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TRANSLOCATION MANAGEMENT PLAN:

Strategy for Moving Displaced Desert Tortoises in the Upper Virgin River Recovery Unit

Publication Number 23-01
Utah Division of Wildlife Resources
1594 W. North Temple
Salt Lake City, Utah
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By

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INTRODUCTION AND BACKGROUND

The Mojave desert tortoise (*Gopherus agassizii*) is a herbivorous, burrowing reptile that occurs in the Mojave Desert, western Sonoran or Colorado Deserts in California, Nevada, Arizona and southwestern Utah (Berry et al. 2021, USFWS 1994, USFWS 2011). As a result of range wide population declines, the Mojave desert tortoise was listed as a Threatened species in 1990 under the Endangered Species Act of 1973, as amended (USFWS 1990). Declines in desert tortoise populations are primarily attributed to habitat degradation and loss, disease, predation, human related loss (e.g., road kill mortality, illegal pet collection), and stochastic events including drought and wildfires (Alison and McLuckie 2018; Berry et al. 2021). The loss or degradation of habitats to urbanization, invasion of exotic fine textured grasses, habitat conversion from wildfires, and increased presence of humans on the landscape place the desert tortoise at increased risk of extirpation (USFWS 2011).

Five distinctive recovery units were identified across the range of the species that were necessary to conserve the genetic, behavioral, morphometric, and ecological diversity for the long-term protection and sustainability of the population (USFWS 2011). Two recovery units occur in Washington County, Utah: the Upper Virgin River Recovery Unit (UVRRU) which occurs east of the Beaver Dam Mountains, and the Northeastern Mojave Recovery Unit (NEMRU) located on the west side of the Beaver Dam Mountains. Due to its proximity to urban growth and small size, the UVRRU is considered highly threatened and the most at-risk recovery unit (USFWS 1994). The UVRRU is significantly smaller than other recovery units, making up roughly 2% of critical habitat across its range (USFWS 2011). The Beaver Dam Wash National Conservation Area (BDW NCA) and Beaver Dam Slope Critical Habitat Unit (BDS) is located in extreme southwest Utah, within the NEMRU.

Washington County has experienced explosive human population growth in the last three decades, with an estimated growth of 271% since the tortoise was listed in 1990 (U.S. Census Bureau 2020). The habitat conservation planning process was initiated in Washington County, Utah, in 1991, to resolve conflicts between wide spread urban development and desert tortoise conservation. Washington County completed a Habitat Conservation Plan (HCP) in 1996 and the Restated and Amended HCP in 2020 (WCC 1995, WCC 2020). The HCP identified measures to minimize and mitigate development of tortoise habitat by establishing the Red Cliffs Desert Reserve (Reserve), which includes critical habitat for the long term protection of tortoise populations in perpetuity (USFWS 1996; WCC 1995). Federal land within Management Zones 1 through 5 of the Reserve was designated as a National Conservation Area (NCA) under the Omnibus Public Land Management Act of 2009 (Pub.L. 111-11, H.R. 146). The Red Cliffs NCA is comprised of approximately 45,000 acres of BLM-administered lands in southcentral Washington County and is within the UVRRU.

The Reserve has uniquely diverse topography with tortoises occupying a mosaic of flats and slopes dominated by creosote bush scrub, Navajo sandstone outcrops, rugged rocky canyons, rocky slopes, and basalt-capped ridges interspersed with sand dunes, valleys, and ephemeral washes (Bury et al. 1994, Fridell et al. 1995). Vegetation is transitional between the Colorado Plateau, Mojave Desert, and Great Basin Desert and composed mainly of creosotebush-white bursage, blackbrush, desert sand sagebrush, warm desert riparian and warm season grassland

communities dominated by creosote bush (*Larrea tridentata*), white bursage (*Ambrosia dumosa*), blackbrush (*Coleogyne ramosissima*), sand sage (*Artemisia filifolia*), Nevada ephedra *(Ephedra nevadensis*), desert almond (*Prunus fasciculata*), and big galleta (*Pleuraphis rigida*; Provencher et al. 2011). Shelters are important to their survival, providing temporary refuge from thermal extremes, protection from predators, and to help minimize water loss. Tortoises spend a majority of time underground in deep rock dens, soil burrows, pallets, rock overhangs and crevices (Berry and Murphy 2019). Soils must be friable enough for digging burrows but firm enough so that burrows do not collapse. Depending on variety of factors, a tortoise's home range is variable, ranging from 2 ha to 80 ha, with males typically using larger home ranges searching and mating with multiple females (Duda et al. 1999, Harless et al. 2009, O'Connor et al. 1994). The USFWS (1994, 2011) identified the following essential features necessary to sustain tortoise populations: 1) sufficient space to support viable populations within the recovery units and to provide for movement, dispersal, and gene flow, 2) sufficient quantity and quality of forage species and the proper soil conditions to provide for the growth of such species, 3) suitable substrates for burrowing, nesting, and overwintering, 4) available burrows, caliche caves, and other shelter sites, 5) sufficient vegetation to reduce soil temperatures and provide protection from predators, and 6) habitat protected from disturbance and human-caused mortality.

The life history of the desert tortoise is characterized by delayed sexual maturity, long life span, low reproduction rate and fecundity, and low juvenile survival (Berry and Murphy 2019; USFWS 2011). Moderate downward fluctuations in adult survival rates can result in rapid population declines making recovery difficult. High survivorship of adult populations is critical to the species persistence and their recovery. Maintaining genetic variability and ecological heterogeneity within and among populations will allow tortoises to adopt to a changing environment and allow populations to persist over time (Scott et al. 2020).

