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Via email and NPS Planning, Environment and Public Comment webpage

May 8, 2025

Ray McPadden, Superintendent
Mojave National Preserve
ATTN: Kelso-Cima/South Kelbaker Road EA
2701 Barstow Road
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raymond_mcpadden@nps.gov
moja_superintendent@nps.gov

RE: Kelso-Cima Road and South Kelbaker Road Rehabilitation Environmental Assessment

Dear Mr. McPadden,

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 future correspondence via email, 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 project. Given the location of the proposed project in habitats occupied by the Mojave desert tortoise (*Gopherus agassizii*) (synonymous with Agassiz's desert tortoise), our comments include recommendations intended to enhance protection of this species and its habitat during activities that may be authorized by the National Park Service (NPS), which we recommend be added to project terms and conditions in the authorizing documents (e.g., decision document, contract, etc.) as appropriate. Please accept, carefully review, and include in the relevant project file the Council's following comments and attachments for the proposed action.

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 DTPC (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. In its status review, California Department of Fish and Wildlife (CDFW) (2024a) stated: "At its public meeting on October 14, 2020, the Commission considered the petition, and based in part on the Department's [CDFW] petition evaluation and recommendation, found sufficient information exists to indicate the petitioned action may be warranted and accepted the petition for consideration. The Commission's decision initiated this status review to inform the Commission's decision on whether the change in status is warranted."

Importantly, in their April 2024 meeting (CDFW 2024b), 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 California Endangered Species Act based on the scientific data provided on the species' status, declining trend, numerous threats, and lack of effective recovery implementation and land management. The Commission still needs to make a final determination to formally list the desert tortoise as State Endangered.

Description of the Proposed Action

In the Kelso-Cima Road and South Kelbaker Road Rehabilitation Environmental Assessment (EA), the National Park Service (NPS) proposes to rehabilitate Kelso-Cima Road and South Kelbaker Road in Mojave National Preserve (Preserve) in San Bernardino County, California. Proposed rehabilitation of the roads would include demolishing and removing the existing road surface, installing a new road base, and reapplying the asphalt road surface. The NPS would maintain the existing low-water crossings on the roadways but would stabilize and armor them to prevent erosion. The NPS would also add roadway pullouts along both roads, improve access and safety, and offer visitors new opportunities to stop and learn about the Preserve. Additionally, the NPS would install features along Kelso-Cima Road and South Kelbaker Road to reduce desert tortoise mortality and promote habitat connectivity.

The project is located along Kelso-Cima Road and South Kelbaker Road, encompassing approximately 42 miles of roadway that bisect the central and southwestern portions of the 1.6 million acres of the Preserve. The Union Pacific Railroad (UPRR) right-of-way corridor parallels the project area and includes an at-grade crossing on South Kelbaker Road, near Kelso Depot. The project area is approximately 557 acres and includes two potential construction staging areas, located southwest of the project limits on South Kelbaker Road and near the intersection of Kelso-Cima and South Kelbaker Roads (Figure 1).

The Federal Highway Administration-Central Federal Lands Highway Division (FHWA-CFLHD) is a cooperating agency in the National Environmental Policy Act (NEPA) process and is providing design details and engineering expertise.

NPS identified two alternatives, the No Action Alternative and the Proposed Action Alternative:

No Action Alternative: Under Alternative 1, NPS would continue to operate and maintain the existing roadways, as needed. The roads would remain in their current conditions and configurations and the current structural and safety issues would remain. These roads would continue to be inundated with water during flood events and potentially sustain major road damage. After storm damage, Preserve maintenance staff would complete repairs, consistent with current practice. The existing speed limit of 55 mph would remain along the roadway corridor, and drivers would continue to be warned to slow down via road signs. Preserve staff would continue to educate visitors to the dangers of exceeding speed limits by posting information on the Preserve website, at the visitor centers, and in other park publications or meetings. Rates of desert tortoise mortality by vehicle strikes would continue until local population vital rates decline to levels that suggest local extirpation. Traffic volume and illegal high speeds on degraded roadways would continue to adversely affect all wildlife in general through vehicle strikes, vegetation and habitat disturbance from vehicles accidentally leaving the roadways, and hazardous material spills.

Proposed Action Alternative: Under Alternative 2, the action alternative, the NPS would rehabilitate approximately 42 miles of Kelso-Cima and South Kelbaker Roads to improve safety and visitor access. The roadway improvements would include treatments, such as relocating dangerous sections of the roads, restriping pavement, adding mumble strips, widening shoulders, paving with asphalt concrete (asphalt), installing low-water crossing features (Figure 2), and adding exclusion fencing for desert tortoises. The NPS ***could*** [emphasis added] also install several tortoise crossings structures along the length of the project corridor, where existing low-water crossings are located. The tortoise crossing structures would feature approximately 2-foot diameter concrete structures under the roadways.

Alternative 2 also includes lowering the speed limit and installing speed limit and other traffic signs, radar speed feedback signs or roadway striping and markings as appropriate, and additional signage to address safety issues and improve visitor experience. To improve visitor experiences, approximately 37 pullouts at designated locations would be constructed, with approximately 1 pullout location per mile, varying along either side of the project corridor.

