DESERT TORTOISE COUNCIL
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Via email only

May 8, 2026

ADOT Communications
Attn: Five Year Program
1655 W. Jackson, Room 179, MD 126F
Phoenix, AZ 85007
fiveyearconstructionprogram@azdot.gov

RE: Arizona Department of Transportation Five Year Facilities Construction Program 2027-2031

Dear Director Toth,

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 northern 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 correspondence as emails, because 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 proposed projects. Given the locations of some of the proposed projects in habitats occupied by the Mojave desert tortoise (*Gopherus agassizii*) (synonymous with Agassiz's desert tortoise) and the Sonoran desert tortoise (*Gopherus morafkai*) (synonymous with Morafka's desert tortoise), our comments include recommendations intended to enhance protection of these species and their habitats during activities that may be authorized by the Arizona Department of Transportation (ADOT) and/or

Federal Highway Administration (FHWA), which we recommend be added to terms and conditions in the authorizing documents (e.g., construction contracts, National Environmental Policy Act (NEPA) decision documents, etc.) for the proposed projects as appropriate. Please accept, carefully review, and include the Council's following comments for the proposed projects in the relevant project file.

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), habitat 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 the Desert Tortoise Preserve Committee (DTPC) to petition the California Fish and Game Commission (Commission) in March 2020 to elevate the listing of the Mojave desert tortoise from Threatened to Endangered under the California Endangered Species Act (CESA) (Defenders of Wildlife et al. 2020). Importantly, following California Department of Fish and Wildlife's (CDFW) (2024a) status review, in their April 2024 meeting the California Fish and Game Commission voted unanimously to accept the CDFW's petition evaluation and recommendation to uplist the tortoise from threatened to endangered under the CESA based on the scientific data provided on the species' status, declining trend, numerous threats, and lack of effective recovery implementation and land management (CDFW 2024b). On July 15, 2025, the tortoise was officially uplisted to endangered status under the CESA (Commission 2025).

Overall, the Sonoran desert tortoise continues to decline in abundance and density. The IUCN's Species Survival Commission, Tortoise and Freshwater Turtle Specialist Group, now considers the Sonoran desert tortoise, located in Arizona and Sonora, Mexico, to be Vulnerable at this time, but nearly qualifies as Endangered (Averill-Murray et al. 2023). "Steep declines of approximately 54% have occurred in recent years in several formally monitored local subpopulations in Arizona." "Despite evidence that several subpopulations have stabilized or increased, survival rates are predicted to decline with future drought conditions, which are expected to intensify with global climate change." In Mexico, "patterns of rainfall and drought across Sonora mirror those in Arizona and suggest that Sonoran subpopulations likely increased and decreased similarly over time." According to the IUCN, this designation of Vulnerable means that the species is "considered to be facing a high rate of extinction in the wild" and is one step away endangered (i.e., Vulnerable is similar to "threatened" under the Federal Endangered Species Act (FESA)).

The IUCN identified several threats to the survival of the Sonoran desert tortoise including residential, commercial, and industrial development; ranching and farming; roads and railroads; hunting and trapping; recreational activities; wildfires and fire suppression activities; invasive non-native plant species; and drought/temperature extremes from climate change.

Description of the Proposed Program and Projects

ADOT is requesting comments from the public on the Arizona Department of Transportation Five Year Facilities Construction Program 2027-2031 (Program). The Program identifies the locations, types of infrastructure projects, and associated costs scheduled for development by ADOT during the next five fiscal years.

Federal assistance continues to be the primary funding source for Arizona's transportation infrastructure. Half the funding supports projects mostly outside of Maricopa and Pima counties with 37% of funding spent in Maricopa County (includes the Phoenix metropolitan area) and 13% in Pima County (includes the Tucson metropolitan area). Projects and their funding are grouped as follows:

- Preservation (78%): Essential activities dedicated to sustaining asset conditions and extending the service life of existing highway infrastructure.
- Modernization (15%): Enhancements designed to upgrade the efficiency, functionality, and safety of highways without adding new capacity.
- Expansion (7%): Targeted improvements that increase transportation capacity through new facilities or services.

Typical projects include pavement rehabilitation, sign installation, bridge scour retrofitting, and road widening/lane additions.

