

DESERT TORTOISE COUNCIL

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Via email only

14 November 2022

Attn: Colleen Cepero-Rios, Planning and Environmental Coordinator
Bureau of Land Management, Las Vegas Field Office
4701 N Torrey Pines Dr.
Las Vegas, NV 89130
cceperorios@blm.gov

RE: Logandale Trails Draft Environmental Assessment for the Resource Management Plan Amendment and planning documents (DOI-BLM-NV-S010-2022-0005-RMP-EA)

Dear Ms. Cepero-Rios,

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

As of June 2022, our mailing address has changed to:

Desert Tortoise Council
3807 Sierra Highway #6-4514
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Our email address has not changed. Both addresses are provided above in our letterhead for your use when providing future correspondence to us. Thank you for contacting us directly via email on 29 September 2022 with the notice and an electronic copy of the Logandale Trails Draft Environmental Assessment for the Resource Management Plan Amendment and planning documents (DOI-BLM-NV-S010-2022-0005-RMP-EA) (herein, "DEA"), which is dated September 2022. Unless otherwise noted, the page numbers referenced herein are from the DEA.

We appreciate this opportunity to provide comments on the above-referenced project. Given the location of the proposed project in suitable habitats likely occupied by Mojave desert tortoise (*Gopherus agassizii*) (synonymous with Agassiz's desert tortoise), our comments pertain to enhancing protection of this species during activities funded, authorized, or carried out by the Bureau of Land Management (BLM), which we assume will be added to the Decision Record for this project as needed. Please accept, carefully review, and include in the relevant project file the Council's following comments and attachments for the proposed project.

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), as 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), population size fewer than 50 individuals, other factors." It is one of three turtle and tortoise species in the United States to be critically endangered. This status, in part, prompted the Council to join Defenders of Wildlife and Desert Tortoise Preserve Committee (Desert Tortoise Council 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.

The Introduction on page 1-1 indicates, "The United States (US) Department of the Interior, Bureau of Land Management (BLM) Las Vegas Field Office (LVFO) is proposing to adjust current management of the Logandale Trails area by amending the 1998 Las Vegas Resource Management Plan (RMP, also known as the 1998 Las Vegas RMP). The proposed RMP amendment (RMPA) would change the current area designation of the Logandale Trails area from an extensive recreation management area (ERMA) to a special recreation management area (SRMA) (Appendix A). To support designation of the SRMA, the BLM LVFO developed a recreation area management plan (RAMP) and travel management plan (TMP) for the area (Appendix B). This environmental assessment (EA) describes and analyzes the proposed RMPA and SRMA designation, along with the proposed management guidance and implementation activities outlined in the RAMP and TMP."

We have iterated in numerous recent comment letters to the Las Vegas Field Office of the BLM (DTC 2022a, 2022b, 2022c), without any formal response from BLM or indication that our concerns are being addressed, that it is inappropriate to continue to amend the Las Vegas Resource Management Plan (RMP), which is outdated and fails to address tortoise declines that were not documented when the RMP was drafted. We have included Appendix A to document the catastrophic tortoise declines that were not documented in 1998 when the RMP was adopted. It is also not evident that the 1998 RMP envisioned the extensive development of southern Nevada that was facilitated by the 2012 Record of Decision facilitating solar development in six western states (BLM and DoE 2012), which was also codified prior to the release of recent documentation of tortoise declines (Allison and McLuckie 2018, USFWS 2015, 2016, 2018, 2019, 2020, 2022a, 2022b).

We reiterate here, as we have stated before, that the Las Vegas RMP needs to be revised using these data and a rigorous cumulative effects analysis addressing the loss of tortoises and habitat connectivity to solar development before the RMP is amended another time. BLM needs to design and implement a “cumulative impacts tracking system” that takes into account its undiminished authorization of solar and other development projects throughout southern Nevada in light of these now-documented tortoise declines. This is particularly important given the following statement on page 1-1, “The 1998 Las Vegas RMP provides limited management direction for the Logandale Trails decision area to support the management of recreational activities within the area,” which may be remedied in a revised RMP.

