



**DESERT TORTOISE COUNCIL**

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**Via email**

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RE: Mojave Desert Tortoise Conservation and Recovery Measures Along Roads; A Practical Guide

Dear Dr. Huijser and Ms. Fairbank,

The Desert Tortoise Council (Council) is a non-profit organization comprised of hundreds of professionals and laypersons who share a common concern for wild desert tortoises and a commitment to advancing the public's understanding of desert tortoise species. Established in 1975 to promote conservation of tortoises in the deserts of the southwestern United States and Mexico, the Council routinely provides information and other forms of assistance to individuals, organizations, and regulatory agencies on matters potentially affecting desert tortoises within their geographic ranges.

Both our physical and email addresses are provided above in our letterhead for your use when providing future correspondence to us. When given a choice, we prefer to receive emails for future correspondence, as mail delivered via the U.S. Postal Service may take several days to be delivered. Email is an "environmentally friendlier way" of receiving correspondence and documents rather than "snail mail."

We appreciate this opportunity to provide comments on the above-referenced document. Our comments include additional recommendations for moving forward with conservation of the tortoise and its habitat with the goal of recovering the species. Please accept, carefully review, and include in the relevant file the Council’s following comments for this Practical Guide.

The Mojave desert tortoise is among the top 50 species on the list of the world’s most endangered tortoises and freshwater turtles. The International Union for Conservation of Nature’s (IUCN) Species Survival Commission, Tortoise and Freshwater Turtle Specialist Group, now considers the Mojave desert tortoise to be Critically Endangered (Berry et al. 2021), “... based on population reduction (decreasing density), habit loss of over 80% over three generations (90 years), including past reductions and predicted future declines, as well as the effects of disease (upper respiratory tract disease/mycoplasmosis). *Gopherus agassizii* (sensu stricto) comprises tortoises in the most well-studied 30% of the larger range; this portion of the original range has seen the most human impacts and is where the largest past population losses have been documented. A recent rigorous rangewide population reassessment of *G. agassizii* (sensu stricto) has demonstrated continued adult population and density declines of about 90% over three generations (two in the past and one ongoing) in four of the five *G. agassizii* recovery units and inadequate recruitment with decreasing percentages of juveniles in all five recovery units.”

This status, in part, prompted the Council to join Defenders of Wildlife and Desert Tortoise Preserve Committee (Defenders of Wildlife et al. 2020) to petition the California Fish and Game Commission in March 2020 to elevate the listing of the Mojave desert tortoise from threatened to endangered in California.

### **Comments on the Document**

We appreciate that the authors have researched and compiled the currently available relevant information on the need for and location, design, and management of barriers, shade structures and crossing structures for the survival of the tortoise and other wildlife species. In addition, we appreciate that U.S. Fish and Wildlife Service’s (USFWS) Headquarters Office funded the project and resulting Practical Guide.

The objective of this Practical Guide “is to make information available to stakeholders (practitioners, researchers, and managers) on the factors that contribute to the successful implementation of measures taken to avoid, mitigate or compensate for the effects of roads and traffic on Mojave desert tortoise populations.”

Because one audience is managers, we recommend that a summary of the important points of the Practical Guide be provided. The document is thorough in this evaluation of the issues and concepts that should be considered when designing/modifying/maintaining fences, shade structures, and crossing structures. Unfortunately, managers are unlikely to read a 90+ page document. Consequently, we recommend a summary of the important points/issues/concerns and solutions to effective barriers, shade structures, and crossing structures that tortoises and other wildlife are able to use.

Another audience identified in the Practical Guide is practitioners, which we identify as including roadway or highway engineers and engineers for similar linear structures that result in unintended barriers to tortoise/wildlife movement (e.g., rail lines). Again, this audience is unlikely to read a 90+ page Practical Guide. Rather, these engineers are looking for the needs of tortoises that they should design for (e.g., substrates suitable for navigation by small animals, etc.) and problems they should design to solve (e.g., downstream erosion from culverts, plunge pools, etc.). In addition, they are likely wanting specifications for standard design for tortoise fencing, openings/gates and underpasses including upstream and downstream designs at culverts, design and placement of shade structures, and design and placement of crossing structures. We recommend that a summary of the needs of tortoises and other small-sized wildlife species and identified problems be provided as well as any specifications that have been developed that have proven successful to prevent tortoise mortality and successfully provide access for tortoises to move from one side of a highway to another.