Translocation, the human-mediated movement from one area and release in another area, can be an effective management tool for animals that have been displaced from natural habitat (e.g., incidental take areas) as well as to repopulate areas with low-density resident populations (Field et al. 2007; Nussear et al. 2000; Nussear et al. 2012; USFWS 2021a). The HCP established Management Zone 4, a 5,318 acre area (21.52 km^2) within the Reserve, as an experimental area to translocate tortoises displaced from their habitat (WCC 1995). Healthy wild desert tortoises, found prior to development on private lands, were removed, blood tested to determine exposure to the Upper Respiratory Tract Disease, and translocated into Management Zone 4, in the spring (March 15 to May 15) or fall (August 20 to September 30) annually. This area was selected as a translocation site because it contained relatively few native tortoises and disease transmission risks to native tortoise populations elsewhere in the Reserve (Zones 2, 3, and 5) was low. In addition, it is effectively isolated from the rest of the Reserve with natural and human made barriers as it is bounded by the Virgin River on the south, Quail Creek Reservoir on the southwest, and I-15 on the west.

The Utah Division of Wildlife Resources (UDWR) has been monitoring tortoises within the Reserve as an ongoing effort to track population trends, demographics and the effectiveness of the translocation program. Over a 23 year period (1999 to 2021), 566 tortoises were relocated to 3,753 acres of previously unoccupied desert tortoise habitat within Management Zone 4, and some of those tortoises have remained on site since they were first translocated several decades

earlier (McLuckie 2022). Prior to translocation, Management Zone 4 was thought to contain few desert tortoises with transects revealing limited tortoise sign with no live animals. Since translocation efforts, long term density trends (1987 to 2017) are increasing within Management Zone 4 indicating that translocated tortoises have successfully established a population with relatively high survival and low mortality; frequent observations of juvenile or immature tortoises indicate adult tortoises are reproducing and maintaining a sustaining population (McLuckie et al. 2019).

The translocation program has created a significant conservation benefit to the UVRRU and minimized the impact of incidental take, effectively repopulating unoccupied or low density habitats with potentially persistent and viable populations (USFWS 2021b). Furthermore, the translocation program supports strategic elements of the 2011 Mojave Desert Tortoise Recovery Plan, augmenting depleted populations through a strategic program, and fulfills the biological goals and objectives of the Washington County HCP, helping recover tortoise populations in southwest Utah (WCC 1995; WCC 2020; USFWS 2011; USFWS 2021a). The Restated and Amended HCP (2020) charges UDWR, along with agency partners, to identify other locations within the UVRRU that might be suitable for strategic desert tortoise population translocation and triggers for utilizing such alternatives (Amended HCP 6.3.2.4 2020).

Due to declines of tortoise populations and their associated threats, translocation is considered an important tool for the conservation of desert tortoises in the UVRRU (USFWS 2011). However, continued threats to the landscape, such as the increase in non-native grasses, extended and future drought in the southwest, and long term impact of wildfires on the landscape, emphasize the need to address the threats and implement restoration actions in conjunction with translocation. Ultimately, if the causes of tortoise populations are not addressed, simply releasing displaced animals in the wild will not result in sustained recovery.

PURPOSE

The Translocation Management Plan outlines how displaced desert tortoises from developed areas are to be used to enhance desert tortoise recovery efforts in southwest Utah. Specifically, the UDWR plans to translocate native desert tortoises displaced through the Washington County HCP incidental take process and relocate them to conservation areas or habitat refugia within the UVRRU to augment relatively low density populations. The goal of this Plan is to: 1) strategically move displaced tortoises to relatively low-density areas to provide the best conservation need and enhance populations within the UVRRU and BDS, 2) identify translocation areas that contain criteria necessary to sustain populations, and 3) supplement core populations and augment connectivity between conservation areas.

The experimental translocation program, initiated in 1999 as part of the Washington County HCP, has demonstrated that it is effective in repopulating previously unoccupied or low density areas (McLuckie et al. 2019). This Plan expands translocation to other areas within the UVRRU as deemed appropriate by USFWS and agency partners, through the adaptive management process. The Plan identifies the process and management procedures to be used for the Washington County HCP. However, as circumstances change or new information becomes available, the Plan will be evaluated and amended as appropriate. For example, we may evaluate

the efficacy of juvenile translocation in the future using an adaptive management approach. The process to evaluate and monitor tortoise release sites will be identified following the establishment of populations within each area or as displaced tortoises become available from larger projects. USFWS (2021a) identifies two sources of translocatees: 1) displaced wild tortoises from construction projects and urban areas, and 2) head-starting facilities. This Plan focuses on the former, that is, the strategy for moving displaced tortoises in the UVRRU.