We note on page 1-1 the following statement, “The 1998 Las Vegas RMP limited motorized and mechanized use of the Logandale Trails decision area as ‘limited to existing roads, trails, and *dry washes* [emphasis added] for all motorized and mechanized vehicles’.” Given the intended amendment, and assumption that BLM will not revise the LMP as requested, we offer a formal recommendation, “amendment” if you will, that the clause, “and dry washes” be removed from the RMP. In the meantime, it is not clear from the EA how many of the routes to be designated as “open” are actually in washes. We request that the final decision record clearly state that “travel in dry washes is prohibited unless those washes are designated as open,” which would apply to all but the No Action Alternative.

It is clear that one of the incentives for amending the RMP is to change the current status of an Extensive Recreation Management Area (ERMA) to a Special Recreation Management Area (SRMA). When we first encountered the acronyms ERMA and SRMA in the Desert Renewable Energy Management Plan (DRECP, BLM 2016), it was our assumption that the word, “Extensive” implied more intensive vehicle use than the word, “Special” would. However, there are several recent examples that suggest to us that the reverse may be true. For example, within three years of designating critical habitat in the West Mojave for SRMA status (BLM 2016), three BLM-designated vehicle open areas (e.g., Johnson Valley, El Mirage, and Spangler Hills) were expanded into designated tortoise critical habitat (USFWS 1994a) and redesignated as National Off Highway Vehicle (OHV) Recreation Areas with passage of the Dingell Act of 2019.

In fact, we now see with Alternatives C and D under the current Proposed Action that BLM wants to establish three new open areas for two distinct uses simultaneous with the proposed designation of the SRMA. We believe that this is a recent trend in BLM’s management of our public lands that favors vehicle recreation at the expense of tortoise conservation, much less, recovery. It also promotes activities that increase carbon emissions that contribute to climate change, rather than promoting the growth and conservation of vegetation. Desert vegetation is a carbon reducer but OHV activity destroys/severely damages desert vegetation.

The EA does not clearly define the level of impact under the No Action Alternative that maintains the ERMA designation compared to the level of impact that would result from an alternative that would change the designation to a SRMA. We appreciate that the routes would become designated, which we support, however if the new SRMA designation would facilitate more impacts than the ERMA designation, we are not supportive of the change. Given these concerns, we ask that the BLM tabulate a clear description of the differences between current management in an ERMA versus future management under a SRMA. Specifically, would the SRMA designation, for

example, allow for more open routes than under the ERMA? Are there relatively more Special Recreation Permits (SRPs) in SRMAs compared to ERMAs? Like we observed in the West Mojave, does this new designation provide for relatively fewer obstacles to eventually redesignate conservation areas in such a way that heightened OHV activities could occur? Quantifying this change is necessary to determine the direct and indirect impacts to the soils, vegetation, and wildlife, including the tortoise, so that BLM can develop and implement mitigation with science-based monitoring and adaptive management as described in BLM's Mitigation Policy, Handbook, and Manual (2021w, 2021b, 2021c).

We see on page 2-2 that Recreational Management Zone (RMZ) for RMZ 2 would "Manage 2,122.51 acres, with the primary management focus on target shooting." Please be sure that this decision considers avoiding tortoise concentration areas, which are preferably determined by empirical data and less so on modeled data, as shooting is known to be an impact to tortoises (Berry et al. 2006, 2008, 2014).

We have recommended for years that all motorized and mechanized vehicles be limited to routes and trails that are designated as "open" by the BLM, that no vehicle use occur on designated "closed" routes, that these open routes be signed and closed routes be eradicated through vertical mulching and other techniques, and that except for well-traveled, historic routes in washes, that no vehicle use be authorized in washes, which are important resources for desert tortoises (Jennings 1992, 1993, 1997). We appreciate that our recommendation is consistent with the following statement on page 1-1: "While the Logandale Trails decision area is a popular destination for motorized recreation in general, and OHV-specific opportunities in particular, the routes within the decision area have never been systematically inventoried, analyzed, and designated as open, closed, or limited by the BLM."