Comments on the Proposed Program and Projects

We appreciate that ADOT contacted the Council directly about the availability of the Program for public review and comment.

Projects in the distribution of Mojave desert tortoise

We found one project that occurs in the range of the federally threatened Mojave desert tortoise – replacement of the I-15 bridge that crosses the Virgin River near Littlefield and associated improvements along 0.5 mile of the highway. We suspect that the FHWA or ADOT has completed section 7 consultation for all listed species and conference for proposed species for listing that may be affected by this bridge replacement project. Depending on the extent of impacts of this project, this consultation may include the Mojave desert tortoise.

Projects in the distribution of Sonoran desert tortoise

When scrolling through the Program we discovered projects that occur in habitats used or likely used by the Sonoran desert tortoise. These projects include pavement rehabilitation, conducting bridge scour retrofitting, and adding travel lanes. Examples of specific projects that are likely to adversely affect the Sonoran desert tortoise include installing a passing lane on SR 95 outside of

Lake Havasu City, constructing an "inspection pit" off of I-40 at a Point of Entry 3.7 miles east of the Colorado River, widening part of US 93 north of Wickenburg to a four-lane highway, and subsequent use of these projects by vehicles.

Life History Strategy and Habitat Needs of the Sonoran Desert Tortoise: Sonoran desert tortoises exist in small populations dispersed throughout the Sonoran Desert, where they typically inhabit rocky upland habitat, mountain foothills, and incised washes (Zylstra and Steidl 2009). Sonoran desert tortoises use areas associated with washes including bursage-dominated habitat on the alluvial slopes above the washes (Reidle et al. 2008), areas with "a higher percentage of canopy cover, . . . and xeric washes—especially those with exposed caliche refuges" (Grandmaison et al. 2010). Sonoran desert tortoises occur at very low densities – but are not absent – in intermountain valley floors, outside of areas with boulders or washes (Averill-Murray and Averill-Murray 2006).

Sonoran desert tortoises have also been observed making long-distance movements across nontypical tortoise habitat (Averill-Murray and Klug 2000; D. Swann, personal communication 2001 – reported in Averill-Murray and Averill-Murray 2002). Sonoran desert tortoises making such movements or occupying valley-floor habitat likely provide connections between adjacent, otherwise disjunct, hillside populations.

Historically Sonoran desert tortoise populations were well-connected, as evidenced by little population genetic structuring throughout their range, suggesting that individuals are capable of making long-distance movements. Edwards et al. (2004) reported that during their study a telemetered adult female made a long-distance inter-population movement of about 32 km (20 mi) with human intervention at several anthropogenic barriers.

Further, this genetic information indicates that the intermountain valleys served as linkage habitat between tortoise populations at hillsides, foothills, and washes. The dispersal and subsequent reproduction and recruitment between populations of Sonoran desert tortoises maintained the exchange of genetic material between populations (Edwards et al. 2004). Thus, over generations, dispersal between mountain populations across valleys has played a critical role in the species' evolutionary history (Edwards et al. 2004).

Connectivity among tortoise populations is important for their long-term persistence (Sutor et al. 2023). These intermountain valleys provided important linkage habitats for the survival and persistence of Sonoran desert tortoises in the mountain and foothill populations. Absent linkage habitats, these disjunct populations become small isolated populations that "are resistant to rescue by their isolation and thus could suffer irreversible declines to extirpation from a variety of threats and stochastic events" (Averill-Murray et al. 2021). Thus, managing for linkage habitats among Sonoran desert tortoise populations is important and necessary to support and maintain long-term gene flow between tortoise populations and demographic viability and persistence of currently disjunct populations.

Sonoran desert tortoises need wide areas, not narrow corridors for functioning linkage habitats. Desert tortoises are referred to as "corridor-dwellers," meaning a corridor or linkage habitat that supports connectivity between tortoise populations must be sufficiently wide to allow for multiple

tortoises' home ranges to overlap and have sufficient resources to support those individuals (Averill-Murray et al. 2021, Beier et al. 2008a, Sutor 2025).