OBJECTIVES

Translocation is an important recovery action that can help recover tortoise populations within designated Recovery Units (USFWS 2011). The USFWS identifies augmentation of desert tortoises in relatively low density populations as an important strategic element and recovery tool (USFWS 2021a). Unique to the UVRRU, is the high number of displaced tortoises removed relative to the size of the Recovery Unit. These excess tortoises can continue to contribute to recovery by strategically placing them in targeted translocation sites, areas with relatively low densities, to reduce impacts to native populations and contribute to recovery within the UVRRU. Specific objectives for this plan include:

1. Identify and summarize the protocols and guidelines for moving and releasing displaced tortoises.

2. Identify the facility to house displaced tortoises and the process to obtain displaced tortoises for translocation.

3. Identify steps to minimize the spread of disease of both translocated and resident desert tortoise populations.

4. Identify the process to translocate displaced tortoises in target areas, including the responsible agencies.

5. Identify potential translocation or augmentation sites within the UVRRU and associated primary threats.

6. Establish triggers for adaptive management decisions regarding potential translocation sites.

7. Receive State of Utah approvals for translocation of displaced tortoises. *The movement of listed species is governed by the State of Utah (§Utah Code 23-14-21) and would require coordination between the tribal, local, state and federal agencies as well as review boards (e.g., Resource Development Coordinating Committee, Utah Wildlife Resources Regional Advisory Councils, State of Utah Wildlife Board). This plan is intended to meet these requirements.*

8. Implement aspects of the recovery objectives, strategic elements and recovery actions as indicated below in accordance with the Mojave Desert Tortoise Recovery Plan and Washington County HCP by promoting the survival of both wild and translocated

tortoises and strategically moving displaced tortoises to low density sites to help achieve recovery:

Revised Recovery Plan for the Mojave Population of the Desert Tortoise (USFWS 2011):

- Recovery Objective 1 – Maintain self-sustaining populations of desert tortoises within each recovery unit into the future where tortoise numbers are increasing over at least 25 years (a single tortoise generation), as measured a) by extensive, range-wide monitoring across tortoise conservation areas (TCAs) within each recovery unit, and b) by direct monitoring and estimation of vital rates (recruitment, survival) from demographic study areas within each recovery unit.

- Recovery Objective 2 – Maintain well-distributed populations of desert tortoises throughout each recovery unit in that distribution of desert tortoises throughout each tortoise conservation area is increasing over at least 25 years.

- Strategic Element 3.0 – Augment relatively low density populations through a strategic program by completing the following recovery actions: 1) develop protocols and guidelines for the translocation program, 2) identify potential sites to move displaced tortoises, and 3) implement translocation in target areas to augment populations using a scientific, research-based approach.

- Strategic Element 6.0 – Implement an Adaptive Management Program and amend plans as needed to implement recovery actions.

Habitat Conservation Plan for Washington County, Utah, Restated and Amended (WCC 2020)

- Section 6.1.2, Objective 7 – Translocating healthy Mojave Desert Tortoise (MDT) individuals from areas affected by Covered Activities to the Reserve, thereby minimizing the impacts of the Covered Activities on the MDT and expanding the protected MDT population.

- Section 6.1.2, Objective 8 – Monitoring MDT population trends and MDT threats in the Permit Area to support adaptive management actions.

TECHNIQUES AND DISEASE MANAGEMENT

Management objectives for population augmentation is to promote survival of both wild and translocated tortoises and minimize the spread of disease (USFWS 2021a). The upper respiratory tract disease (URTD) is implicated in declines of the desert tortoise throughout its range and, while other pathogens and diseases do exist that could have significant impacts on populations, URTD is currently the most important infectious disease for desert tortoises (Berry and Murphy 2019). Because desert tortoises are long-lived, a disease outbreak that causes the death of adult tortoises may result in significant population losses, making it difficult for the population to recover (Homer 1998; USFWS 2011).

Wildlife populations are not disease free, and tortoise populations within the Upper Virgin River Recovery Unit are no exception (McLuckie et al. 2019). Rideout (2015) emphasized that the purpose of disease risk minimization is not to maintain a disease-free state within a population but rather to maintain resilient and self-sustaining populations capable of adequately responding to disease occurrences. Health assessments, conducted prior to translocation, are used to minimize the risk of spreading disease, protect resident tortoises, and increase survival of translocated tortoises (Rideout 2015). Enzyme-linked immunosorbent assay (ELISA) have been used to detect the presence of antibodies to *Mycoplasma agassizii* and *M. testudineum*, thought to be the cause of URTD in desert tortoises (Jacobson 1994). Currently, ELISA tests are recommended to evaluate populations, not individuals, and, to that end, USFWS (2020) does not recommend collection of biological samples (e.g., ELISA test) for projects that include a small number of adult tortoises.

To reduce the potential for disease transmission, the USFWS (2020) recommends that each tortoise undergo a minimum of two health assessments, completed 14-30 days apart, prior to release into relatively low-density recipient populations. Additional assessments (beyond 30 days) may be conducted, but a narrow window is necessary to identify animals with intermittent clinical signs. Given that tortoise densities are relatively high within the Reserve compared to the rest of the Mojave, the focus is to minimize spread of disease for resident tortoise populations (Alison and McLuckie 2018). Further, the USFWS (2020) recommends keeping adult densities at translocation sites within one standard error of the mean density of the nearest Recovery Unit.

To increase success of translocation projects and avoid outbreeding depression, tortoises used in population augmentation should be of appropriate origin and genotype to the specific areas to be augmented, and located no more than 200 km straight-line distance from their origin (Averill-Murray and Hagerty 2014). Interestingly, Scott (2020) found that individual high heterozygosity, rather than geographic or genetic similarity, was a greater predictor of translocation success. The USFWS (2020) identified the following criteria that should be addressed when identifying augmentation sites: 1) low-density recipient tortoise population within conservation areas or population linkages, 2) habitat suitable for all life stages, 3) no evidence of an active outbreak of disease, such as high prevalence of clinical signs of disease, 4) no major unfenced roads (i.e., high traffic volumes/speed limits and no desert tortoise exclusion fence), highways, or human development that would pose a risk to desert tortoises, 5) no detrimental rights-of-way or other encumbrances that would pose ongoing risks to successful establishment of translocated tortoises, and 6) compatible management with continued desert tortoise occupancy.

