1; Figure 4). 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 paved roads 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). Existing roads will be used to access different portions of the release area, and tortoises will be distributed broadly rather than released within one localized area.

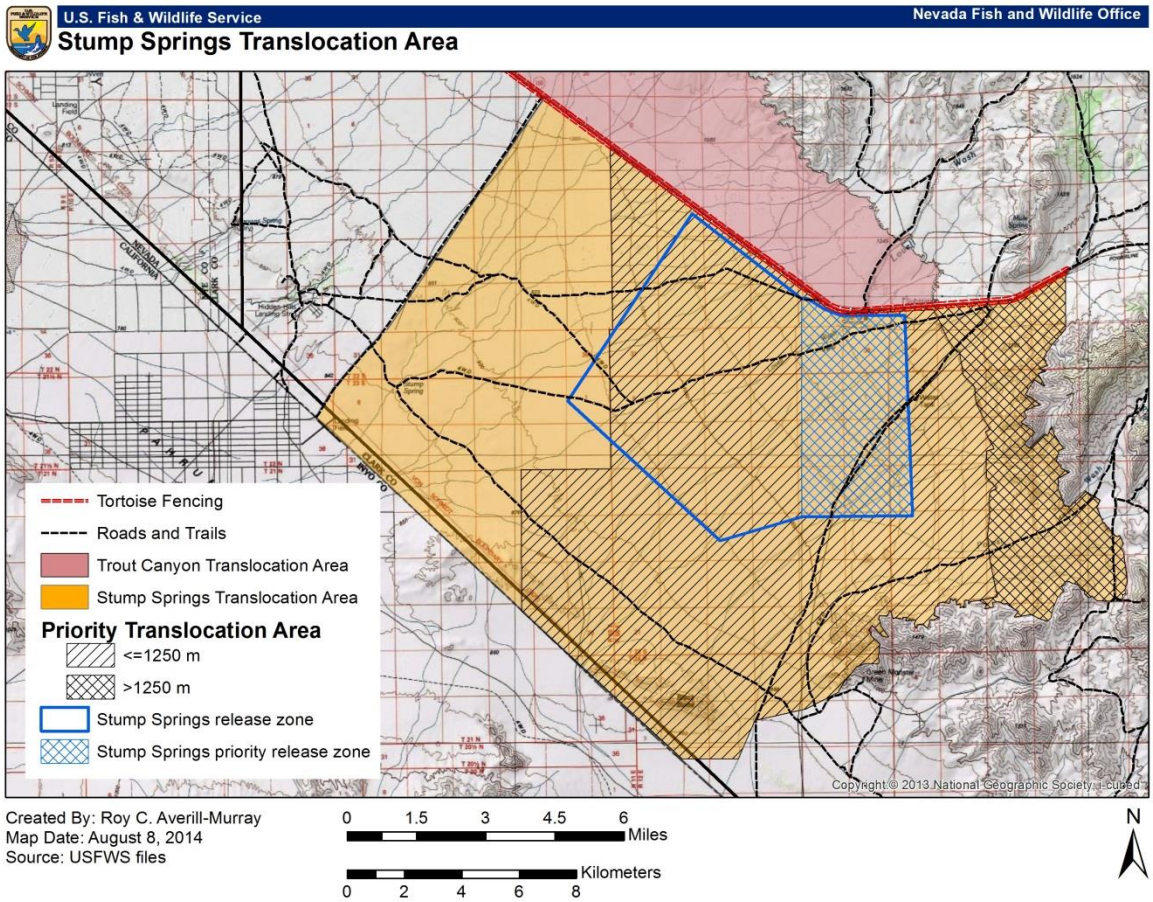

Figure 4. Release zones within the Stump Springs Translocation Area.