As given in Alternatives C and D, we are adamantly opposed to establishing any "open areas" that would facilitate unrestricted use by vehicles traveling cross-country. In California, we have seen that such use results in higher mortalities of tortoises (BLM 2005) and degradation of habitat (Berry 2013). We cannot tell for the lack of tortoise distribution data if the 107 acres that would be designated for rock crawling and 57 acres for sand-dune driving occur in suitable or tortoise-occupied habitats including habitats used by tortoise to connect populations, but in either case, we are still opposed to this new use condoning cross-country vehicle travel with its many impacts (see Appendix B). Although we definitely prefer Alternative B, if the open area component were dropped from Alternative C, we are not strongly opposed to that Alternative.

We appreciate that the Goals and Strategies outlined in Table 2-6 would ostensibly result in eradicating newly-designated closed routes so as to prohibit future uses. Following is a list of Best Management Practices that we provide to BLM as resources to be considered for this effort:

Best Management Practices – Restoring Perennial Plants

https://deserttortoise.org/wp-content/uploads/BMP_fact_sheet_1_restore_perennials.pdf

Best Management Practices – Enhancing Forage for the Mojave Desert Tortoise

https://deserttortoise.org/wp-content/uploads/BMP_fact_sheet_2_forage.pdf

Best Management Practices – Salvaging Topsoil

https://deserttortoise.org/wp-content/uploads/BMP_fact_sheet_3_topsoil.pdf

Best Management Practices – Rehabilitating Lands After Severe Disturbance

https://deserttortoise.org/wp-content/uploads/BMP_fact_sheet_4_severe_disturbance.pdf

Best Management Practices – Reducing Impacts of Roads

https://deserttortoise.org/wp-content/uploads/BMP_fact_sheet_5_roads.pdf

Restoration plan for site within the Eastern Expansion Area of Desert Tortoise Research Natural Area

https://deserttortoise.org/wp-content/uploads/restoration_plan_guidance_21apr2017.pdf

Abella S.R. and K.H. Berry. 2016. Enhancing and restoring habitat for the desert tortoise (*Gopherus agassizii*). *Journal of Fish and Wildlife Management* 7(1):255–279.

<https://doi.org/10.3996/052015-JFWM-046>.

We note in the Appendices, Chapter 3, Section 3.1 Monitoring, 3.1.1 Logandale Monitoring Requirements the following statement: “The BLM will conduct monitoring for threatened and endangered species, candidate species, and other special status species, such as bighorn sheep and desert tortoise.” Without any details, we are not sure what “monitoring desert tortoises” implies. We ask that this be clarified in the final National Environmental Policy Act (NEPA) document. We further request that the design of this monitoring plan be developed and implemented in coordination with a science-based entity such as a university with biological sciences expertise or the U.S. Geological Survey and that the monitoring plan be included in the NEPA document.

In our previous comments (Desert Tortoise Council 2022b), we made the following request: “We ask that BLM provide maps of tortoise distributions, if not densities, that show suitable and occupied desert tortoise habitats within the planning area. If BLM considers such maps to remain confidential to better protect tortoises (i.e., not provide information for poachers), they should still be developed in-house for consultation purposes. The TMP must rely on existing or updated data based on tortoise surveys (preferred) or [current validated] modeling (next best) to inform decisions.”

Since we do not see such a map in the current EA, was this recommendation ignored? Did BLM take into account suitable and occupied tortoise habitats when delineating the proposed RMZ 2 area for shooting and the three new open areas? We see in the appendix volume to the EA that the sand dune area and two rock-crawling areas, which correspond to proposed open areas, are shown in pink on page 29 in Figure 2-7. And whereas we are opposed to establishing any new open areas, we also are concerned as to whether any of these three proposed open areas correspond to tortoise concentration areas or even suitable habitats, as determined either by pedestrian surveys or modelling. Please provide this information the NEPA document.