USFWS criteria (2020) were used to evaluate ten potential augmentation areas (Figure 1) within the HCP Plan area (Appendix C). Our evaluation of these potential sites ranks Zone 3 of the Red Cliffs Desert Reserve / NCA as the highest priority for augmentation beginning in 2023. Although more specific site selection will occur prior to translocation, the Grapevine area, within the East Cottonwood Analytical Unit (AU), currently supports low density tortoise populations with high quality habitat for all life stages (USFWS 2021). Although large scale fires in adjacent areas (e.g., Middleton, Cottonwood Wash) including the Mill Creek fire (2005), Reserve Fire (2012), Turkey Farm Fire (2020), and Cottonwood Trail Fire (2020) have degraded habitat resulting in high mortality and a decline in tortoise abundance (Kellam et al. 2022), translocation in this area, in conjunction with habitat restoration, may help tortoise populations recover. This

area represents the largest contiguous block of habitat in the Reserve, supports high-intra-Reserve connectivity (USFWS 2021) due to its central location, has reduced threats and encumbrances relative to adjacent areas, and thus provides the best opportunity to enhance depleted populations meeting our recovery objective.

Based on the number of adult tortoises translocated annually to Management Zone 4 in the past 15 years, we anticipate that a relatively small number of displaced adults and juveniles will be translocated annually (McLuckie 2022). Monitoring a few translocated tortoises annually would lack the statistical power to evaluate and determine translocation effectiveness (USFWS 2020). In Zone 4, for example, effectiveness monitoring for the translocation program was conducted in 2018, roughly 19 years after the first release of displaced tortoises in 1999 (McLuckie et al. 2019). Effectiveness monitoring, such as in Management Zone 4, will be conducted periodically when a significant number of displaced adult tortoises have been released to the target translocation site.

When the post-translocation density of the target site (e.g., Grapevine in Zone 3) exceeds one standard error above the mean density for the surrounding area (e.g., RC NCA), the adaptive management process will be triggered and alternate sites will be reviewed and considered (USFWS 2020). Similarly, if future effectiveness monitoring indicates a decreasing tortoise density, alternate translocation sites will be reviewed through the adaptive management process. Other potential triggers for reconsideration of augmentation sites, include but are not limited to, significant threats such as wildfire, disease outbreak, habitat degradation, predation, or issues with development, utilities, or recreation. Regardless of any of the potential triggers mentioned above, the plan will be reviewed by agency partners (e.g., UDWR, USFWS, BLM, and Washington County) at least every 3-5 years.

The movement of listed species is governed by the State of Utah (§Utah Code 23-14-21) and would require coordination between the tribal, local, state and federal agencies as well as review boards (e.g., Resource Development Coordinating Committee, Regional Advisory Council, Wildlife Board). The UDWR outlined translocation procedures, based on Nussear (2012) research in Washington County, and began implementing translocation in 1999 (McLuckie et al. 2019). The USFWS has provided translocation guidance (2020, 2021), health assessment procedures (2019), and a comprehensive disease risk analysis (2015) to assist agencies implementing translocation. As the lead agency responsible for managing wildlife within the state of Utah, UDWR has the following responsibilities regarding the translocation of native wildlife: 1) maintaining the integrity of wild and free-ranging protected wildlife, 2) investigating and controlling the spread of disease-causing pathogens in terrestrial wildlife, 3) preventing the spread of disease-causing pathogens from terrestrial animals to other terrestrial animals transferred from one site to another, and 4) enforcing laws and rules made by the Wildlife Board governing the collection, importation, transportation, and possession of animals (UDWR Policy 501, Administration Rule R657).

The process to translocate displaced tortoises within the Upper Virgin River Recovery Unit is briefly described in the Amended and Restated Washington County Habitat Conservation Plan (2020; Appendix A). Based on current research and knowledge of translocation, we have further developed the methods and techniques for translocating displaced tortoises within the Upper

Virgin River Recovery Unit. Additional details of the process are outlined in the Disposition Flow Chart in Appendix B. Potential translocation sites, which satisfy the USFWS (2020) identified criteria include Grapevine and Cottonwood Wash; a complete list, including their criteria status, is identified in Appendix C. To optimize the conservation use of displaced tortoises, those animals that have moderate to severe clinical signs of URTD or are identified as long term captives will be placed in: 1) UDWR adoption program, 2) research institute for scientific study, 3) outreach at conservation facility or, as a last resort, 4) euthanized.

1. Obtain displaced, native tortoises through the following means:
   a. Clearance surveys under the Washington County HCP incidental take process and pro-active clearances on private properties,
   b. Wild, native tortoises received by Washington County HCP partners and processed through UDWR's Urban Wildlife Program

2. Process the displaced tortoise and complete an initial health assessment (see Appendix D for Desert Tortoise Visual Health Assessment Datasheet):
   a. Assign a file number (Cagle 1939), measure carapace length, determine shell wear, assess marginal and carapace anomalies, and determine sex, if possible.
   b. Describe physical condition, identify evidence of trauma, assign body condition score, and assess for clinical signs of URTD and oral lesions (Berry and Christopher 2001, USFWS 2019, 2020).
   c. Tortoises must have mild to no clinical signs of URTD to be translocated into a Conservation Area (Berry and Christopher 2001, USFWS 2019)

3. If a displaced tortoises is located less than 300 m from a Conservation Area (e.g., Reserve, Red Cliffs NCA, Temple Quarry area, Warner Valley ACEC) they can be released following the initial health assessment. Relocated tortoises will be released to their area of origin, in an adjacent Conservation Area.