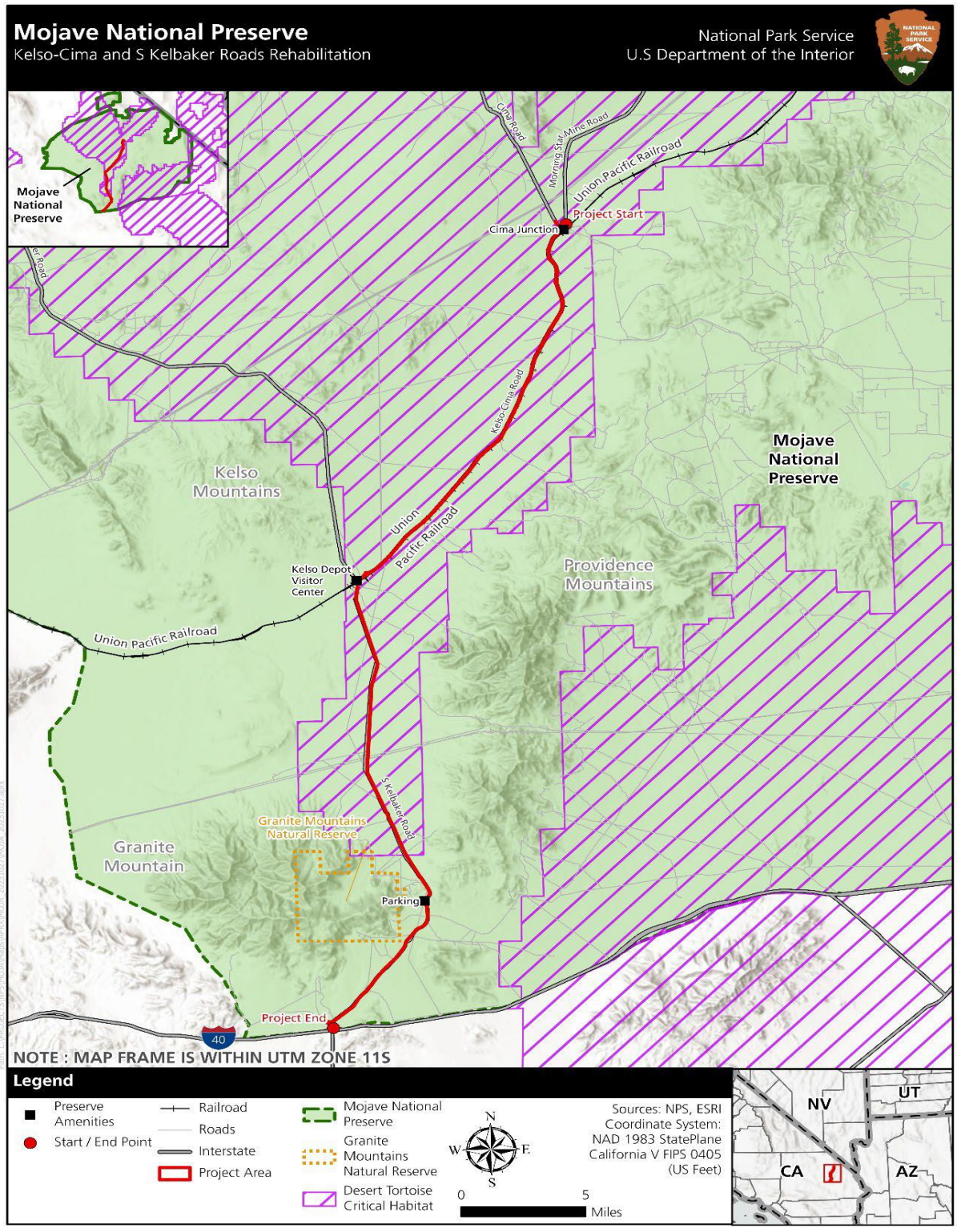


Figure 1. Project area for Kelso-Cima Road and South Kelbaker Road rehabilitation project and designated critical habitat for the Mojave desert tortoise, Mojave National Preserve, San Bernardino County, CA.

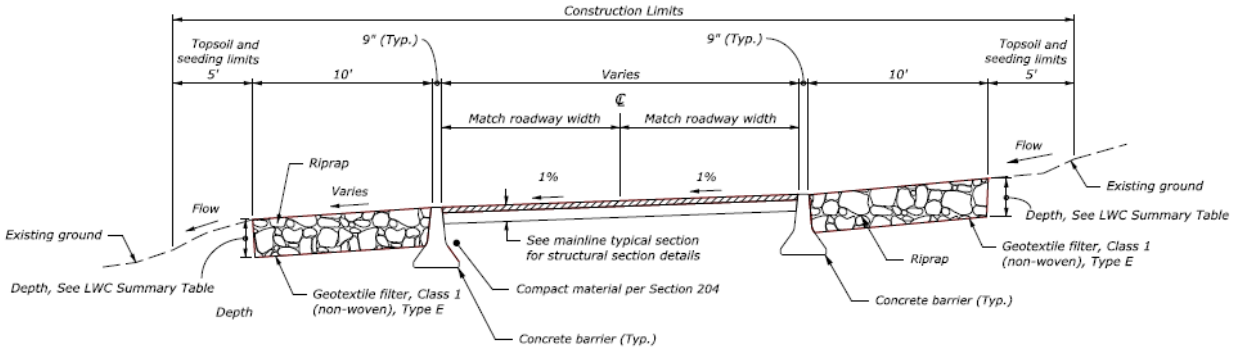


Figure 2. Design of typical low-water crossing cross section.

All staging areas would be on previously disturbed areas, existing roadbeds, or disturbed pullouts. No staging would occur on previously undisturbed land. One potential staging area could be a location immediately southwest of the project limits on South Kelbaker Road near the southern entrance of the Preserve. The second potential staging area could be located in an area near the intersection of Kelso-Cima Road and South Kelbaker Road, near the Kelso Depot visitor center.

The proposed project is located in the Ivanpah Tortoise Conservation Area (TCA) population in the Eastern Mojave Recovery Unit for the tortoise (USFWS 2011) and in the Ivanpah Critical Habitat Unit (USFWS 1994) for the tortoise. Alternative 2 would take up to three years to complete,

For Alternative 2, the NPS described "Resource Protection Measures" and "Best Management Practices" that would be implemented. For the tortoise/tortoise habitat, these include the standard measures that are implemented during the construction phase of projects to avoid direct mortality and injury to the tortoise (USFWS 2009) and the following additions:

- Install proposed tortoise exclusion fencing and tortoise guards prior to road construction activities to keep tortoises off the road right-of-way and minimize habitat fragmentation.
- Install features along Kelso-Cima Road and South Kelbaker Road to prevent desert tortoise mortality from vehicle strikes and promote habitat connectivity. Features would include tortoise exclusion fencing along the roadway and tortoise crossing structures for the length of the project corridor, approximately every kilometer and/or where existing low-water crossings are located. In total, install approximately 60 to 100 tortoise crossing structures. In addition, place tortoise guards at each secondary road access point to allow uninhibited vehicle traffic and prevent tortoises from accessing the primary roadway.
- Maintain and clean all equipment to avoid the spread of invasive species onto the site from outside areas.
- Require habitat restoration if construction activities disturb desert tortoise habitat. Habitat restoration would include alleviating soil compaction, collecting seeds for restoration work, replanting, and adding rocks and woody debris to a disturbed area.
- Restore watershed conditions to preconstruction conditions (or better) to reduce accelerated runoff caused by soil compaction; poor vegetation cover; or the unnatural conveyance of water by roads, ditches, or trails.

In addition to the two alternatives analyzed in the EA, the NPS identified other alternatives that were dismissed from further analysis. These alternatives included:

- realigning the roadway at several locations along the project corridor, and
- installing box culverts and crossing features for desert tortoises.

These two alternatives were dismissed because of additional environmental impacts to Preserve resources and additional costs. In addition, the box culvert alternative was dismissed because the proximity of the project to the existing UPRR access and right-of-way could affect the railway because constructing the water crossing structures would require a large amount of earthwork and construction to meet the requirements of the UPRR.

Comments on the Proposed Action

Under Alternative 2, the Council is concerned that the NPS says that it ***could*** [emphasis added] also install several tortoise crossings structures along the length of the project corridor, where existing low-water crossings are located. Alternative 2 should include as part of the project the construction, monitoring, and maintenance of these crossing structures in the description of this alternative. The NPS should add that although they are called tortoise crossing structures, they are used by numerous other species of wildlife for safe passage under roadways. Please see our comments below under "Environmental Consequences, Threatened and Endangered Species, Federally and State-Listed Species – Desert Tortoise" that discuss the status of the tortoise in this Tortoise Conservation Area and Recovery Unit, the documented ongoing tortoise mortality in the Preserve from vehicle strikes, and the NPS's requirements under its Organic Act and Sections 7(a)(1) and 7(a)(2) of the Federal Endangered Species Act (FESA).

Resource Protection Measures and Best Management Practices

Regarding the first Resource Protection Measures and Best Management Practice (page 11 of the EA and Appendix B, page B-1) in the above bulleted list, the Council is unsure how installing tortoise exclusion fencing and guards will minimize habitat fragmentation. We recommend that the words "and minimize habitat fragmentation" be removed from this sentence. In its place we recommend that the NPS says that installing tortoise exclusion fencing and tortoise/wildlife crossing structures will reduce tortoise mortality and reconnect the Ivanpah tortoise population fragmented by the use of the Kelso-Cima and Kelbaker Roads.