Density/Trends of Resident Tortoise Population

The nearest historic population study plot is a 1-square mile (mi^2) (2.6-km^2) plot within the western end of the Greater Trout Canyon translocation area, approximately 7.5 km northwest of the nearest point of the Stump Springs translocation area (Figure 2). The plot was surveyed in 1987 and 1992 (Hardenbrook, undated; Holle et al. 1992). In 1987, 31 tortoises were captured at least once (24 >180mm carapace length) on the plot, and estimated adult

abundance was 30 ± 25 (2 SE; = 11.6/km^2) (Hardenbrook, undated). Surveyors found 28 adult shell remains (ratio of dead:live adults = 1.17), most of which were estimated to have died >2 years previous to the survey. In 1992, 27 tortoises were captured at least once (25 >180mm carapace length), and estimated adult abundance was 19 ± 8.6 (= 7.3/km^2) (Holle et al. 1992). Surveyors found 13 shell remains on the plot (dead:live = 0.52), at least 5 (38%) of which were tortoises marked in 1987.

More recent surveys were conducted southeast of Pahrump, Nevada, during the 2008 range-wide monitoring season between 19 and 29 May (USFWS 2012c). Field workers surveyed 75 transects totaling 847 km in the area that includes the Stump Springs site. Estimated density was 2.9 adult tortoises per km^2 (coefficient of variation = 43.9). Within the entire Pahrump Valley (i.e., north and south of Pahrump), 28 of 58 tortoise detections were of shell remains; the ratio of dead:live tortoises (0.93) exceeded the average for all other monitoring strata in Nevada (range = 0.16-0.83; USFWS, unpubl. data). Twenty-nine full or partial transects were walked within the boundaries of the Stump Springs translocation site, and only 16 of 34 tortoise detections were of live animals. Between 2004 and 2012, estimated tortoise density across the Eastern Mojave Recovery Unit, within which this site lies, had declined to 2.6 adult tortoises per km^2 (USFWS, unpubl. data).

Additional site-specific line distance sampling surveys were conducted in Fall 2014 to determine a more precise estimate of tortoise density within the Stump Springs area. To adjust for the number of tortoises that could not be detected because they were deep underground in burrows, we made behavioral observations on resident tortoises outfitted with radio transmitters in the Greater Trout Canyon translocation area to estimate the proportion that are not detectable while surveys are conducted on transects (USFWS 2012c). After completing 1,068 km of surveys, the tortoise population in Stump Springs is currently estimated at 0.9 tortoises/km^2 (95% CI = 0.24–3.45). This density is depauperate relative to the Eastern Mojave Recovery Unit (2 standard deviations below the estimated mean for the recovery unit; USFWS 2015a). Although the estimate is based on a small number (9) of live observations, behavioral observation of transmittered animals at Trout Canyon indicated that 88% of the population was visible rather than hidden in burrows, indicating that the small sample size was due to few tortoises in the area, not due to tortoises being hidden in burrows at the time of the survey. Based on these surveys it is apparent that the tortoise population in the area has suffered a decline of some degree in the moderate past.

Specific Goal of Translocation

Population augmentation is an important tool for conservation of the Mojave desert tortoise (USFWS 2011). The primary goal for translocation to the Stump Springs area is to augment the population over time, using wild tortoises from development sites in the vicinity of Las Vegas, to increase density to a level comparable to that seen within the surrounding Eastern Mojave Recovery Unit. For a successful translocation, the number of tortoises in any area should not exceed the capacity of the surrounding desert. Little to no information on specific habitat characteristics or measures of habitat quality exists 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. Densities described by a single standard deviation of the mean tortoise density for a recovery unit are not unusually high. Given appropriate habitat and tortoise management, the rationale described above results in a maximum post-translocation density of adult tortoises not to exceed the first standard deviation above the mean density in the respective recovery unit (USFWS 2012b). For the Eastern Mojave Recovery Unit, the density represented by the first standard deviation above the mean density is currently 2.0 adult tortoises/km^2 (USFWS, unpubl. data, from USFWS 2015a).