In the Practical Guide, the authors identify parameters for determining the effectiveness of crossing structures for wildlife movement. Identifying these parameters and monitoring to determine whether they are being met is strategically important to complying with the directive of the Federal Endangered Species Act (FESA) to the Federal Highway Administration (FHWA) and all other Federal agencies is “to conserve endangered species and threatened species” and to “utilize their authorities in furtherance of the purposes of this Act.” The purposes of the FESA “are to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved” and “to provide a program for the conservation of such endangered species and threatened species.” Using the scientific process and applying it to the design, construction/implementation, monitoring, and adaptive management to determine whether barriers, shade structures, and crossing structures are effective in providing their intended purpose is crucial to complying with the FESA.

The Practical Guide contained photographs of barriers (tortoise exclusion fencing), shade structures, and underpasses (culverts). These photographs were effective in conveying the problems with tortoise fence, shade structure, and underpass designs that do not consider the needs of the tortoise or the desert environment, and the solutions for ensuring these structures are functioning properly and effectively for the needs of the tortoise.

The Practical Guide should recommend that persons with biological expertise on the movements and ecological needs of tortoises be part of all efforts by FHWA and State and County transportation/highway agencies when designing and constructing underpasses in tortoise habitat and when maintaining underpasses in tortoise habitat, especially after a substantial rainfall event in the area or upslope of the area.

The Council recommends that the Practical Guide provide guidance on the estimated cost of constructing and maintaining barriers, shade structures, and crossing structures for tortoises and smaller wildlife species. These costs should include different types of crossing structures (e.g., construction of new culverts, modifying existing culverts, etc.) and should be included in the construction budget just as the construction of boundary fencing is included in the construction budget. Maintenance costs should be provided so that transportation agencies will know how to estimate costs for the next fiscal year and request appropriate funding. In addition, providing this information would help other agencies and organizations that need (required in a biological opinion or permit) or want to contribute to construction and/or maintaining these structures.

Please add that transportation agencies should be required to locate and map using a GIS the types and locations of fences, shade structures, and crossing structures (e.g., bridges and culverts) so they can be easily located to conduct routine maintenance and track the maintenance activities. For example, we have heard numerous reports of County and State transportation agencies that do not know where all the culverts are for roads, especially in rural areas. This absence of information makes it difficult to maintain culverts and fences so they may effectively function to ensure the integrity of the roadway and safety for drivers and wildlife.

Although the Practical Guide focuses on the Mojave desert tortoise, we assert that many of the measures described to avoid, mitigate or compensate for the effects of roads and traffic on Mojave desert tortoise populations would also be effective for the Sonoran desert tortoise and should be implemented to ensure the conservation of that species as well.

### **Specific Comments**

Page 28: Design, Fence Length – The Practical Guide says, “the average home range for resident males was 23-55 ha and 17-19 ha for resident females (Turner et al. 1980, Harless et al. 2010).” Please add that lifetime home ranges for adult tortoises are larger than those determined using only a few years of movement data. As the Document notes, environmental conditions affect home range size. In wetter than average years, tortoises travel greater distances and occasionally make forays of up to 7 miles (Berry 1986). In drier than average years, their home ranges may be substantially reduced in areas. Because predictions on the impacts of climate change are for drier years and longer periods of drought, the locations of crossing structures should be for drier than average years and smaller home ranges. These conditions are most likely to become the norm in the future.

Page 50: Barrier maintenance – We cannot stress the importance of routine barrier maintenance to prevent direct tortoise mortality and return substantial areas of the Mojave and Colorado desert to usable tortoise habitat.

Page 52: Shade Structures – The Practical Guide provides a general description of a shade structure, recommendations on placement, and photographs. We recommend that if the design and placement have been tested and proven effective, the specifications for it, including its location on the ground, by the tortoise exclusion fence, placement of soil on/around it, and distance between shade structures should be included in the Practical Guide.