The NPS explains that the purpose of exclusion fencing and guards is to prevent unnecessary tortoise mortality/removal from the wild population by preventing tortoises from entering and crossing roads where they are highly likely to be killed from vehicle strikes or collected by the public. Tortoise-vehicle collisions are a major source of desert tortoise mortality and have likely contributed to a decline in desert tortoise population densities, including in the Ivanpah TCA, Mojave National Preserve, and Ivanpah Critical Habitat Unit. NPS (2025) reported that "road mortality is a pervasive issue for wildlife in the Preserve, particularly the federally listed desert tortoise." More than a decade earlier, Hughson and Darby (2013) reported that over a period of 11 years on average 5.3 tortoises were reported killed annually on paved roads in the Preserve.

"Appendix A. Demographic Status and Trend of the Mojave Desert Tortoise (*Gopherus agassizii*) including the Eastern Mojave Recovery Unit" (attached) provides information on the status and trend of the tortoise by recovery unit and TCA. Since 2004, the adult and juvenile tortoise populations in the TCA and recovery unit have experienced a substantial decline in tortoise densities and numbers, and the adult population densities have been below population viability for more than a decade. In addition, the Ivanpah TCA population has the lowest density of adult tortoises of all the TCAs. It is likely that the density and numbers of tortoises outside the TCAs in the Eastern Mojave Recovery Unit are lower than this (Averill-Murray 2021) because these areas do not require implementation of as many resource protection measures and are subject to greater habitat disturbance activities.

Currently the priority for managing the tortoise is to substantially reduce mortality and manage desert tortoise habitat for persistence and connectivity of the species (Averill-Murray et al. 2021, Holcomb 2025 personal communication). The Eastern Mojave Recovery Unit should be a focal point for this management because it has experienced the greatest decline in abundance and density of adult tortoises among the five recovery units. Consequently, any action implemented by land management agencies/project proponents to reduce or eliminate tortoise mortality/removal from the population and restore and maintain population and habitat connectivity for the tortoise is urgently needed.

The Council supports the construction of tortoise exclusion fencing along roads in tortoise habitat such as the exclusion fencing that the NPS and FHWA are proposing to implement in Alternative 2. In addition, we request that this alternative include: (1) regular monitoring of the exclusion fencing including at the beginning of the tortoise active season and immediately following storm events in the watershed of the Preserve to ensure that the fence has not been damaged and continues to function effectively at preventing tortoises from entering the roadway, and (2) implementing maintenance as soon as a problem with the fence's function is reported. As indicated in the analysis of impacts by the NPS in the EA, Alternative 2 includes construction/rehabilitation, use, and maintenance of the Kelso-Cima and Kelbaker Roads, not just construction.

Biological Resources

On page 17 of the EA, the NPS indicates that the Monarch butterfly (*Danaus plexippus*) is a candidate for listing under the FESA. However, on page 19 of the EA, the NPS says, "Federally Listed Species – Monarch Butterfly" "Monarch butterflies have been documented breeding, brood rearing, and foraging in the Preserve." Please revise the EA on page 17 to reflect that on December 12, 2024, the USFWS published in the *Federal Register* a proposed rule to list the Monarch butterfly as threatened with critical habitat. The USFWS has not published a final rule to list the Monarch butterfly. On page 19, we question the use of "brood rearing" as a behavior associated with the Monarch butterfly.

Also on page 17, the NPS says "Federally Listed Species – Desert Tortoise. The desert tortoise is known to occur within the areas that would be affected by this project; the entire Mojave population was listed as a threatened species in 1990 (USFWS 1994a). The habitat range of the desert tortoise includes the Mojave and Sonoran Deserts in Southern California, Arizona, southern Nevada, the southwestern tip of Utah, and Sonora and northern Sinaloa, Mexico."

Please note that there are three species of tortoises in the "habitat range" described by the NPS on page 17. Morafka's desert tortoise (*G. morafkai*), also known as the Sonoran desert tortoise (Murphy et al. 2011,) occurs in the Sonoran Desert of Arizona and Sonora, Mexico, and the thornscrub tortoise (*G. evgoodei*) occurs in thornscrub and tropical deciduous forests of southern and eastern Sonora and northern Sinaloa.

Under "Trends and Planned Actions," the NPS says, "Future actions at the Preserve include pavement removal on Morning Star Mine Road." The Council supports this action but requests that NPS provide an explanation of how this pavement removal would result in the conclusion stated in the EA that this action would "reduce road mortality for desert tortoises, resulting in beneficial impacts."

Under "Environmental Consequences – Vegetation," NPS says that during construction of Alternative 2 "approximately 70 acres of vegetation would be cleared to accommodate the proposed roadway improvements" and this would "would damage or destroy small areas of vegetation (i.e., Joshua trees . . .)."

Although this proposed alternative would occur on federal land, we request that the NPS demonstrate how it would comply with the spirit and intent of the State of California's Western Joshua Tree Conservation Act passed by the California legislature in 2023. This legislation requires a project proponent whose actions will result in taking a western Joshau tree to (1) avoid and minimize impacts to, and the taking of, the western Joshua tree to the maximum extent practicable, and (2) mitigate all impacts to, and taking of, the western Joshua tree. Mitigation may include facilitating the successful relocation and survival of western Joshua trees. Please provide information in the EA on how the NPS will avoid and minimize impacts to the western Joshua tree, and for the remaining impacts how NPS will fully mitigate them. We note that the NPS has proposed to salvage and replant approximately 89 Joshua trees under Alternative 2.

In addition, in 2021 the U.S. District Court Central District of California ordered the USFWS to set aside the USFWS's 12-month finding that listing the Joshua tree under the FESA was not warranted and declare this finding to be arbitrary, capricious, and contrary to the FESA, and remanded to the USFWS for reconsideration of its decision. This information on the federal status and state status of the Joshua tree along with the NPS's Organic Act should compel the NPS to fully mitigate the impacts to Joshua trees that are likely to occur from the construction, use, and maintenance envisioned under Alternative 2. Please add this information to the EA on the regulatory status of the Joshua tree and appropriate measures that fully mitigate the direct and indirect impacts to this species.

In this section, the NPS says that "[r]emoving or damaging desert vegetation would have short-term, adverse impacts on vegetation." Earlier in the EA the NPS defined "short-term" and "long-term."

- Short-term: Impacts that would occur as a result of the construction activities. Depending on impact topic, impacts may be intermittent (days or weeks) or continuous during construction.
- Long-term: Impacts that would continue to occur after construction is complete and may continue for years or decades.

Abella (2010) reviewed the literature from several studies on vegetation reestablishment following a variety of disturbances in the Mojave and Sonoran deserts. Abella found that the time needed for full reestablishment of total perennial plant cover was estimated at 76 years and time needed for the recovery of species composition typical of undisturbed areas was estimated are more than 200 years. Scientifically-assisted restoration efforts may reduce this time but not to such an extent that it meets the definition of short term impacts during the estimated construction period of three years. The Council requests that the NPS revise this section of the EA to include that the impacts to the vegetation from implementing Alternative 2 that include removal or damage to vegetation would be long-term impacts to vegetation.

Under "Environmental Consequences, Threatened and Endangered Species, Federally and State-Listed Species – Desert Tortoise," the NPS says "[m]itigation measures, such as the implementation of tortoise crossing structures, exclusion fencing, and recessed vertical barriers could offset long-term impacts, as well as provide long-term, beneficial impacts to the critical habitat by improving connectivity and reducing mortality." We suggest rewording this sentence to say ". . . could offset long-term *adverse* impacts …."