4. Displaced tortoises, found > 300 m from a Conservation Area, will be temporarily housed at the Temporary Care Facility (TCF), a 5-acre facility located in Hurricane, on the south side of the Virgin River, at the confluence of Ash and La Verkin Creeks. This facility is managed by Washington County.

5. Prior to translocation, a final visual health assessment will be conducted during the tortoise active period (March 15 to September 30th). Tortoises eligible for translocation are those that exhibit appropriate attitude and activity; acceptable body condition (Body Condition Score 4-7), no mucoid and not more than mild serous nasal discharge; no oral lesions; and no other condition that may impact its survival (USFWS 2019). Tortoises will be held in isolation, in individual pens within the TCF, until final disposition is determined.

6. Depending on the translocation site, tortoises that have a carapace length greater than 140 mm may be pit tagged prior to release.

7. Tortoises approved for translocation will be released to a designated translocation site during the following activity periods: March 15 thru May 15 and August 20 thru September 30.
    - Translocation sites will be determined prior to release and release sites will be reassessed every 3-5 years, at a minimum, using the adaptive management process.
    - At least 24 hours prior to translocation, tortoises to be translocated will be dropped off to UDWR Washington County Field Office in Hurricane, Utah for final processing and health assessment.
    - Prior to release, all tortoises will be soaked in fresh water for a minimum of 20 minutes.
    - Tortoises must be transported to their release sites in clean, ventilated containers. If re-used, these containers must be cleaned and disinfected before being used for another tortoise.
    - Tortoises will be translocated to a recipient site that provides the essential features necessary to sustain tortoise populations (USFWS 2011).
    - Tortoises will be placed in an unoccupied soil burrow, caliche cave, rock overhang or in the shade of a shrub, with adult males spaced a minimum of 50 m apart.
    - Translocation or recipient sites will be located in conservation areas that contain the translocation criteria outlined by the USFWS (2020) such as Red Cliffs NCA (e.g., Babylon area, Grapevine, Cottonwood Wash, Middleton), Warner Valley ACEC, and BDS (Figure 1). See Appendix C for a list of potential Conservation Areas and their translocation criteria status (USFWS 2020).
    - Sterile gloves must be used when handling tortoises at all times. Measuring and filing equipment must be disinfected and sanitized after each use (USFWS 2019).
    - If reproduction occurs at the Temporary Care Facility in Hurricane, final disposition of juvenile tortoises will be assessed on a case by case basis to best benefit conservation and recovery objectives.

8. During Exception Drought conditions, agency partners (USFWS, UDWR, Washington County) will determine what, if any, modifications to the translocation program may be prudent. If it is determined that a temporary suspension of translocation is appropriate, the suspension will stay in effect until drought conditions abate below the threshold or upon receiving clearance from the USFWS to resume translocation activities.

9. If a novel disease, or clinical signs of the disease indicate the presence of URTD exceeds 25% of the population, agency partners may suspend translocations into the Reserve. Partners will discuss alternative translocation options and possible treatment for affected tortoises, subject to financial constraints and practicability.

10. UDWR will complete an annual report on the number of tortoise translocated, their demography (e.g., sex, size, health assessment, body condition), translocation site, origin location and date released. This annual report will be distributed to agency partners at the end of each calendar year.

IMPLEMENTATION SCHEDULE

The listed activities are planned through the duration of the Washington County HCP, from 2022 to 2045. The goal of this plan is to optimize conservation use of desert tortoises by releasing individuals in relatively low-density recipient sites to help achieve recovery in the UVRRU. This Plan is to be adaptive to meet the needs of the Washington County HCP and recovery objectives of the USFWS. UDWR will complete an annual report on the number of tortoises translocated, their demography (e.g., sex, size, health assessment, body condition), origin location, and the date released. In addition, translocation sites and implementation will be reviewed and summarized in the annual report. The USFWS, UDWR and Washington County HCP will meet, at a minimum, every 3-5 years to review translocation activities, evaluate progress towards desired recovery goals, and develop ongoing priorities.