Consequently, the Sonoran desert tortoise needs rocky upland habitat, mountain foothills, and incised washes where tortoises occur in higher densities. They also need undeveloped linkage habitats of sufficient size in intermountain valleys where they occur in lower densities to support gene flow among existing populations and promote dispersal between populations so the species will survive into the future and be conserved.

Threats to the Sonoran desert tortoise from highways and roads: Anthropogenic activities occurring throughout the Sonoran Desert are replacing and fragmenting habitat of the Sonoran desert tortoise and reducing landscape connectivity between higher density populations in rocky upland habitat, mountain foothills, and incised washes (Sutor et al. 2024). In Arizona, 70% of Sonoran desert tortoise habitat is within 1 km of development (Carter et al. 2020).

Linear features such as high-traffic roads, railroads, canals, and the border wall are a form of development that create long barriers to tortoise movement between higher density populations (Latch et al. 2011; Andrews et al. 2015; Dutcher et al. 2020; USFWS 2021; cited in Sutor et al. 2023). Linear barriers (e.g., roads) are "limiting structural connectivity for Sonoran desert tortoises and may prevent dispersal events, rescue effects in the event of localized extinctions, and successful range shift in response to climate change" (Sutor et al. 2023). Highways have severely compartmentalized the Sonoran desert tortoise habitat patch network (Sutor et al. 2023) especially in the northern part of the tortoise's distribution (i.e., Arizona). The long-distance movements that once united populations of Sonoran desert tortoises are now likely impossible (Edwards et al. 2004) because of development including construction and use of roads and highways. Fragmentation resulting from permanent linear barriers (e.g., roads and highways) has been identified as one of the greatest threats to the persistence of the Sonoran desert tortoise (USFWS 2015).

Besides fragmenting habitat and reducing population connectivity with their associated genetic and demographic impacts, the construction, use, and maintenance of roads have numerous other impacts to the Sonoran desert tortoise. Direct impacts include loss of habitat and mortality/injury to tortoise from vehicle collisions. Indirect impacts include increased human access or greater facilitation of access to collect or vandalize tortoises; increased noise levels that impact tortoise behavior and increase susceptibility to predation; modification of surface hydrology that alters downgradient flow and reduces availability of water to native vegetation thus degrading tortoise habitat by reducing the availability of native forage needed for growth, reproduction, and recruitment and cover from predators and thermal extremes; ongoing transport and establishment of non-native invasive plants that outcompete native plants; ongoing nitrogen deposition from vehicles that promotes the growth of non-native invasive plants and other "road effect zone" impacts; increased fuel load by non-native invasive plants in spaces between woody shrubs that carry wildfire; increased human sources of wildfire (e.g., vehicles, etc.); increased size, frequency and intensity of wildfires; and recurring wildfires that result in vegetation type conversion from native shrubs and herbaceous plants to non-native invasive annual grasses.

More than 20 years ago, Edwards et al. (2004) reported that anthropogenic threats to the Sonoran desert tortoise have isolated populations to mountain ranges with far less than 20,000 adult tortoises, with some populations having only hundreds of animals. Because these populations are isolated, the population level in any given mountain range is far below that recommended by the population viability analysis generated for Mojave desert tortoises (Edwards et al. 2004). This means these populations of Sonoran desert tortoises will likely be extirpated in the foreseeable future because of genetic and demographic isolation.

Some of ADOT's proposed projects occur in the distribution of the Sonoran desert tortoise. While these actions do not include the construction of new roads, they do include improvements to roads that result in greater vehicle use, higher speeds, further alteration of surface hydrology, and with the addition of traffic lanes, reduced the probability of tortoises successfully crossing the roadway/highway for distribution, reproduction, and recruitment between disjunct populations. ADOT's proposed projects increase the direct and indirect threats from roads and road use to the Sonoran desert tortoise described above.

FHWA's and ADOT's Commitments to the Sonoran desert tortoise: ADOT maintains thousands of acres of rights-of-way (ROWs) throughout Arizona, including easements and rights-of-way across lands managed by federal agencies and other state agencies. Many of these lands contain and/or are adjacent to occupied or linkage habitats for the Sonoran desert tortoise.