Construction-related impacts from vehicle use that result in mortality or injury to tortoises "would primarily result in short-term, adverse impacts." The Council disagrees with this conclusion. Because of the long time needed for a tortoise to reach sexual maturity (e.g., 15 to 20 years) (Medica et al. 2012) and the population density of tortoise in the Ivanpah TCA, which is below that of population viability, it would take 15 to 20 years to replace one tortoise removed from the population as the result of implementing Alternative 2. Given the NPS's definitions of short-term and long-term impacts in the EA (please see our comments above under "Environmental Consequences – Vegetation"), the mortality of one or more adult tortoises during project construction would be a long-term adverse impact. The Council requests that the EA be revised to reflect this long-term impact. This long-term impact is the primary reason that exclusion fencing is part of Alternative 2. Similarly, the mortality of one or more adult desert tortoises from failure to construct tortoise exclusion fencing along the roads would be an adverse long-term impact. Please revise the analysis and conclusions in the EA to reflect the duration of these impacts.

In this section of the EA, we did not find a description or analysis of the impacts of the use of pullout areas by the public on the illegal collection of tortoises. While the NPS is proposing to add "approximately 37 pullouts along the project area" to provide "additional opportunities for visitors to enjoy the scenic vistas and take photographs, resulting in long-term, beneficial impacts on visitor experience," it also provides additional opportunities and locations for visitors to stop, traverse into the nearby desert areas, and collect desert tortoises. Illegal collection of tortoises has been reported in the scientific and popular literature (USFWS 1994, Berry et al. 1996; Boarman 2002, Kessler 2021). This activity is likely to increase with the availability of "safe" tortoise habitat near the roads and increased opportunities and locations to access the desert and tortoise habitat. The Council recommends that this impact be analyzed in the final EA and that NPS ensure that in its education and outreach efforts to the public, a "hands off" policy for plants and wildlife, including the tortoise, be emphasized to visitors to the Preserve.

We presume that the NPS and/or FHWA plan to implement the monitoring and maintenance of the exclusion fencing and crossing structures. If correct, we request that the EA include a description and analysis of the impacts of these monitoring and maintenance activities to the relevant resource issues particularly the tortoise, migratory birds, and vegetation. The EA should analyze the entire project that is likely to be implemented or authorized by NPS or FHWA in the future, which includes monitoring and maintenance activities. Similarly, the Section 7 consultation with the USFWS should include all foreseeable monitoring and maintenance activities.

Under "Environmental Consequences, Threatened and Endangered Species, Federally Listed Species – Monarch Butterfly," we found no mention of whether the NPS has completed its required conference with the USFWS for this proposed threatened species. Please add this information to the EA and any requirements in the USFWS's conference opinion that the NPS must implement to ensure that Alternative 2 does not jeopardize the existence of this species.

Under "Environmental Consequences, Threatened and Endangered Species, State-Listed Species – Gilded Flicker," the NPS asserts that the loss of vegetation used for foraging would be a short-term impact. Please see our comments above under "Environmental Consequences – Vegetation" that provide information that the loss of perennial desert vegetation would be for decades and thus meets the definition of long-term impacts rather than short-term impacts. The Council requests that this section of the EA be revised to reflect this long-term impact.

Under "Reasonably Foreseeable Impacts," the Council requests that the EA be revised to reflect the long-term adverse impacts to vegetation and listed/proposed wildlife species.

Geologic Features and Soils

Under "Geologic Features and Soils, Trends and Planned Actions," the NPS says that "floods and droughts . . . are expected to become more severe with increasing temperature fluctuations and precipitation patterns (Diffenbaugh et al. 2005; Kharin et al. 2007; Loehman 2010)." "Higher intensity and more frequent rainfall may lead to more erosion on susceptible soils along the project area and an increase in runoff when soils reach saturation levels." These extreme weather events would result in greater volumes of runoff and surface flow in washes. Consequently, culvert sizes and locations in the road design should include these projected increases in amounts of surface flow in a single storm event and add culverts/upsize the capacity of culverts to accommodate these larger surface flows. Adding culverts means more opportunities to design them for dual functions — to convey increased volumes and velocities of surface flows and function as tortoise/wildlife crossing structures.

The Council requests that the NPS describe the typical design for a tortoise crossing structure or include the various factors that are identified in Fairbank et al. (2023) when designing these structures to assure that the crossing structures and their approaches will be effective for all age classes of tortoises when constructed (e.g., no riprap bottoms, no drop off points or plunge pools, etc.) and that they are designed to minimize the need for frequent maintenance.

In addition, this section of the EA does not mention tortoise crossing structures under "Reasonably Foreseeable Impacts" for Alternative 2. It only mentions "permanent structures such as new roadway beds, pullouts, the Granite Pass parking area, communications tower at Cima Junction, low-water crossing structures, safety road signs, recessed vertical barriers, and tortoise exclusion

fencing." We believe that crossing structures for tortoises, usually culverts, would be important structures to consider when analyzing the impacts to geology and soils under Alternative 2. Please revise this section of the EA to include culverts/tortoise crossing structures and analyze how their design and maintenance would impact geologic features and soils.

Water Resources

Under "Water Resources, Affected Environment, Floodplains," the NPS reports that the project area is "within and adjacent to the approximately 150 ephemeral stream channels that intersect or flow parallel to the project area." The NPS policy is to preserve floodplain functions and values and minimize potentially hazardous conditions associated with flooding. Part of floodplain functions and values includes that the washes are used by tortoises as foraging areas and for movements within local populations, and as linkage habitats between populations. Desert tortoises tend to follow washes (Jennings 1993, Peaden et al. 2017, Gray et al. 2019) and choose ephemeral stream channels or washes in which to forage especially in late spring (Jennings and Berry 2023). Todd et al. (2016) reported that juvenile tortoises when not in burrows were located closer to washes than would occur randomly. Thus, these juvenile tortoises were selecting to be near washes. Thus, washes play an important role in providing greater diversity and abundance of forage, shelter sites, and movement corridors for both juvenile and adult tortoises. Their importance to connectivity within and between tortoise populations cannot be overemphasized.

Although this section of the EA describes recent precipitation events that resulted in flash floods in both winter and summer in the Preserve that washed out portions of Preserve roads, covered roads with rocks, sand, and debris, and stranded visitors, we found no information in the EA that culverts would be installed to minimize/eliminate these damaging conditions. Rather the EA mentions reinforcing and adding low water crossings in the sections on "Alternative 2: Proposed Action Floodplains" and "Surface Waters." Unfortunately, low water crossings (please see Figure 2 above) do not prevent the flow of debris and sediment from crossing roads so this adverse impact would continue and cover the roads with rocks, sand, and debris and strand visitors. In addition, they do not provide safe passage for tortoises and other wildlife across roads.

In addition, we are confused by the wording in the EA (page 9) that says "where U-shaped fencing termini would not be feasible, the NPS ***could*** [emphasis added] also install several tortoise crossings structures along the length of the project corridor, where existing low-water crossings are located. The tortoise crossing structures would feature approximately 2-foot diameter concrete structures under the roadways" and wording in Appendix B, page B-2 that lists Resource Protection Measures and Best Management Practices for Alternative 2 including that tortoise crossing structures would be installed "for the length of the project corridor, approximately every kilometer and/or where existing low-water crossings are located. In total, install approximately 60 to 100 tortoise crossing structures."