Page 56: Crossing Structures, Effectiveness – The Practical Guide says, “the increase in movement [between two areas now connected by crossing structures] may or may not be sufficient to result in a viable population, especially when population densities and reproductive rates are already low.” This statement is supported by research reported recently by Dutcher et al. (2023). In their study, Dutcher et al. (2023) reported that species density is important for connectivity and low densities resulted in declines regardless of the landscape barrier scenario. We congratulate the authors on formulating this hypothesis that was recently verified by a study. If the Practical Guide is updated to reflect new information, we suggest the results of this research be added to the Practical Guide.

Page 57: One section the Practical Guide is titled “The correct crossing structure type (i.e., underpass vs. overpass).” We advise the authors that the Bureau of Reclamation constructed overpasses for the Central Arizona Project, which is an aqueduct project that delivered Colorado River water to Phoenix and Tucson. We suggest contacting the Bureau as they should have data on whether overpasses were used by desert tortoises.

Page 60: The authors say, “if Mojave desert tortoise populations have been depleted in areas adjacent to roads already, fences in combination with crossing structures are insufficient. In those cases, population augmentation or reintroduction, and reducing unnaturally high densities of predators (e.g., raven, coyote) is likely required.” This statement assumes that there are no other major threats to tortoises in these areas. Because there are multiple threats to tortoises occurring throughout the distribution of the species, we recommend this sentence be revised to say: “In those cases, population augmentation or reintroduction, and reducing unnaturally high *sources of mortality* is likely required.”

The network of numerous threats to the tortoise “demonstrates that many human activities can have negative effects on tortoise populations through many pathways. Taking management actions that break one pathway, even though the pathway is real, may not be adequate to prevent the mortality factor from continuing to diminish a tortoise population. This is because alternative pathways exist to ‘compensate’ by removing animals that were otherwise ‘saved’ by a management action as with ‘compensatory mortality’” (Tracy et al. 2004). Breaking the predator pathway as suggested in the Document still leaves a multitude of other anthropogenically-caused threats pathways that result in tortoise mortality.

Page 60: Not too far apart – “Overall, the current general guidance is to space suitable structures 670 m (0.42 miles) apart to achieve connectivity for adult Mojave desert tortoises (U.S. Fish and Wildlife Service 2014). This is based on a home range size of 45 ha (square sized, each side is 670 m) (U.S. Fish and Wildlife Service 2014).”

Earlier in this section, the authors identify goals including “[m]aintain ecological integrity of Mojave desert tortoise populations by allowing (almost) all individuals that live adjacent to the road to have access to at least one suitable crossing opportunity.” We note that the average home range for resident males was 23-55 ha and 17-19 ha for resident females (Turner et al. 1980, Harless et al. 2010). The USFWS recommendation does not appear to consider the smaller home range sizes for adult females. Using the data above, we conclude that implementing the USFWS recommendation would foster the movement of adult male desert tortoises through crossing structures but not adult females. We request that the authors explain this discrepancy in the document. We recommend that the crossing structure be placed at appropriate intervals where the data indicate they are available for both adult male **and female** desert tortoises.

Page 62: Planning – The Practical Guide says, “The planning process for installation of fencing in any priority road segment should include an inspection of existing culverts to determine their suitability as potential tortoise crossings and an analysis to identify potential sites for construction of new crossing structures.” We recommend adding to this sentence, “The planning process for installation of fencing in any priority road segment should include an inspection of existing culverts and other underpasses to determine their suitability as potential tortoise crossings...” Not all underpasses are accessible or can be traversed by tortoises. However, many are suitable tortoise crossings or with minor modifications may become suitable.

Page 66: Table 1: Structure type and dimensions “used” by Mojave desert tortoises – This information is helpful and should be updated periodically. In addition, we request that data on the use of bridges and overpasses be added to this table.

Page 67: Construction – For construction of crossing structures, the authors indicate that “[p]lunge pools should be filled in with finer substrate to reduce the likelihood of trapping Mojave desert tortoises. In addition, drainage should be sufficient for water to disappear relatively quickly to reduce the risk of Mojave desert tortoises drowning.”

We recommend revisiting the issue of culverts with downstream plunge pools, as there may be other ways to effectively slow water flow that do not result in barriers to tortoise movements or mortality from drowning/entrapment. Although not the focus of this Practical Guide, we wonder if the USFWS analyzed the effects of the construction and maintenance of plunge pools on the tortoise and authorized incidental take for their mortality and entrapment/drowning.