Typically, Mojave desert tortoises occur at elevations <4,100 feet (1,250 meters [m]). However, we defined the translocation area to include the approximate 4,900-foot (1500-m) elevational limit, and the release zone is within the expected dispersal distance (6.5 km) of this elevation. To ensure that we do not underestimate post-translocation density in the event that few tortoises disperse above 4,100 feet, we subtracted the area above 4,100 feet (approximately 8,900 acres [36 km^2]) in determining the maximum number of tortoises to augment the population. This subtraction results in a minimum priority translocation area of 212 km^2 and a minimum full translocation area of 308 km^2. Maximum number of releases is calculated in the tables below.

Calculation of numbers of adult tortoises that may be released to the Stump Springs priority translocation area (212 km^2).	
Maximum post-translocation abundance	2.0/km^2 * 212 km^2 = 424 adult tortoises
- Current abundance	0.9/km^2 * 212 km^2 = 190 adult tortoises
= Maximum number of new adult tortoises	234 adult tortoises

Calculation of numbers of adult tortoises that may be released to the Stump Springs full translocation area (308 km^2), including releases into the priority translocation area.	
Maximum post-translocation abundance	2.0/km^2 * 308 km^2 = 616 adult tortoises
- Current abundance	0.9/km^2 * 308 km^2 = 277 adult tortoises
= Maximum number of new adult tortoises	339 adult tortoises

Juvenile tortoises (<180 mm carapace length) have naturally higher mortality rates than adults (Bjurlin and Bissonette 2004; see also Averill-Murray 2002), so tortoises released in this size category are expected to contribute less to the population than, and compete minimally for resources with, adult tortoises. Approximately 87% of a wild population consists of tortoises <180 mm carapace length (Turner *et al.* 1987). As a conservative limit, however, the number of juvenile tortoises released will not exceed the maximum number of adults that can be released according to the calculations above.

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 survival of individual translocated tortoises, but inaction could extend indefinitely given the uncertainty of future drought, allowing for continued declines in the resident population.

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.

<u>Health status of resident tortoise population</u>
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 region surrounding Stump Springs (and higher levels elsewhere in southern Nevada; Sandmeier et al. 2013). This indicates that *M. agassizii* is not unfamiliar to populations in southern Nevada and that inadvertent release of an infected tortoise from other areas around Clark County to Stump Springs would not introduce a novel pathogen to the population.

In order to collect data for post-translocation monitoring purposes, we conducted complete health assessments according to standardized protocols (USFWS 2015b), including collection of biological samples, on all possible tortoises found during the Fall 2014 surveys. We conducted 5 health assessments with no suspect or positive titers for either *Mycroplasma testudineum* or *M. agassizii* (estimated prevalence based on this sample size and estimated population size = 0 – 43%). There were very mild clinical signs observed in this small group of tortoises, and only 2 had body condition scores of 3, which is less than ideal. Documented presence of *M. agassizii* in the region, plus the extremely low resident density, indicates that extensive disease screening for this pathogen is likely unnecessary (IUCN 2013).

<u>Health status of translocatees</u>
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 2015b; Figure 5). All tortoises to be translocated in this project will be wild tortoises displaced by development. Quarantine before release is a basic disease-prevention precaution for translocation, and potential stress caused by confinement usefully may bring out latent infections (IUCN 2013). However, the recently released risk assessment for Transmissible Infections and Desert Tortoise Translocation (Rideout 2015) states that wild-to-wild translocations may be more risky to an animal's health as opposed to an extended quarantine. They recommend heath assessments occur between 14-30 days apart with translocation of healthy individuals occurring immediately after the final health assessment.