ADOT is a signatory to the Candidate Conservation Agreement for the Sonoran Desert Tortoise (Agreement) (USFWS et al. 2015). In this Agreement ADOT committed to "identify suitable habitat, conduct surveys, assess impacts, and coordinate mitigation efforts for the SDT [Sonoran desert tortoise] on these lands." "ADOT right-of-way (sic) intersects suitable habitat for the SDT in the southern, central and western portions of Arizona. ADOT has established guidelines to protect SDT populations along state highways and at construction sites." As a signatory to the Agreement, ADOT committed to implement the following mitigation:

- "Promote awareness of the conservation status of the Sonoran desert tortoise within ADOT.
- Collect data on SDT [Sonoran desert tortoise] sightings in ADOT right-of-way (sic) and provide that information to AGFD [Arizona Game and Fish Department].
- Partner with AGFD to implement survey and handling procedures, conservation approaches and research related to SDTs.
- Maintain ADOT right-of-way (sic) to minimize invasive plant species and fire risks as authorized.
- Partner with state and federal agencies to address invasive plant species in and adjacent to ADOT right-of-way (sic).
- Coordinate and partner with state and federal agencies and other interested parties to incorporate project design features to minimize SDT habitat fragmentation and vehicle strikes.
- Conduct habitat suitability surveys and analyze potential impacts for projects with a scope of work that could impact SDT habitat.
- Provide awareness training and/or information to ADOT and contractor personnel working on construction and maintenance projects in areas with suitable habitat.

- Follow the most current protocol for relocating any SDT that may be impacted by an ADOT construction or maintenance project."

In addition, the FHWA requires analysis of project effects on species listed as candidates and those protected by candidate conservation agreements under the federal Endangered Species Act such as the Sonoran desert tortoise and the Agreement. In the Agreement, ADOT says that "[a]voidance, minimization and mitigation measures are regularly enacted for these [listed and candidate] species on ADOT projects." Because most of the funding for the projects in the Program are from FHWA, ADOT should also comply with FHWA's requirement when implementing the projects identified in the Program in/adjacent to tortoise habitats.

In 2006 – 2008, Arizona Game and Fish Department funded several studies on Arizona Missing Linkages that included design of linkages needed for providing wildlife movement and habitat connectivity at several locations in Arizona. The Sonoran desert tortoise was a focal species analyzed. At least 8 studies were located in the distribution of the Sonoran desert tortoise. The impacts of vehicle mortality and population isolation were identified along with the need for tortoise exclusion fencing and crossing structures to allow the safe passage of the tortoise across highways to help mitigate the impacts of highways (e.g., Beier and Majka 2007, Beier et al. 2006, Beier et al. 2007a, Beier et al. 2007b, Beier et al. 2007c, Beier et al. 2008b, Beier et al. 2008c, Beier et al. 2008d). Unfortunately, it has been more than 15 years since the recommendations in these studies were published and they have not been implemented by ADOT or FHWA.

Actions to ensure future survival and connectivity of Sonoran desert tortoise populations: The presence and use of linear features (i.e., roads, railroads, canals, etc.) throughout the distribution of the Sonoran desert tortoise make "such movements [between populations] by tortoises virtually impossible without human assistance" (Edwards et al. 2004). In reviewing ADOT's list of proposed projects, several occur in habitats used by the Sonoran desert tortoise. Any ADOT project that may adversely affect the Sonoran desert tortoise should as a minimum follow the commitments made by ADOT in the Agreement.

To comply with ADOT's commitments in the Agreement including "[a]voidance, minimization and mitigation measures are regularly enacted for these [listed and candidate] species on ADOT projects" and bulleted item 6 above ("incorporate project design features to minimize SDT habitat fragmentation and vehicle strikes" of tortoises), the Council requests that ADOT implement the following conservation actions:

> When planning and implementing construction projects that occur in the distribution of the Sonoran desert tortoise or Sonoran desert tortoise habitat, FHWA and ADOT will include as part of their avoidance, minimization, and mitigation measures for the tortoise, funding for tortoise exclusion fencing and crossing structures (e.g., culverts and bridges). Specifically, the Council requests that FHWA and/or ADOT construct, monitor, and maintain tortoise exclusion fencing and design, construct, monitor, and maintain highway/roadway tortoise crossing structures. If there are existing crossing structures, these should be modified as needed and regularly maintained so that Sonoran desert tortoises may use them as part of a habitat linkage network to connect tortoise populations.