The Council strongly recommends that the EA be revised to say that culverts **will be** installed under the Kelso-Cima and Kelbaker Roads. The NPS should describe these culverts as being designed and implemented for multiple functions including (1) conveying surface waters, sediment, and debris under roads during flow events; (2) providing for the safe passage of tortoises under these roads so they are able to effectively use many of these washes for feeding, shelter, movement, and connectivity with tortoises on the other side of the road and nearby populations; and (3) providing for the safe passage of small-sized wildlife under these roads so they are able to effectively use many of these washes for feeding, shelter, and movement/connectivity.

Regarding the second function, the Kelso-Cima and Kelbaker Roads bisect the southern part of the Ivanpah TCA. The construction and maintenance of culverts as tortoise crossings under these roads would help to restore and maintain connectivity within the tortoise population in the Ivanpah TCA and to the nearby Fenner TCA tortoise population. The lifetime home range for the Mojave desert tortoise is more than 1.5 square miles (3.9 square kilometers) of habitat (Berry 1986) and adult tortoises may make periodic forays of more than 7 miles (11 kilometers) at a time (Berry 1986). Thus, an adult tortoise needs to be able to move throughout a large area of desert vegetation that is free of sources of mortality such as vehicle strikes when crossing roads.

Regarding the third function, other small-sized wildlife species that use desert washes for foraging, cover, movement, and connectivity would also benefit from the installation and maintenance of these culverts. We remind the NPS that the fundamental principles of conservation biology include the need for gene flow within and between populations to maintain genetic diversity, thereby enabling a species to more likely survive, especially during climate change, which enables biodiversity. Thus, safe road crossings for wildlife are important because they provide connectivity within and among wildlife populations to help achieve and maintain viability and biodiversity.

We request that the EA be revised to include information on the design and location of culverts and how these structures would facilitate these multiple functions.

The successful implementation of tortoise exclusion fencing with safe road crossing structures will likely reduce the amount of road-killed animals along Kelso-Cima and Kelbaker Roads. Currently, these road-killed animals are anthropogenic food subsidies for predators of the tortoise (e.g., common raven and coyote) (Kristan et al. 2010, Kelly et al. 2021) and result in increased numbers of tortoise predators and predation on tortoises in nearby areas. Common ravens mostly prey on hatchling and juvenile tortoises and coyotes prey on subadult and adult tortoises. Threats from ravens may be particularly severe because predators are more likely to cause extinctions in prey (e.g., tortoises) when food subsidies allow their populations to remain high as prey populations decline (Kristan et al. 2004). The increased number of predators and associated predation also adversely affects other wildlife species in the area.

A reduction in the number of these predators is needed because the mortality for the tortoise continues to be greater than recruitment (Allison and McLuckie 2018). One method is to reduce their subsidized food source (Kristan et al. 2004). Exclusion fencing combined with road crossings for the tortoise and other small wildlife would contribute to reducing their direct mortality and their indirect mortality by reducing road-killed food subsidies for these predators. Reduced food availability should result in fewer predators.

Comment Letter Submitted during Public Participation Period

The Council submitted a comment letter on January 31, 2024 to the NPS on the proposed project during the public participation/public feedback phase of the project, which we consider as a scoping phase under NEPA. In that letter we made several recommendations regarding the proposed project. The Council appreciates that the NPS included some of these recommendations in the EA such as installing and maintaining permanent tortoise exclusion fencing during project construction activities. However, we were unable to find in the EA that NPS is implementing other recommendations that we made. A summary of our January 31, 2024 comments that we were unable to find addressed in the EA are provided below:

- Follow the guidance/direction provided in the publications by Blanchard et al. (2022), Fairbank et al. (2021), Fairbank et al. (2023), and Huijser et al. (2023) for tortoise exclusion fencing and tortoise crossing structures.
- Ensure there are sufficient culverts in tortoise habitat taking into account predicted changes in frequency and intensity of precipitation events from climate change.
- Ensure that tortoise/wildlife crossing structure (e.g., culverts) sizes and access points are usable by tortoises of all size classes (e.g., no riprap in the pathways leading to and from the culverts; no drop-off points/plunge pools, etc.). We suggest following guidelines developed by the Desert Tortoise Recovery Office (DTRO) and other entities (e.g., Fairbank et al. 2023) when designing culverts and upgradient and downgradient approaches to culverts.
- Perform regular maintenance of exclusion fencing and culverts, especially after major precipitation events in the watershed.
- Monitor the effectiveness of tortoise exclusion fencing to prevent tortoises from accessing roads and becoming trapped on roads, and monitor the use of culverts by tortoises and other wildlife to ensure their design and/or absence of maintenance is not impeding use.
- Determine whether the railroad tracks at Kelso create an effective artificial barrier for tortoise movements, as we understand NPS currently plans to not install tortoise exclusion fencing along that side of the road. If the tracks create a semi-permeable barrier, exclusion fencing or similar effective barrier should be installed and maintained on both sides of the road. We provided information from the scientific literature of documentation of box turtles (Kornilev et al. 2006) and gopher tortoises (Rautsaw et al. 2018) crossing railroad tracks.
- Add GPS coordinates for the locations of improved roadways, tortoise exclusion fencing, culverts, and pullouts to a database and geospatial tracking system. This documentation would allow NPS to easily locate structures for future monitoring and maintenance and enable NPS to track cumulative impacts for the tortoise and other special status species and traffic issue associated with visitor safety.
- Support the Sweeney-Granite Mountain Natural Reserve (Reserve) and its need for ongoing access for resident and visiting staff, researchers, and classes during the estimated three-year construction phase of Alternative 2 by facilitating assess to the Reserve during this time.

These are persisting concerns that we ask be considered in the final EA.

We support the change in the road surface for Morningstar Mine Road and suggest that NPS monitor vehicle speeds before and after this change is completed to determine the effect. We also appreciate that the posted speed limit on Kelso-Cima and Kelbaker Roads will be reduced. Both actions may result in reduced speeds of some vehicles and provide more time for drivers to brake for tortoises and other wildlife on the roads.

Appendix D: Draft Floodplain Statement of Findings

On page 17 of Appendix D we read, "[t]he road rehabilitation would primarily occur within the existing road alignment. Permanent infrastructure proposed to be constructed in floodplains would include concrete barriers, rock riprap, geotextile fiber to support the rock riprap and improve surface water flow conveyance across roadways, and tortoise exclusion fencing and crossing features to improve tortoise movement across roadways and reduce tortoise fatalities." Please provide a drawing of how these features would be constructed so they all work effectively.

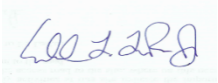
The Council is concerned about these infrastructure features. The use of certain materials and slope of culverts/approaches to culverts may deter tortoises from using these crossings and may result in a new source of mortality for tortoises (e.g., riprap on culvert aprons may trap small tortoises, etc.). Consequently, we request that the NPS/FHWA work closely with the USFWS staff that specialize in culvert design (e.g., the DRTO) and use the guidance in the Fairbank et al. (2023) Technical Guidance document and more recent publications and reports on how to design, construct, and maintain crossing structures that are used successfully by tortoises.