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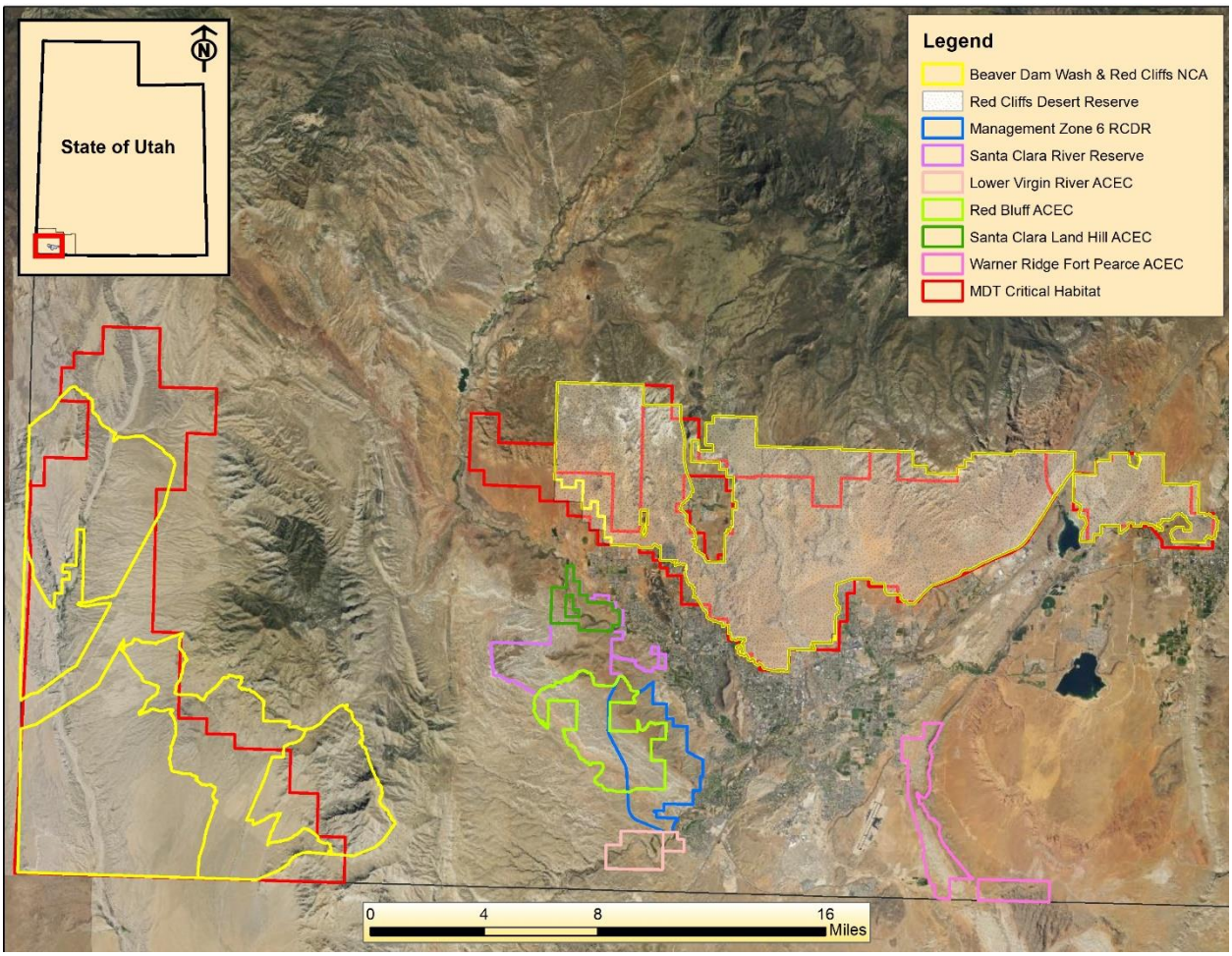
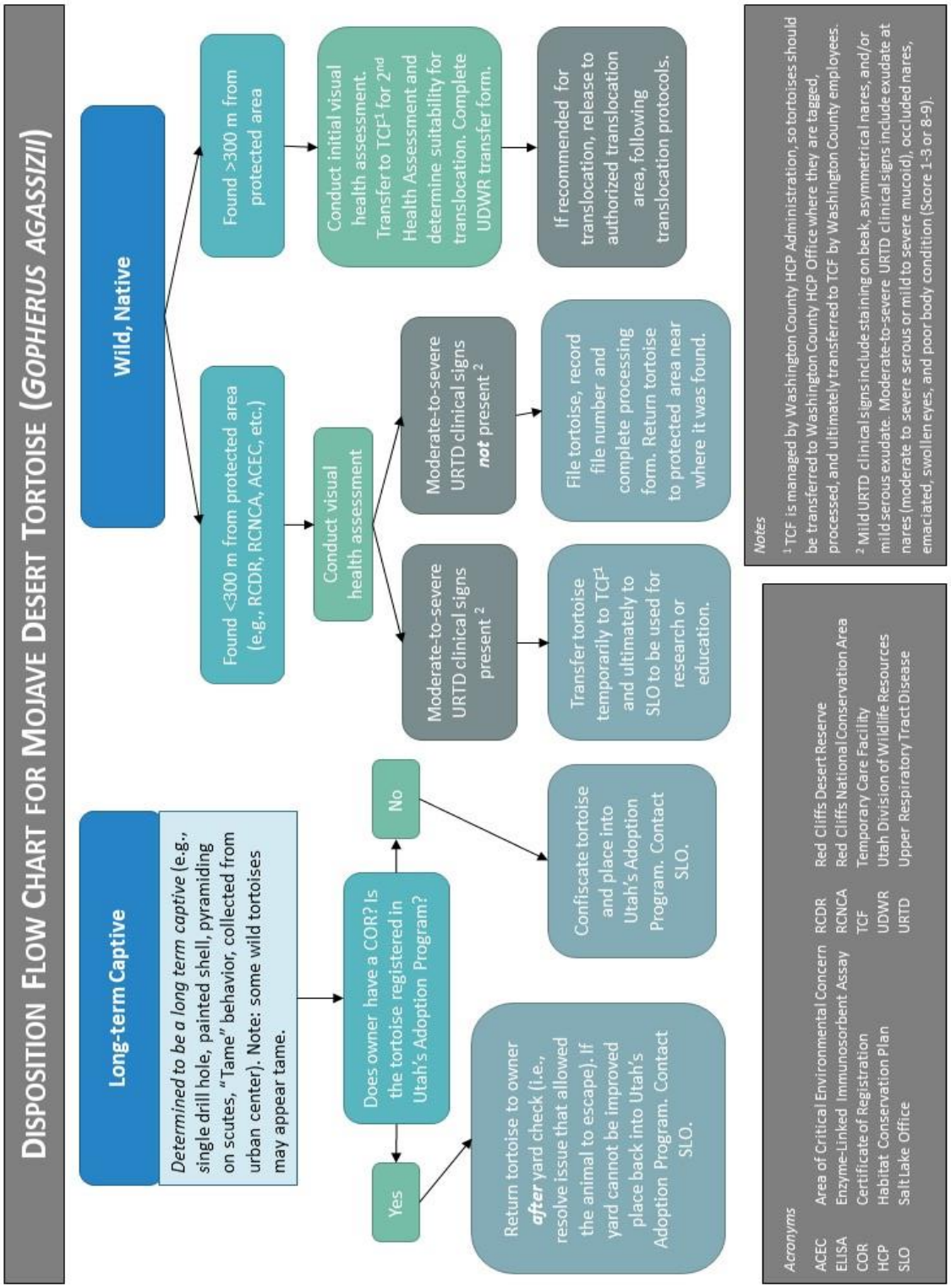