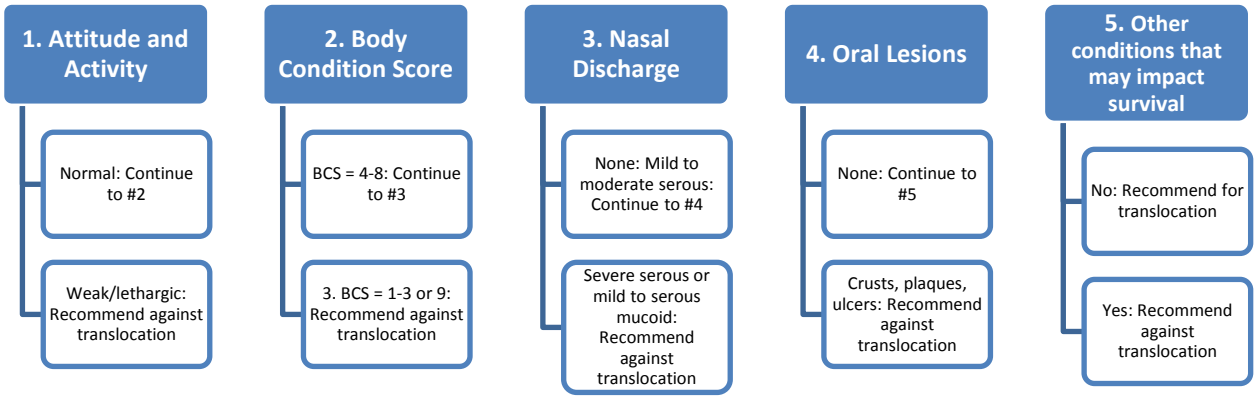

Figure 5. Algorithm for evaluating if desert tortoises are suitable for translocation, taken from USFWS (2013) guidance for wild-to-wild translocation projects. BCS = body condition score.

Given that the tortoises to be translocated to Stump Springs are expected to be wild, they will undergo screening by a qualified biologist according to the most recent USFWS translocation guidance (e.g., Rideout 2015; USFWS 2012b, 2013; Figure 5). Since tortoises will be translocated to Stump Springs from disparate populations throughout the County (as opposed to a contiguous population), all tortoises to be released will undergo an isolation and evaluation period of 14-30 days as a basic disease-prevention precaution (Rideout 2015) or will otherwise be evaluated according to the most recent USFWS guidance. Clark County is requesting a Right-of-Way grant from the BLM for the use of 32 constructed pens to be used for this function. Health assessments will be completed at the beginning and end of the evaluation period. This precaution will minimize the chance that transitory signs of illness are missed from a single assessment and that an ill tortoise is inadvertently translocated, especially given the documented prevalence of clinically ill (and seropositive) desert tortoises in proximity to urban areas, and to Las Vegas in particular (Tomlinson and Hardenbrook 1993; Jacobson et al. 1995; Jones 2008). Tortoises that do not pass their health assessments will not be translocated. In the event that captive tortoises are released into this area, previous San Diego Zoo Global requirements developed for the former Desert Tortoise Conservation Center(e.g., 90 day quarantine; Attachment 1) will be required for those animals.

Genetic Considerations

The Stump Springs translocation area is located approximately 40 km west of Las Vegas, Nevada. Moving tortoises within 200 km of their origin ensures that translocated tortoises will remain in an equivalent genetic unit (Averill-Murray and Hagerty 2014). 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, if at all (Averill-Murray and Hagerty 2014). As a result, we consider genetic analysis of individuals as a means of selecting tortoises to be translocated to be unnecessary. Negative population effects will be further reduced in the event any translocated individuals do happen to originate from a more distant population (e.g., if a released captive is unknowingly translocated) if they are poorly adapted to conditions in the Stump Springs area and do not successfully integrate into the resident population (Edwards and Berry 2013).