The Council offers assistance to NPS as it moves forward with implementing tortoise exclusion fencing and tortoise/wildlife crossing structures. Please contact the Council to discuss how we can help the NPS or FHWA in the design, implementation, monitoring, or maintenance of these features that will contribute to the conservation of the tortoise. For example, monitoring the use of crossing structures by tortoises and other wildlife may require the use of Hobbs Active Light Trigger (HALT) wildlife cameras. The Council has a grant program to help fund research and studies that contribute to the conservation of desert tortoises. This is one way in which the Council may be able to help with implementation of tortoise conservation measures for Alternative 2.

We appreciate this opportunity to provide the above comments and 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 NPS that may affect desert tortoises, and that any subsequent environmental documentation for this project is provided to us at the contact information listed above. Additionally, we ask that you notify the Council at eac@deserttortoise.org of any proposed projects that the NPS may authorize, fund, or carry out in the range of any species of desert tortoise in the southwestern United States (i.e., *Gopherus agassizii*, *G. morafkai*, *G. berlandieri*, *G. flavomarginatus*) so we may comment on it to ensure the NPS fully considers and implements actions to conserve these tortoises as part of its directive to conserve biodiversity on lands managed by NPS.

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 Project.

Respectfully,



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

Attachment: Appendix A. Demographic Status and Trend of the Mojave Desert Tortoise (*Gopherus agassizii*) including the Eastern Mojave Recovery Unit

Cc: Kerry Holcomb, Desert Tortoise Recovery Office, U.S. Fish and Wildlife Service, Palm Springs, CA kerry_holcomb@fws.gov

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Appendix A. Demographic Status and Trend of the Mojave Desert Tortoise (*Gopherus agassizii*) including the Eastern Mojave Recovery Unit

To assist the Agencies with their analysis of the direct, indirect, and cumulative impacts of proposed projects on the Mojave desert tortoise, we provide the following information on its status and trend. In reviewing the data presented below, note that the location of the proposed project is within the Ivanpah Tortoise Conservation Area (TCA) and Eastern Mojave Recovery Unit, which has experienced a decline in adult tortoise density and abundance of –67%, since 2004.

The Desert Tortoise Council (Council) has serious concerns about (1) direct, indirect, and cumulative sources of human mortality for the Mojave desert tortoise given the status and trend of the species range-wide, within each of the five recovery units, and within the TCAs that comprise each recovery unit and (2) the ability of the tortoise to survive and persist in these recovery units in the foreseeable future.

Below are tables with data on changes to Mojave desert tortoise densities and abundance since 2004. Important points from these tables include the following:

Change in Status for the Mojave Desert Tortoise Range-wide
● Ten of 17 populations of the Mojave desert tortoise declined from 2004 to 2014.

● Eleven of 17 populations of the Mojave desert tortoise are below the population viability threshold through 2021. These 11 populations represent 89.7 percent of the range-wide habitat in Critical habitat units (CHUs) and TCAs.

Change in Status for the Eastern Mojave Recovery Unit – Nevada and California
● This recovery unit had a 67 percent decline in tortoise density from 2004 to 2014, the highest rate of decline of the five recovery units.

● All tortoise populations in this recovery unit have densities that are below the viability level established by the USFWS (1994a).

● The Eastern Mojave Recovery Unit provides population and habitat connectivity between the Western Mojave and Colorado Desert recovery units and the Northeastern and Upper Virgin River recovery units. Continued development that fragments tortoise populations and habitats eventually severs the genetic connection between the two recovery units to the west and two to the east.

Densities of Adult Mojave Desert Tortoises: A few years after listing the Mojave desert tortoise under the Federal Endangered Species Act (FESA), the U.S. Fish and Wildlife Service (USFWS) published a Recovery Plan for the Mojave desert tortoise (USFWS 1994a). It contained a detailed population viability analysis. In this analysis, the minimum viable density of a Mojave desert tortoise population is 10 adult tortoises per mile^2 (3.9 adult tortoises per km^2). This assumed a male-female ratio of 1:1 (USFWS 1994a, page C25) and certain areas of habitat with most of these areas geographically linked by adjacent borders or corridors of suitable tortoise habitat. Populations of Mojave desert tortoises with densities below this density are in danger of extinction (USFWS 1994a, page 32). The Revised Recovery Plan (USFWS 2011) designated five recovery

units for the Mojave desert tortoise that are intended to conserve the genetic, behavioral, and morphological diversity necessary for the recovery of the entire listed species (Allison and McLuckie 2018).

Range-wide, densities of adult Mojave desert tortoises declined more than 32% between 2004 and 2014 (Table 1) (USFWS 2015). At the recovery unit level, between 2004 and 2014, densities of adult desert tortoises declined, on average, in every recovery unit except the Northeastern Mojave (Table 1). Adult densities in the Northeastern Mojave Recovery Unit increased 3.1% per year (SE = 4.3%), while the other four recovery units declined at different annual rates: Colorado Desert (–4.5%, SE = 2.8%), Upper Virgin River (–3.2%, SE = 2.0%), Eastern Mojave (–11.2%, SE = 5.0%), and Western Mojave (–7.1%, SE = 3.3%)(Allison and McLuckie 2018). However, the small area and low starting density of the tortoises in the Northeastern Mojave Recovery Unit (lowest density of all Recovery Units) resulted in a small overall increase in the number of adult tortoises by 2014 (Allison and McLuckie 2018). In contrast, the much larger areas of the Eastern Mojave, Western Mojave, and Colorado Desert recovery units, plus the higher estimated initial densities in these areas, explained much of the estimated total loss of adult tortoises since 2004 (Allison and McLuckie 2018).

At the population level, represented by tortoises in the TCAs, adult densities of 10 of 17 monitored populations of the Mojave desert tortoise declined from 26% to 64% and 11 have adult densities less than 3.9 adult tortoises per km^2 (USFWS 2015), the minimum density identified by the USFWS for population viability (USFWS 1994a).

Population Data on Mojave Desert Tortoise: The Mojave desert tortoise was listed as threatened under the FESA in 1990. The listing was warranted because of ongoing population declines throughout the range of the tortoise from multiple human-caused activities. Since the listing, the status of the species has changed. Population numbers (abundance) and densities continue to decline substantially (please see Tables 1 and 2).

Density of Juvenile Mojave Desert Tortoises: Survey results indicate that the proportion of juvenile desert tortoises has been decreasing in all five recovery units since 2007 (Allison and McLuckie 2018). The probability of encountering a juvenile tortoise was consistently lowest in the Western Mojave Recovery Unit. Allison and McLuckie (2018) provided reasons for the decline in juvenile desert tortoises in all recovery units. These included decreased food availability for adult female tortoises resulting in reduced clutch size, decreased food availability resulting in increased mortality of juvenile tortoises, prey switching by coyotes from mammals to tortoises, and increased abundance of common ravens that typically prey on smaller desert tortoises.

Declining adult tortoise densities through 2014 have left the Eastern Mojave Desert adult numbers at 64% (Allison and McLuckie 2018, USFWS 2015). Such steep declines in the density of adults are only sustainable if there are suitably large improvements in reproduction and juvenile growth and survival. However, the proportion of juveniles has not increased anywhere in the range of the Mojave desert tortoise since 2007 (Allison and McLuckie 2018).