Tortoise exclusion fencing (i.e., fencing designed to avoid/reduce tortoise mortalities or injuries from vehicle strikes) occurs along highways throughout protected Mojave desert tortoise habitat and has been found to effectively reduce tortoise road mortalities/vehicle strikes (Boarman and Sazaki 2006.). Although recommended as a conservation action (USFWS et al. 2015), tortoise exclusion fencing is not widely used throughout the range of the Sonoran desert tortoise.

The USFWS has documented Mojave desert tortoises using crossing structures to safely move from one side of a highway to the other (Deffner et al. 2020). These data indicate that connectivity between Sonoran desert tortoise populations that occur in habitat patches on opposites sides of highways is possible and can be restored using crossing structures.

As mentioned above, washes are important habitat components for tortoises. Thus, it is likely that tortoises would use/traverse washes including those with culverts and bridges. Ensuring that culverts and bridges are designed and maintained so they convey surface flow, maintain the structural integrity of travel surfaces for vehicles, and allow for tortoise movement under roads and highways would facilitate population and habitat connectivity. It would also benefit other species by facilitating their safe passage across roadways/highways and would contribute to improving their conservation status.

To assist FHWA and ADOT in the implementation of effective tortoise exclusion fencing and undercrossing to connect tortoise populations, we are providing links to publications by Blanchard et al. (2022), Fairbank et al. (2021), Fairbank et al. (2023), and Huijser et al. (2023) that contain information on real world issues of designing, constructing, and monitoring tortoise exclusion fencing and tortoise crossing structures.

Blanchard, E., Z. Wurtzebach, E. Fairbank, R. Callahan, M. Brocki, A. Keil , and F. Deffner. 2022. Policy Report: Challenges and Opportunities for Implementing Conservation Measures for Mojave Desert Tortoise Along Roads. Prepared by the Mojave Desert Tortoise Transportation Ecology Task Force.
https://largelandscapes.org/wp-content/uploads/Final-Report_MDT-Policy-Guidance.pdf

Fairbank, E., F. Deffner, S. Johnson, and N. Maya. 2021. Mojave Desert Tortoise Transportation Ecology Workshop Report.
https://largelandscapes.org/wp-content/uploads/2021/11/Mojave-Desert-Tortoise-Transportation-Ecology-Workshop-Report_FINAL.pdf

Fairbank, E., M. Huijser, and F. Deffner. 2023. Technical Guidance: Mojave Desert Tortoise Conservation and Recovery Measures Along Roads. Prepared by the Mojave Desert Tortoise Transportation Ecology Task Force.
https://largelandscapes.org/wp-content/uploads/Final-Report_MDT-Technical-Guidance.pdf

Huijser, M.P., and E.R. Fairbank. 2023. Mojave Desert Tortoise Conservation and Recovery Measures Along Roads; A Practical Guide. Final Report prepared for the U.S. Fish & Wildlife Service Headquarters Office, Falls Church, VA. https://www.mphetc.com/_files/ugd/9d46fb_a8fb92fde4aa497cb793b1633013915a.pdf

In addition, the Council strongly recommends that ADOT map the locations of tortoise exclusion fencing and the types and locations of crossing structures (i.e., culverts and bridges) using GIS so these features may be easily located, monitored, and maintained.

Preventing tortoise mortality and isolation of tortoise populations caused by direct and indirect effects of the construction, presence, and use of highways/roadways should be a priority for ADOT and FHWA. The Council is available to answer questions you may have about these comments and assist with planning and implementation of exclusion fencing and crossing structures to help with long-term viability of tortoise populations in Arizona.

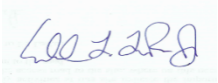
Specific Edits

Page 172: For Maricopa County, eSTIP ID 105487, Project Name 347: I-10 to Riggs Road, Route SR 347, Project Limits SR 347 from I-10 to Riggs Road – ADOT included a Google map of Nevada. We suggest replacing this with a map of the specified area in Arizona.

Again, we appreciate this opportunity to provide the above comments. We trust they will help protect tortoises during any resulting authorized activities. Herein, we reiterate that the Council wants to be identified as an Affected Interest for this and all other projects funded, authorized, or carried out by the FHWA or ADOT that may affect Mojave or Sonoran desert tortoises, and that any subsequent environmental documentation for this Program and these projects is provided to us at the contact information listed above.