Assuming an alternative is selected that would result in the establishment of these new open areas and that this authorized use will result in take of tortoises, does BLM plan to initiate consultation with the U.S. Fish and Wildlife Service (USFWS) that will result in a new Biological Opinion for

this plan amendment? Please do not respond by saying that take would be covered by a 24-year-old opinion associated with the RMP, assuming there is one, as it too, like the RMP, would be outdated and lack recent data documenting declining tortoises densities.

We appreciate this opportunity to provide comments on this project and trust they will help protect tortoises during any resulting authorized activities. Herein, we reiterate that the Desert Tortoise Council wants to be identified as an Affected Interest for this and all other projects funded, authorized, or carried out by the BLM that may affect species of 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 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.
Ecosystems Advisory Committee, Chairperson
Desert Tortoise Council

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

We provide the following information on the status and trend of the listed population of the desert tortoise to assist the BLM and Marine Corps with their analysis of the direct, indirect, and cumulative impacts of the Proposed Project on the Mojave desert tortoise.

BLM's implementation of a conservation strategy for the Mojave desert tortoise in its resource management plans through 2020 has resulted in the following changes in the status for the tortoise throughout its range and in Nevada from 2004 to 2014 (Table 1; USFWS 2015) and 2004 to 2020 (Table 2). There are 17 populations of Mojave desert tortoise described below that occur in the Critical Habitat Units (CHUs) and Tortoise Conservation Areas (TCAs); 14 are on lands managed by the BLM.

The Desert Tortoise Council (Council) has serious concerns about 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.

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 mile² (3.9 adult tortoises per km²). 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, densities of 10 of 17 monitored populations of the Mojave desert tortoise declined from 26% to 64% and 11 have densities less than 3.9 adult tortoises per km² (USFWS 2015).

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).

Table 1. Summary of 10-year trend data for 5 Recovery Units and 17 CHUs/TCAs for the Mojave desert tortoise, *Gopherus agassizii* (=Agassiz’s desert tortoise). 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/km² and standard errors = SE), and the percent change in population density between 2004-2014. Populations below the viable level of 3.9 adults/km² (10 adults per mi²) (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 CHU/TCA	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 Valley, 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

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 adult numbers at 33% (a 67% decline of their 2004 levels) (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, and in the Eastern Mojave Recovery Unit the proportion of juveniles in 2014 declined from 14 to 11 percent (a 21% decline) of their representation since 2007 (Allison and McLuckie 2018).

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).

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 CHUs/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/km² 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/km² (10 breeding individuals per mi²) (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	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

Recovery Unit: Designated CHU/TCA	% of total habitat area in Recovery Unit & CHU/TCA	2014 density/km ² (SE)	% 10-year change (2004–2014)	2015	2016	2017	2018	2019	2020	2021
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
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

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
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.

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.

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%

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).

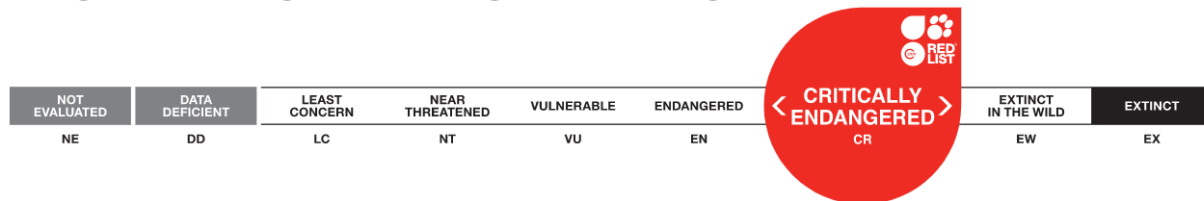
Habitat loss would also disrupt the prevailing population structure of this widely distributed species with geographically limited dispersal (isolation by resistance Dutcher et al. 2020).

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) as are 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.

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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