Table 1. Summary of 10-year trend data for 5 Recovery Units and 17 Critical Habitat Units (CHU)/Tortoise Conservation Areas (TCA) for the Mojave desert tortoise, *Gopherus agassizii* (=Agassiz's desert tortoise). The table includes the area of each Recovery Unit and Critical Habitat Unit (CHU)/Tortoise Conservation Area (TCA), percent of total habitat for each Recovery Unit and Critical Habitat Unit/Tortoise Conservation Areas, density (number of breeding adults/km^2 and standard errors = SE), and the percent change in population density between 2004-2014. Populations below the viable level of 3.9 adults/km^2 (10 adults per mi^2) (assumes a 1:1 sex ratio) and showing a decline from 2004 to 2014 are in red (Allison and McLuckie 2018, USFWS 2015).

Recovery Unit Designated Critical Habitat Unit/Tortoise Conservation Area	Surveyed area (km^2)	% of total habitat area in Recovery Unit & CHU/TCA	2014 density/km^2 (SE)	% 10-year change (2004–2014)
Western Mojave, CA	**6,294**	**24.51**	**2.8 (1.0)**	**–50.7 decline**
Fremont-Kramer	2,347	9.14	2.6 (1.0)	–50.6 decline
Ord-Rodman	852	3.32	3.6 (1.4)	–56.5 decline
Superior-Cronese	3,094	12.05	2.4 (0.9)	–61.5 decline
Colorado Desert, CA	**11,663**	**45.42**	**4.0 (1.4)**	**–36.25 decline**
Chocolate Mtn AGR, CA	713	2.78	7.2 (2.8)	–29.77 decline
Chuckwalla, CA	2,818	10.97	3.3 (1.3)	–37.43 decline
Chemehuevi, CA	3,763	14.65	2.8 (1.1)	–64.70 decline
Fenner, CA	1,782	6.94	4.8 (1.9)	–52.86 decline
Joshua Tree, CA	1,152	4.49	3.7 (1.5)	+178.62 increase
Pinto Mtn, CA	508	1.98	2.4 (1.0)	–60.30 decline
Piute Valley, NV	927	3.61	5.3 (2.1)	+162.36 increase
Northeastern Mojave	**4,160**	**16.2**	**4.5 (1.9)**	**+325.62 increase**
Beaver Dam Slope, NV, UT, AZ	750	2.92	6.2 (2.4)	+370.33 increase
Coyote Spring, NV	960	3.74	4.0 (1.6)	+ 265.06 increase
Gold Butte, NV & AZ	1,607	6.26	2.7 (1.0)	+ 384.37 increase
Mormon Mesa, NV	844	3.29	6.4 (2.5)	+ 217.80 increase
Eastern Mojave, NV & CA	**3,446**	**13.42**	**1.9 (0.7)**	**–67.26 decline**
El Dorado Valley, NV	999	3.89	1.5 (0.6)	–61.14 decline
Ivanpah, CA	2,447	9.53	2.3 (0.9)	–56.05 decline
Upper Virgin River	**115**	**0.45**	**15.3 (6.0)**	**–26.57 decline**
Red Cliffs Desert	115	0.45	15.3 (6.0)	–26.57 decline
Total amount of land	**25,678**	**100.00**		**–32.18 decline**

The USFWS and Utah Division of Wildlife Resources have continued to collect density data on the Mojave desert tortoise since 2014. The results are provided in Table 2 along with the analysis USFWS (2015) conducted for tortoise density data from 2004 through 2014. These data show that adult tortoise densities in most Recovery Units continued to decline in density since the data collection methodology was initiated in 2004. In addition, in the Northeastern Mojave Recovery Unit that had shown an overall increase in tortoise density between 2004 and 2014, subsequent data indicate a decline in density since 2014 (USFWS 2016, 2018, 2019, 2020, 2022a, 2022b).

Abundance of Mojave Desert Tortoises: Allison and McLuckie (2018) noted that because the area available to tortoises (i.e., tortoise habitat and linkage areas between habitats) is decreasing, trends in tortoise density no longer capture the magnitude of decreases in abundance. Hence, they reported on the change in abundance or numbers of the Mojave desert tortoise in each recovery unit (Table 2). They noted that these estimates in abundance are likely higher than actual numbers of tortoises, and the changes in abundance (i.e., decrease in numbers) are likely lower than actual numbers because of their habitat calculation method. They used area estimates that removed only impervious surfaces created by development as cities in the desert expanded. They did not consider degradation and loss of habitat from other sources, such as the recent expansion of military operations (753.4 km2 so far on Fort Irwin and the Marine Corps Air Ground Combat Center), intense or large scale fires (e.g., 576.2 km2 of critical habitat that burned in 2005), development of utility-scale solar facilities (as of 2015, 194 km2 have been permitted) (USFWS 2016), or other sources of degradation or loss of habitat (e.g., recreation, mining, grazing, infrastructure, etc.). Thus, the declines in abundance of Mojave desert tortoise are likely greater than those reported in Table 3.

Habitat Availability: Data on population density or abundance does not indicate population viability. The area of protected habitat or reserves for the subject species is a crucial part of the viability analysis along with data on density, abundance, and other population parameters. In the Desert Tortoise (Mojave Population) Recovery Plan (USFWS 1994a), the analysis of population viability included population density and size of reserves (i.e., areas managed for the desert tortoise) and population numbers (abundance) and size of reserves. The USFWS Recovery Plan reported that as population densities for the Mojave desert tortoise decline, reserve sizes must increase, and as population numbers (abundance) for the Mojave desert tortoise decline, reserve sizes must increase (USFWS 1994a). In 1994, reserve design (USFWS 1994a) and designation of critical habitat (USFWS 1994b) were based on the population viability analysis from numbers (abundance) and densities of populations of the Mojave desert tortoise in the early 1990s. Inherent in this analysis is that the lands be managed with reserve level protection (USFWS 1994a, page 36) or ecosystem protection as described in section 2(b) of the FESA, and that sources of mortality be reduced so recruitment exceeds mortality (that is, lambda > 1)(USFWS 1994a, page C46).

Habitat loss would also disrupt the prevailing population structure of this widely distributed species with geographically limited dispersal (isolation by resistance Dutcher et al. 2020). Allison and McLuckie (2018) anticipate an additional impact of this habitat loss/degradation is decreasing resilience of local tortoise populations by reducing demographic connections to neighboring populations (Fahrig 2007). Military and commercial operations and infrastructure projects that reduce tortoise habitat in the desert are anticipated to continue (Allison and McLuckie 2018) along with other sources of habitat loss/degradation.

Allison and McLuckie (2018) reported that the life history of the Mojave desert tortoise puts it at greater risk from even slightly elevated adult mortality (Congdon et al. 1993; Doak et al. 1994), and recovery from population declines will require more than enhancing adult survivorship (Spencer et al. 2017). The negative population trends in most of the TCAs for the Mojave desert tortoise indicate that this species is on the path to extinction under current conditions (Allison and McLuckie 2018). They state that their results are a call to action to remove ongoing threats to tortoises from TCAs, and possibly to contemplate the role of human activities outside TCAs and their impact on tortoise populations inside them.