Please 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 proposed Program and its identified projects.

Respectfully,



Edward L. LaRue, Jr., M.S.
Desert Tortoise Council, Ecosystems Advisory Committee, Chairperson

Cc: Anthony Sarahan, Deputy Division Administrator, Arizona Division – Federal Highway Administration, Phoenix, AZ Arizona.FHWA@dot.gov
Heather Whitlaw, Field Supervisor, U.S. Fish and Wildlife Service, Arizona Ecological Services Field Office, Phoenix, AZ heather_whitlaw@fws.gov
Tom P. Finley, Director, Arizona Game and Fish Department, Phoenix, AZ tfinley@azgfd.gov

Literature Cited

Averill-Murray, R.C. and A. Averill-Murray. 2002. Distribution and Density of Desert Tortoises at Ironwood Forest National Monument. Sonoran Herpetologist 15 (07): 78–79.

Averill-Murray, R.C. and A. Averill-Murray. 2006. The Reptiles and Other Vertebrates of Ironwood Forest National Monument. Sonoran Herpetologist 19 (12):137–141.

Averill-Murray, R.C., T.C. Esque, L.J. Allison, S. Bassett, S.K. Carter, K.E. Dutcher, S.J. Hromada, K.E. Nussear, and K. Shoemaker. 2021. Connectivity of Mojave Desert tortoise populations—Management implications for maintaining a viable recovery network. U.S. Geological Survey Open-File Report 2021–1033, 23 pages. https://doi.org/ 10.3133/ ofr20211033
https://pubs.usgs.gov/of/2021/1033/ofr20211033.pdf

Averill-Murray, R.C., P.C. Rosen, C.A. Jones, T.R. Jones, R.A. Lara-Resendiz, T. Edwards, A. Karl, and K.H. Berry. 2023. *Gopherus morafkai*. The IUCN Red List of Threatened Species 2023: e.T97246109A97246177.
https://dx.doi.org/10.2305/IUCN.UK.2023-1.RLTS.T97246109A97246177.en

Berry, K.H., L.J. Allison, A.M. McLuckie, M. Vaughn, and R.W. Murphy. 2021. *Gopherus agassizii*. The IUCN Red List of Threatened Species 2021: e.T97246272A3150871.
https://dx.doi.org/10.2305/IUCN.UK.2021-2.RLTS.T97246272A3150871.en

Beier, P., and D. Majka. 2007. Arizona Missing Linkages: US-93: Wickenburg to Santa Maria River Linkage Design. Report to Arizona Game and Fish Department. School of Forestry, Northern Arizona University.

Beier, P., E. Garding, and D. Majka. 2006. Arizona Missing Linkages: Tucson – Tortolita – Santa Catalina Mountains Linkage Design. Report to Arizona Game and Fish Department. School of Forestry, Northern Arizona University.

Beier, P., D. Majka, and T. Bayless. 2007a. Arizona Missing Linkages: Wickenburg-Hassayampa Linkage Design. Report to Arizona Game and Fish Department. School of Forestry, Northern Arizona University.

Beier, P., D. Majka, and T. Bayless. 2007b. Arizona Missing Linkages: Ironwood-Picacho Linkage Design. Report to Arizona Game and Fish Department. School of Forestry, Northern Arizona University.

Beier, P., D. Majka, and T. Bayless. 2007c. Arizona Missing Linkages: Rincon-Santa Rita-Whetstone Linkage Design. Report to Arizona Game and Fish Department. School of Forestry, Northern Arizona University.

Beier, P., D. Majka, and T. Bayless. 2007d. Arizona Missing Linkages: US-60 Superior to Globe Linkage Design. Report to Arizona Game and Fish Department. School of Forestry, Northern Arizona University

Beier, P., D.R. Majka, and W.D. Spencer. 2008a. Forks in the road: choices in procedures for designing wildland linkages. Conservation Biology 22:836–51. https://doi.org/10.1111/ j.1523-1739.2008.00942.x.