Monitoring

Currently, the only scheduled translocations would be conducted by Clark County and would include the translocation of up to 10 tortoises per year for 5 years or until a total of 50 tortoises have been translocated. Translocated individuals would consist of animals that are displaced during private-land development activities. Following this translocation (approximately 2020), and in the absence of other translocation projects, the County would fund a line distance sampling project that would repeat the surveys completed during the pre-translocation phase of this project for comparison and re-evaluation. In the event that other translocation projects occur during that timeframe, Clark County would work with the USFWS to determine an appropriate level of involvement in developing and implementing post-translocation monitoring based on the scope of the other translocation projects and what is required by their respective Biological Opinions.

It is a USFWS priority to gather additional information about the potential long-term effects of translocation. For example, in light of the lack of information on carrying capacity mentioned in the Specific Goal of Translocation above, developing a habitat-focused project or other monitoring approaches is a priority to evaluate the success of this translocation relative to site-specific conditions and to support our adaptive management approach to subsequent translocation projects. Toward that end, tortoises found during the Fall 2014 pre-release surveys and all translocated tortoises will be given permanent marks to provide the option to comparatively monitor residents and translocatees through future mark-recapture surveys. Clark County and USFWS will consider additional monitoring strategies through the County's normal biennial funding process and as translocation numbers materilize. For example, a potential approach would use survivorship and health of translocatees and of residents to describe the success of the translocation relative to habitat treatments in different parts of the translocation area or between other translocation areas (Trout Canyon, for example).

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 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.

Literature Cited

Averill-Murray, R.C. 2002. Effects on survival of desert tortoises (*Gopherus agassizii*) urinating during handling. Chelonian Conservation and Biology 4:430-435.

Averill-Murray, R.C., and B.E. Hagerty. 2014. Translocation relative to spatial genetic structure of the Mojave desert tortoise, *Gopherus agassizii*. Chelonian Conservation and Biology 13:35-41.

Bjurlin, C.D., and J.A. Bissonette. 2004. Survival during early life stages of the desert tortoise (*Gopherus agassizii*) in the south-central Mojave Desert. Journal of Herpetology 38:527-535.

Drake, K.K., K.E. Nussear, T.C. Esque, A.M. Barber, K.M. Vittum, P.A. Medica, C.R. Tracy, and K.W. Hunter, Jr. 2012. Does translocation influence physiological stress in the desert tortoise? Animal Conservation 15:560-570.

Edwards, T., and K.H. Berry. 2013. Are captive tortoises a reservoir for conservation? An assessment of genealogical affiliation of captive *Gopherus agassizii* to local, wild populations Conservation Genetics. DOI 10.1007/s10592-013-0458-y.

Esque, T.C., K.E. Nussear, K.K. Drake, A.D. Walde, K.H. Berry, R.C. Averill-Murray, A.P. Woodman, W.I. Boarman, P.A. Medica, J. Mack, and J.S. Heaton. 2010. Effects of subsidized predators, resource variability, and human population density on desert tortoise populations in the Mojave Desert, USA. Endangered Species Research 12:167-177.

Fuchs, B. 2015. United States Drought Monitor: Nevada. http://droughtmonitor.unl.edu/Home/StateDroughtMonitor.aspx?NV. Accessed 9 July 2015.

Hanisch, S.L., S.J. Riley, and M.P. Nelson. 2012. Promoting wildlife health or fighting wildlife disease? Insights from history, philosophy, and wildlife health experts. Wildlife Society Bulletin 36:477–482.

Hardenbrook, D.B. undated. Results from the Trout Canyon desert tortoise study plot, Clark County, Nevada. Report by the Bureau of Land Management, Las Vegas District Office, Las Vegas, Nevada.

Holle, E., K. Palmer, and G.O. Goodlett. 1992. Desert tortoise population study at Trout Canyon permanent study plot, Clark County, Nevada. Report to Bureau of Land Management, Las Vegas, Nevada.

IUCN/SSC. 2013. Guidelines for reintroductions and other conservation translocations. Version 1.0. IUCN Species Survival Commission, Gland, Switzerland.