Figure 1. Location of Mojave Desert Tortoise (MDT) critical habitat and potential translocation sites including the Red Cliffs Desert Reserve (Zones 1-6), Red Cliffs National Conservation Area (NCA), Beaver Dam Wash NCA, Santa Clara River Reserve, and Areas of Critical Environmental Concern (i.e., Lower Virgin River, Red Bluff, Santa Clara Land Hill, and Warner Ridge Fort Pearce). Federal land within the Reserve is designated as the Red Cliffs National Conservation Area under the Omnibus Public Land Management Act of 2009 (Pub.L. 111-11, H.R. 146).

Appendix A. The process to relocate displaced Mojave Desert tortoises (MDT) within the Upper Virgin River Recovery Unit, as described in the Amended and Restated Washington County Habitat Conservation Plan (2020).

- Washington County will continue to implement the clearance protocols that are part of the Development Protocols, through the Renewed/amended ITP Term or until all lands outside of the Reserve subject to the clearance protocols are either develop or proactively cleared and fenced.
- The County will continue to operate a temporary holding facility for the immediate disposition and care of collected MDT prior to transfer to UDWR or other USFWS-approved entity for relocation, translocation, adoption, or other USFWS-approved purpose.
- The USFWS coordinates with the County, UDWR, and the BLM to plan for the translocation or other appropriate disposition of collected MDT and provides oversight for such activities.
- The USFWS provides specific procedures for handling MDT that include considerations for tortoise hydration, temperature extremes, disease and parasites, capture, processing, movement, and release. The USFWS also provides guidance in the form of Health Assessment Procedures to assess the condition of collected MDTs and determine their suitability for translocation.
- UDNR-UDWR receives collected MDT from Washington County and performs health screenings of collected individuals to assess overall fitness and disease risk.
- UDNR-UDWR coordinates with BLM and Washington County to release healthy MDT into the Reserve or other USFWS-approved location, or places unsuitable candidates for translocation and individuals originating from captivity into an adoption program.
- BLM has agreed to allow for the translocation of healthy, collected MDT to certain of its lands within the Reserve, in accordance with the HCP. Subject to BLM approval, this may be expanded to lands outside the Reserve with a recommendation from the HCAC as an adaptive management measure.
- During Exception Drought conditions, the County will meet and confer with the USFWS and the UDNR- UDWR (the lead agency of the translocation program) to determine what, if any, modifications to the conservation program may be prudent. If the County, the USFWS, and UDWR determine that a temporary suspension of MDT translocation is prudent, the County shall direct its HCP Partners to temporarily suspend MDT translocations into the Reserve. This temporary suspension of MDT translocations will stay in effect until drought conditions abate below the threshold or upon receiving clearance from the USFWS to resume translocation activities.
- If a novel disease, or clinical signs of the disease indicate the presence of URTD exceeds 25% of the population, the County will consult with the USFWS and UDWR about suspending MDT translocations into the Reserve. The County, UDWR, and the USFWS will discuss alternative translocation options and possible treatment for affected tortoises, subject to financial constraints and practicability.

Appendix B. Disposition flow chart for the Mojave Desert Tortoise (*Gopherus agassizii*) in Washington County, Utah.



Appendix C. Potential translocation sites and suitability based on USFWS (2020) criteria and biological knowledge (USFWS 2021b). The following criteria addressed when identifying potential augmentation sites include: 1) relative density of recipient tortoise population or population linkages, 2) available suitable habitat for all life stages, 3) evidence of clinical signs of disease, 4) presence of major unfenced roads, tortoise exclusion fence or human development that would pose a risk to desert tortoises, and 5) detrimental rights-of-way or other encumbrances to successful establishment of translocated tortoises. Only areas that contained an additional layer of management protection compatible with desert tortoise long term management (e.g., Area of Critical Environmental Concern, National Conservation Area, Reserve status) were included in the table.