Page 73: Maintenance – The Practical Guide recommends “[r]egular inspection of culverts, especially prior to high movement periods for Mojave desert tortoises.” Please add the times of high movement periods for tortoises (e.g., spring and fall months and during/immediately following precipitation events).

Further, stated in the Practical Guide is “[i]nspection, and at least some maintenance efforts will likely have to be outsourced as it is not or insufficiently done by DOT [Department of Transportation] maintenance personnel.” We do not understand why maintenance would need to be outsourced. We presume that culvert inspection by State and County transportation/highway agencies occurs (1) just before a precipitation event, especially if it is forecast to be a substantial event, to ensure that the culverts and other underpasses are able to convey flows and maintain the integrity of the highways, and (2) just after a substantial rain event to ensure that the underpasses/culverts are not blocked or damaged and that highway integrity was maintained. This timing for conducting needed maintenance by transportation agencies seems to coincide with the needs of the tortoise.

Page 78: Population Augmentation and Reintroductions, Effectiveness – “Additionally, improved management plans for selected release sites and known predators (e.g., ravens), when appropriate, may improve augmentation effectiveness.” This paragraph needs to identify the myriad of threats to the tortoise and if the causes of tortoise population declines are not addressed, simply adding individuals to populations in the wild through augmentation will not result in recovery or increased population numbers (USFWS 2021). Additionally, “[o]ne of the most insidious problems preventing desert tortoise recovery is that tortoise populations face multiple threats” (Tracy et al. 2004). “Individual populations face a suite of threats simultaneously and threats act together to become synergistic in their impacts” (Tracy et al. 2004). “Actions to recover the tortoise should emphasize the importance of cumulative, interactive, and synergistic threats to desert tortoise populations” (Tracy et al. 2004). This section of the document seems to gloss over this most important factor. We recommend that this information be added to the Document.

Writing improved management plans for the selected release site will not result in improved management of the tortoise. The responsible management agencies need to effectively implement these plans. From the Council’s interpretation of the status of the tortoise, most population areas currently managed for the tortoise (e.g., critical habitat units) are below the minimum density needed for population viability. We conclude that management plans are not working.

The Practical Guide should emphasize the complex relationship of multiple threats and corresponding coordinated efforts that need to be implemented by multiple agencies simultaneously to effectively increase tortoise population numbers and densities in the wild.

The Practical Guide says, “population augmentation may still need to be combined with habitat restoration and reducing populations of human-subsidized predators (Daly et al. 2019).” Please see our comments above under pages 60 and 78.

Page 80: Predator Management Along Roads – We suggest changing the wording that currently say, “Ravens (*Corvus corax*) and coyotes (*Canis latrans*) are important predators for the Mojave desert tortoise” to “**Common** ravens (*Corvus corax*) and coyotes (*Canis latrans*) have become major predators for the Mojave desert tortoise.” This statement is supported, especially for ravens, by information provided later in this paragraph that says, “In the southwest, ravens have increased by an estimated 1000% between the mid-1980s and 2011” because of human subsidies for food, water, and nest sites (Kristan and Boarman 2003). It is also inferred for coyotes as “[c]oyotes consumed anthropogenic material at much higher frequencies than desert kit foxes (Kelly et al. 2019) in the Mojave Desert.”

Page 85: Measures for park roads – In this section, the authors indicate, “...vehicle speed may be limited through reduced legal posted speed limit and associated measures that affect the design speed of a road (e.g., curves, narrow lanes, no road shoulder, speed bumps).” We suggest adding the results of studies conducted by the National Park Service at Mojave National Preserve to demonstrate the effectiveness, or lack thereof, when some of these measures are implemented and as a result of these studies, the measures that Mojave National Preserve is implementing to effectively reduce tortoise mortality from road use (Hughson 2023).

We appreciate this opportunity to provide the above comments for this Practical Guide and trust they will help future conservation efforts for the tortoise. We ask that you respond in an email that you have received this comment letter so we can be sure our concerns have been registered with the appropriate personnel and office for this Practical Guide.

Respectfully,



Edward L. LaRue, Jr., M.S.  
Chairperson, Ecosystem Advisory Committee

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