Beier, P., E. Garding, and D. Majka. 2008b. Arizona Missing Linkages: Bradshaw Mountains to Agua Fria Linkage Design. Report to Arizona Game and Fish Department. School of Forestry, Northern Arizona University.

Beier, P, E. Garding, and D. Majka. 2008c. Arizona Missing Linkages: Hualapai-Cerbat Linkage Design. Report to Arizona Game and Fish Department. School of Forestry, Northern Arizona University.

Beier, P., E. Garding, and D. Majka. 2008d. Arizona Missing Linkages: Galiuro-Pinaleño-Dos Cabezas Linkage Design. Report to Arizona Game and Fish Department. School of Forestry, Northern Arizona University.

Blanchard, E., Z. Wurtzebach, E. Fairbank, R. Callahan, M. Brocki, A. Keil , and F. Deffner. 2022. Policy Report: Challenges and Opportunities for Implementing Conservation Measures for Mojave Desert Tortoise Along Roads. Prepared by the Mojave Desert Tortoise Transportation Ecology Task Force. https://largelandscapes.org/wp-content/uploads/Final-Report_MDT-Policy-Guidance.pdf

Boarman, W.I. and M. Sazaki. 2006. A highway's road-effect zone for desert tortoises (*Gopherus agassizii*). Journal of Arid Environments 65:94-101.

[CDFW] California Department of Fish and Wildlife. 2024a. Status Review for Mojave Desert Tortoise (*Gopherus agassizii*) Report to the Fish and Game Commission, February 2024. https://nrm.dfg.ca.gov/documents/ContextDocs.aspx?cat=CESA-Listing

[CDFW] California Department of Fish and Wildlife. 2024b. 2022-2024 News Releases. California Fish and Game Commission Holds Hybrid Meeting, April 23, 2024. https://wildlife.ca.gov/News/Archive/california-fish-and-game-commission-holds-hybrid-meeting11

Carter, S.K., K.E. Nussear, T.C. Esque, I.I. Leinwand, E. Masters E, R.D. Inman, N.B. Carr, and L.J. Allison. 2020. Quantifying development to inform management of Mojave and Sonoran desert tortoise habitat in the American southwest. Endangered Species Research 42:167–184. https://doi.org/ 10.3354/ esr01045.

[Commission] California Fish and Game Commission. 2025. CESA, Petitions to List Species Under the California Endangered Species Act, Finalized Petitions. https://fgc.ca.gov/CESA#1089124-mojave-aka-agassizs-desert-tortoise-2025 https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=232827&inline

Defenders of Wildlife, Desert Tortoise Preserve Committee, and Desert Tortoise Council. 2020. A Petition to the State of California Fish And Game Commission to move the Mojave desert tortoise from listed as threatened to endangered. https://defenders.org/sites/default/files/2020-03/Desert%20Tortoise%20Petition%203_20_2020%20Final_0.pdf

Defenders of Wildlife, Desert Tortoise Preserve Committee, and Desert Tortoise Council. 2020. A Petition to the State of California Fish And Game Commission to move the Mojave desert tortoise from listed as threatened to endangered. https://defenders.org/sites/default/files/2020-03/Desert%20Tortoise%20Petition%203_20_2020%20Final_0.pdf

Deffner, F.M., E. Myers, K. Holcomb, and K. Holcomb. 2020. Monitoring use of underpasses by Mojave desert tortoise (*Gopherus agassizii*) to inform culvert design and function. Desert Tortoise Transportation Ecology Webinar Series. Desert Tortoise Recovery Office, U.S. Fish and Wildlife Service.

Edwards, T., C.R. Schwalbe, D.E. Swann, and C.S. Goldberg. 2004. Implications of anthropogenic landscape change on interpopulation movements of the desert tortoise (*Gopherus agassizii*). Conservation Genetics 5:485–499. https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=2af6a0e620f9d5cfee51940ce098a0d39e49d305

Fairbank, E., F. Deffner, S. Johnson, and N. Maya. 2021. Mojave Desert Tortoise Transportation Ecology Workshop Report. https://largelandscapes.org/wp-content/uploads/2021/11/Mojave-Desert-Tortoise-Transportation-Ecology-Workshop-Report_FINAL.pdf