Conservation Area	Suitability
Beaver Dam Slope Critical Habitat Unit Beaver Dam Wash NCA	1) low-density recipient tortoise population; moderate to poor linkage potential to UVR and none within UVR, could support linkages within NEMRU, 2) contains habitat suitable for all life stages; large scale fires (2006) in area have degraded habitat, 3) historical outbreak of disease in early 1990's, 4) State Road 91 unfenced, 5) no encumbrances for tortoise establishment.
Red Cliffs Desert Reserve Red Cliffs NCA	1) relatively low density recipient populations in Grapevine, Cottonwood and Middleton; high density in most remaining areas; linkage potential within UVR variable between Management Zones, 2) contains habitat suitable for all life stages; several large scale fires have degraded prime habitat (e.g., 2005, 2012, 2020) in Cottonwood and Middleton areas, 3) disease present in pockets; URTD clinical signs low, 4) no major unfenced roads; majority of southern boundary fenced, 5) low to moderate encumbrances for tortoise establishment (e.g., SITLA land within RC NCA and Reserve boundary; competitive sports events and high impact recreation in Management Zone 6).
Santa Clara River Reserve	1) low to moderate density recipient tortoise population; low to moderate linkage potential within UVRRU and NEMRU, 2) contains habitat suitable for all life stages, 3) no evidence of URTD, 4) State Road 91 unfenced; Reserve boundary unfenced; adjacent to proposed Western Corridor ROW, 5) moderate to high encumbrances (Western Corridor ROW).
Lower Virgin River ACEC	1) low-density recipient tortoise population; poor linkage potential within UVRRU, moderate linkage potential to NEMRU, 2) contains habitat suitable for all life stages, 3) no evidence of URTD, 4) Interstate 15 unfenced; ACEC boundary unfenced; adjacent to Western Corridor ROW, 5) moderate to high encumbrances (Western Corridor ROW).
Red Bluff ACEC	1) low to high density recipient tortoise population; moderate linkage potential within UVRRU, moderate linkage to NEMRU, 2) contains habitat suitable for all life stages, 3) minimal observations of URTD clinical signs, 4) adjacent to proposed Western Corridor ROW; ACEC boundary unfenced, 5) moderate to high encumbrances (Western Corridor ROW).

Santa Clara Land Hill ACEC	1) low to medium density recipient tortoise population; moderate linkage to UVRRU to NEMRU, 2) contains habitat suitable for all life stages, 3) minimal observations of URTD clinical signs, 4) south of Santa Clara city; State Road 91 unfenced; ACEC boundary unfenced, 5) moderate to high encumbrances (e.g., recreation, competitive sports events).
Warner Ridge ACEC	1) low-density recipient tortoise population; poor linkage within UVRRU and NEMRU, 2) contains habitat suitable for all life stages; vegetation and shrubs sparse in many areas, 3) no evidence of URTD, 4) Southern Parkway fenced; adjacent to proposed development, 5) moderate to high encumbrances (e.g., future development).
Beaver Dam Mountains Wilderness	1) low density recipient tortoise population; poor linkage potential within UVRRU, moderate to good linkage to NEMRU, 2) contains habitat suitable for all life stages; vegetation and shrubs sparse in many areas, 3) no evidence of URTD, 4) Virgin river and steep terrain are possible barriers; I-15 unfenced, 5) minimal encumbrances.

Appendix D. Desert Tortoise Visual Health Assessment Datasheet

Desert Tortoise Visual Health Assessment Datasheet

Observer(s):	**Date (mm/dd/yy):** Time: S_____ E_____	**Location found (General description):** **UTM (NAD83):** _ _ _ _ _ _ X _ _ _ _ _ _ _ Y Error _____		
Health Assessment: #1 or #2 (circle one)	**# days since previous assessment:**			
File Number:	**Epoxy Tag:**	**Pit Tag:**	**Sex:** M F U	**Scute Count:** M_____C_____
MCL (mm):	**M3 (post):**	**M7/8:**	**Height:**	
Attitude/Activity/Posture (circle all that apply): Alert, Responsive, Lethargic-weak, Appendages limp, Head hanging, Other:		**Beak (circle one):** Physical defect, Staining, Evidence of foraging	**Body Condition Score (circle one):** 1 2 3 4 5 6 7 8 9	
Breathing/Respiration (circle all that apply): Clear, Normal, Wheezing, Rasping, Bubbly, Increased effort, Abnormal Sounds (describe):		**Weight (grams):**	**Shell Wear (circle one):** 1 2 3 4 5 6 7	
L naris (circle one): Normal Eroded Occluded	**L naris discharge/severity:** None Serous: 1 2 3 Mucous: 1 2 3 Bubbles present: N Y	**L eye (circle all that apply):** Normal, Sunken, Corneal opacity, Partially closed, Fully closed, Serous discharge, Mucous discharge, Periocular swelling, Periocular redness, Conjunctival swelling, Conjunctival redness		
R naris (circle one): Normal Eroded Occluded	**R naris discharge/severity:** None Serous: 1 2 3 Mucous: 1 2 3 Bubbles present: N Y	**R eye (circle all that apply):** Normal, Sunken, Corneal opacity, Partially closed, Fully closed, Serous discharge, Mucous discharge, Periocular swelling, Periocular redness, Conjunctival swelling, Conjunctival redness		
Oral cavity (circle one): normal Not examined, Hyper salivation, Impaction, Crust-Plaque-Ulcer	**Tongue color:** White, Pink, Red, Other:	**Choana:** Not examined, White, Pink, Red	**Void (circle all that apply):** No, Yes: color_____, Urates, Feces	
Shell Characteristics (draw below): Normal, Sunken scutes, Premature depressions, Whitish flaking-shell fungus, Scute laminae peeling, Trauma		**If shell trauma present:** Active / Inactive	**Ticks:** None / # of ticks: Collected? Y N	
Lesions Present: N Y Distribution: 1 2 3 Severity: 1 2 3 Active: No Yes	**Lesion Location (Draw on diagram):** Head, Neck, L/R forelimb, L/R axillary region, L/R hindlimb, L/R pre-femoral region, Vent-tail, Shell		**Comments:**	

Draw file marks, gular, injuries, anomalies, and depressions on diagram.