Table 2. Summary of data for Agassiz's desert tortoise, *Gopherus agassizii* (=Mojave desert tortoise) from 2004 to 2021 for the 5 Recovery Units and 17 Critical Habitat Units (CHUs)/Tortoise Conservation Areas (TCAs). The table includes the area of each Recovery Unit and CHU/TCA, percent of total habitat for each Recovery Unit and CHU/TCA, density (number of breeding adults/km^2 and standard errors = SE), and percent change in population density between 2004-2014 (USFWS 2015). Populations below the viable level of 3.9 breeding individuals/km^2 (10 breeding individuals per mi^2) (assumes a 1:1 sex ratio) (USFWS 1994a, 2015) or showing a decline from 2004 to 2014 are in **red.**

Recovery Unit: Designated CHU/TCA &	**% of total habitat area in Recovery Unit & CHU/TCA**	**2004 density/ km^2**	**2014 density/ km^2 (SE)**	**% 10-year change (2004–2014)**	**2015 density/ km^2**	**2016 density/ km^2**	**2017 density/ km^2**	**2018 density/ km^2**	**2019 density/ km^2**	**2020 density/ km^2**	**2021 density/ km^2**
Western Mojave, CA	**24.51**		**2.8 (1.0)**	**–50.7 decline**							
Fremont-Kramer	9.14		2.6 (1.0)	–50.6 decline	4.5	No data	4.1	No data	2.7	1.7	No data
Ord-Rodman	3.32		3.6 (1.4)	–56.5 decline	No data	No data	3.9	2.5/3.4*	2.1/2.5*	No data	1.9/2.5*
Superior-Cronese	12.05		2.4 (0.9)	–61.5 decline	2.6	3.6	1.7	No data	1.9	No data	No data
Colorado Desert, CA	**45.42**		**4.0 (1.4)**	**–36.25 decline**							
Chocolate Mtn AGR, CA	2.78		7.2 (2.8)	–29.77 decline	10.3	8.5	9.4	7.6	7.0	7.1	3.9
Chuckwalla, CA	10.97		3.3 (1.3)	–37.43 decline	No data	No data	4.3	No data	1.8	4.6	2.6
Chemehuevi, CA	14.65		2.8 (1.1)	–64.70 decline	No data	1.7	No data	2.9	No data	4.0	No data
Fenner, CA	6.94		4.8 (1.9)	–52.86 decline	No data	5.5	No data	6.0	2.8	No data	5.3
Joshua Tree, CA	4.49		3.7 (1.5)	+178.62 increase	No data	2.6	3.6	No data	3.1	3.9	No data
Pinto Mtn, CA	1.98		2.4 (1.0)	–60.30 decline	No data	2.1	2.3	No data	1.7	2.9	No data
Piute Valley, NV	3.61		5.3 (2.1)	+162.36 increase	No data	4.0	5.9	No data	No data	No data	3.9

Recovery Unit: Designated CHU/TCA	% of total habitat area in Recovery Unit & CHU/TCA	2004 density/ km^2	2014 density/km^2 (SE)	% 10-year change (2004–2014)	2015	2016	2017	2018	2019	2020	2021
Northeastern Mojave AZ, NV, & UT	**16.2**		**4.5 (1.9)**	**+325.62 increase**							
Beaver Dam Slope, NV, UT, & AZ	2.92		6.2 (2.4)	+370.33 increase	No data	5.6	1.3	5.1	2.0	No data	No data
Coyote Spring, NV	3.74		4.0 (1.6)	+ 265.06 increase	No data	4.2	No data	No data	3.2	No data	No data
Gold Butte, NV & AZ	6.26		2.7 (1.0)	+ 384.37 increase	No data	No data	1.9	2.3	No data	No data	2.4
Mormon Mesa, NV	3.29		6.4 (2.5)	+ 217.80 increase	No data	2.1	No data	3.6	No data	5.2	5.2
Eastern Mojave, NV & CA	**13.42**		**1.9 (0.7)**	**–67.26 decline**							
El Dorado Valley, NV	3.89		1.5 (0.6)	–61.14 decline	No data	2.7	5.6	No data	2.3	No data	No data
Ivanpah Valley, CA	9.53		2.3 (0.9)	–56.05 decline	1.9	No data	No data	3.7	2.6	No data	1.8
Upper Virgin River, UT & AZ	**0.45**		**15.3 (6.0)**	**–26.57 decline**							
Red Cliffs Desert**	0.45	29.1 (21.4-39.6)**	15.3 (6.0)	–26.57 decline	15.0	No data	19.1	No data	17.2	No data	
Range-wide Area of CHUs - TCAs/Range-wide Change in Population Status	**100.00**			**–32.18 decline**							

* This density includes the adult tortoises translocated from the expansion of the MCAGCC, that is resident adult tortoises and translocated adult tortoises.

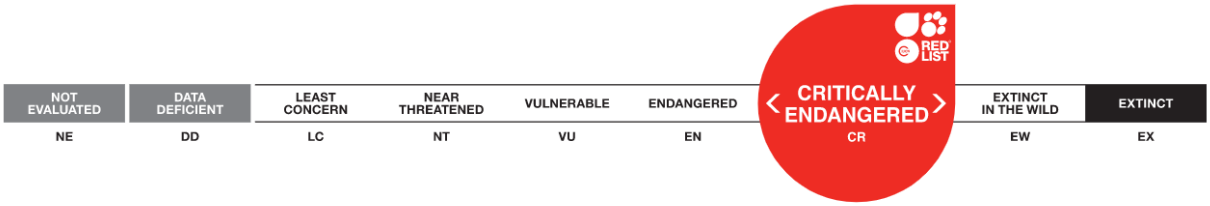
**Methodology for collecting density data initiated in 1999.

Table 3. Estimated change in abundance of adult Mojave desert tortoises in each recovery unit between 2004 and 2014 (Allison and McLuckie 2018). Decreases in abundance are in red.

Recovery Unit	Modeled Habitat (km^2)	2004 Abundance	2014 Abundance	Change in Abundance	Percent Change in Abundance
Western Mojave	23,139	131,540	64,871	-66,668	-51%
Colorado Desert	18,024	103,675	66,097	-37,578	-36%
Northeastern Mojave	10,664	12,610	46,701	34,091	270%
Eastern Mojave	16,061	75,342	24,664	-50,679	-67%
Upper Virgin River	613	13,226	10,010	-3,216	-24%
Total	**68,501**	**336,393**	**212,343**	**-124,050**	**-37%**

Densities, numbers, and habitat for the Mojave desert tortoise declined between 2004 and 2014 and densities continue to decline in most Recovery Units since 2014. As reported in the population viability analysis, to improve the status of the Mojave desert tortoise, reserves (area of protected habitat) must be established and managed. When densities of tortoises decline, the area of protected habitat must increase. When the abundance of tortoises declines, the area of protected habitat must increase. We note that the Desert Tortoise (Mojave Population) Recovery Plan was released in 1994 and its report on population viability and reserve design was reiterated in the 2011 Revised Recovery Plan as needing to be updated with current population data (USFWS 2011, p. 83). With lower population densities and abundance, a revised population viability analysis would show the need for greater areas of habitat to receive reserve level of management for the Mojave desert tortoise. In addition, we note that none of the recovery actions that are fundamental tenets of conservation biology has been implemented throughout most or all of the range of the Mojave desert tortoise.

IUCN Species Survival Commission: The Mojave desert tortoise is now on the list of the world's most endangered tortoises and freshwater turtles. It is in the top 50 species. The International Union for Conservation of Nature's (IUCN) Species Survival Commission, Tortoise and Freshwater Turtle Specialist Group, now considers Mojave desert tortoise to be Critically Endangered (Berry et al. 2021). As such, it is a "species that possess an extremely high risk of extinction as a result of rapid population declines of 80 to more than 90 percent over the previous 10 years (or three generations), a current population size of fewer than 50 individuals, or other factors." It is one of three turtle and tortoise species in the United States to be critically endangered. This designation is more grave than endangered.



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