Fairbank, E., M. Huijser, and F. Deffner. 2023. Technical Guidance: Mojave Desert Tortoise Conservation and Recovery Measures Along Roads. Prepared by the Mojave Desert Tortoise Transportation Ecology Task Force. https://largelandscapes.org/wp-content/uploads/Final-Report_MDT-Technical-Guidance.pdf

Grandmaison, D. D., M. F. Ingraldi, and F. R. Peck. 2010. Desert tortoise microhabitat selection on the Florence military reservation, southcentral Arizona. Journal of Herpetology 44:581–590. https://bioone.org/journals/journal-of-herpetology/volume-44/issue-4/08-291.1/Desert-Tortoise-Microhabitat-Selection-on-the-Florence-Military-Reservation-South/10.1670/08-291.1.short

Huijser, M.P., and E.R. Fairbank. 2023. Mojave Desert Tortoise Conservation and Recovery Measures Along Roads; A Practical Guide. Final Report prepared for the U.S. Fish & Wildlife Service Headquarters Office, Falls Church, VA
https://www.mphetc.com/_files/ugd/9d46fb_a8fb92fde4aa497cb793b1633013915a.pdf

Riedle, J.D., R.C. Averill-Murray, C.L. Lutz, and D.K. Bolen. 2008. Habitat use by desert tortoises (*Gopherus agassizii*) on alluvial fans in the Sonoran Desert, south-central Arizona. Copeia (2008)2:414–420.
https://www.researchgate.net/profile/Roy-Averill-Murray/publication/228617047_Habitat_Use_by_Desert_Tortoises_Gopherus_agassizii_on_Alluvial_Fans_in_the_Sonoran_Desert_South-Central_Arizona/links/54be9d1e0cf28ad7e71855e4/Habitat-Use-by-Desert-Tortoises-Gopherus-agassizii-on-Alluvial-Fans-in-the-Sonoran-Desert-South-Central-Arizona.pdf

Sutor, S. 2025. Factors Affecting Space Use, Habitat Use, and Landscape Connectivity for Sonoran Desert Tortoises (Gopherus morafkai) in Southern Arizona. Doctoral Dissertation, Texas Rech University, Lubbock. May 2025.
https://ttu-ir.tdl.org/server/api/core/bitstreams/7831d551-fcee-4abd-add9-997714b9a989/content

Sutor, S., N.E. McIntyre, and K. Griffis-Kyle. 2023. Characterizing range-wide impacts of anthropogenic barriers on structural landscape connectivity for the Sonoran desert tortoise (*Gopherus morafkai*). Landscape Ecology April 7, 2023..
https://doi.org/10.1007/s10980-023-01649-3
https://link.springer.com/article/10.1007/s10980-023-01649-3

Sutor, S., N.E. McIntyre, and K.I. Griffis-Kyle, 2024. Vegetation cover, topography, and low-traffic roads influence Sonoran desert tortoise (*Gopherus morafkai*) movement and habitat selection. Movement Ecology 12, 68 (2024).
https://doi.org/10.1186/s40462-024-00503-8
https://link.springer.com/article/10.1186/s40462-024-00503-8

[USFWS] U.S. Fish and Wildlife Service. 2015. Species Status Assessment for the Sonoran Desert Tortoise. Version 1.0. September 2015. U.S. Fish and Wildlife Service, Southwest Region, Albuquerque, NM.
https://iris.fws.gov/APPS/ServCat/DownloadFile/161608

[USFWS et al.] U.S. Fish and Wildlife Service, Bureau of Land Management, Bureau of Reclamation, National Park Service, Department of Defense, Customs and Border Protection, U.S. Forest Service, Natural Resources Conservation Service, Arizona Game and Fish Department, and Arizona Department of Transportation. 2015. Candidate Conservation Agreement for the Sonoran Desert Tortoise (*Gopherus morafkai*) in Arizona. May 27, 2015.
https://www.blm.gov/sites/blm.gov/files/policies/IMAZ-2016-004-a1.pdf

Zylstra, E.R. and R.J. Steidl. 2009. Habitat Use by Sonoran Desert Tortoises. Journal of Wildlife Management 73(5):747-754. https://wildlife.onlinelibrary.wiley.com/doi/abs/10.2193/2008-446