National Climatic Data Center. 2015. Historical Palmer Drought Indices. http://www.ncdc.noaa.gov/temp-and-precip/drought/historical-palmers.php. Accessed 9 July 2015.

NOAA/National Weather Service. 2015. Probability of Exceedance (POE) Maps. http://www.cpc.ncep.noaa.gov/products/predictions/long_range/poe_index.php?lead=3&var=p. Accessed 9 July 2015.

Nussear, K.E., T.C. Esque, R.D. Inman, L. Gass, K.A. Thomas, C.S.A. Wallace, J.B. Blainey, D. M. Miller, and R.H. Webb. 2009. Modeling habitat of the desert tortoise (*Gopherus agassizii*) in the Mojave and parts of the Sonoran Deserts of California, Nevada, Utah, and Arizona. U.S. Geological Survey Open-file Report 2009-1102. 18 p.

Nussear, K.E., C.R. Tracy, P.A. Medica, D.S. Wilson, R.W. Marlow, and P.S. Corn. 2012. Translocation as a conservation tool for Agassiz's desert tortoise: survivorship, reproduction, and movements. Journal of Wildlife Management 76:1341-1353.

Rideout, Bruce (Ed.) 2015. Transmissible Infections and Desert Tortoise translocation: A Comprehensive Disease Risk Analysis. A report to the U.S. Fish and Wildlife. Desert Tortoise Recovery Office, Reno, Nevada.

Sandmeier, F.C., C.R. Tracy, B.E. Hagerty, S. DuPré, H. Mohammadpour, and K. Hunter, Jr. 2014. Mycoplasmal upper respiratory tract disease across the range of the threatened Mojave desert tortoise: associations with thermal regime and natural antibodies. EcoHealth DOI: 10.1007/s10393-013-0835-5.

Turner, F.B., K.H. Berry, D.C. Randall, and G.C. White. 1987. Population ecology of the desert tortoise at Goffs, California, 1983-1986. Report to Southern California Edison Co., Rosemead, California.

U.S. Bureau of Land Management and U.S. Department of Energy. 2012. Final programmatic environmental impact statement (PEIS) for solar energy development in six southwestern states. FES 12-24. DOE/EIS-0403.

U.S. Fish and Wildlife Service. 2011. Revised recovery plan for the Mojave population of the desert tortoise (*Gopherus agassizii*). U.S. Fish and Wildlife Service, Pacific Southwest Region, Sacramento, California.

U.S. Fish and Wildlife Service. 2012a. Connectivity of Mojave desert tortoise populations. White paper by the Desert Tortoise Recovery Office, Reno, Nevada.

U.S. Fish and Wildlife Service. 2012a. Connectivity of Mojave desert tortoise populations. White paper by the Desert Tortoise Recovery Office, Reno, Nevada.

U.S. Fish and Wildlife Service. 2012b. Translocation of Mojave desert tortoises from project sites: plan development guidance. Draft guidance document.

U.S. Fish and Wildlife Service. 2012c. Range-wide monitoring of the Mojave desert tortoise (*Gopherus agassizii*): 2008 and 2009 reporting. Report by the Desert Tortoise Recovery Office, U.S. Fish and Wildlife Service, Reno, Nevada.

U.S. Fish and Wildlife Service. 2012d. Defining spatial scales for translocation that are consistent with genetic population structure of Mojave desert tortoises. White paper by the Desert Tortoise Recovery Office, Reno, Nevada.

U.S. Fish and Wildlife Service. 2015a. Range-wide Monitoring of the Mojave Desert Tortoise (*Gopherus agassizii*): 2013 and 2014 Annual Reports. Report by the Desert Tortoise Recovery Office, U.S. Fish and Wildlife Service, Reno, Nevada.

U.S. Fish and Wildlife Service. 2015b. 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.

Attachment 1

Health Eligibility Criteria for Translocation of Captive Tortoises (based on prior San Diego Zoo Global protocols implemented at the Desert Tortoise Conservation Center)

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