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Via email only

18 February 2022

Attn: Ali Aghili, Senior Environmental Scientist Supervisor
California Department of Fish and Wildlife
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RE: Notice of Preparation of a Draft Environmental Impact Report for the Southern California Gas Company California Desert Conservation Area Operations and Maintenance Long-Term Incidental Take Permit (SoCalGas O&M – NOP Scoping Comments)

Dear Mr. Ali,

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.

We appreciate this opportunity to provide comments on the above-referenced project. Given the location of the proposed project in habitats occupied by Mojave desert tortoise (*Gopherus agassizii*) (synonymous with Agassiz's desert tortoise), our comments pertain to enhancing protection of this species during proponent-authorized activities. Please accept, carefully review, and include in the relevant project file the Council's following comments and attachments for the proposed project.

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.

Unless otherwise noted, all referenced page numbers are from the February 2, 2022 Notice of Preparation (NOP), which includes the following introduction on page 1: "In accordance with Sections 15081 and 15082 of the California Environmental Quality Act (CEQA) Guidelines, the California Department of Fish and Wildlife (CDFW), as the CEQA lead agency, will prepare a Draft Environmental Impact Report (EIR) for the Southern California Gas Company (SoCalGas) California Desert Conservation Area (CDCA) Operations and Maintenance (O&M) Long-Term Incidental Take Permit (ITP) (Project). The Project applicant, SoCalGas, has filed an application with CDFW for an ITP under California Fish and Game Code Section 2081(b) and Title 14 of the California Code of Regulations, Sections 783.0–783.8, to authorize the otherwise prohibited 'take' as defined by State law of six state-listed wildlife species incidental to SoCalGas ongoing O&M activities within the CDCA. The wildlife species protected by the California Endangered Species Act (CESA) that SoCalGas proposes for incidental take coverage under the ITP (Covered Species) are listed below in Table 1."

The background information on page 3 indicates, "SoCalGas operates and maintains approximately 1,100 miles of transmission pipeline and 308 miles of main distribution pipelines within the CDCA. Each pipeline transports natural gas and includes appurtenant and support facilities including valve, metering, and pressure-limiting stations; cathodic protection equipment; aerial and ground markers; telecommunications equipment; and access roads."

"SoCalGas has been conducting O&M operations on its pipeline network within the CDCA for more than 70 years. Ongoing O&M of the existing pipelines and appurtenant and supporting facilities has been occurring in accordance with an existing CESA Memorandum of Understanding (MOU) that CDFW executed with SoCalGas in 1997 under former Fish and Game Code Section 2081. (See Fish & G. Code, 2081.1.) The CESA MOU is set to expire on December 31, 2022. The long-term ITP SoCalGas seeks for its continued and ongoing O&M activity in the CDCA would replace the CESA MOU, consistent with the permitting criteria set forth in current Fish and Game Code Section 2081, subdivisions (b) and (c)."

Please clarify in the EIR the differences between "MOU" and "ITP," which seem to be used interchangeably in the NOP, but are very different documents. The NOP does not indicate that an ITP was ever acquired, suggesting that the MOU has served as take authorization. We note that CDFW often requires a project-specific, biologist-specific MOU on a case-by-case basis, but we are unaware that there is such a thing as a programmatic MOU. The ITP is required to authorize take and covers many projects over many years, but multiple MOUs may still be required of authorized biologists and biological monitors working for SoCalGas and preapproved by CDFW, USFWS, and Bureau of Land Management (BLM). So, please be sure to explain in the EIR the many authorizations and approvals of these three agencies and how they affect SoCalGas O&M activities.

In general, the terms and conditions of the 2081 permit that are minimally included in the 1996 MOU need to be substantially updated to 2022 standards and be rooted in science. The permit should include a requirement for compliance monitoring and effectiveness monitoring of the avoidance/minimization measures, plus adaptive management to change the implementation of the mitigation measures if they are not effective or if additional compensation is needed because the impacts are greater than anticipated or when take is exceeded.

Ed LaRue attended the webinar for the project on February 2, 2022, and would like to thank Chad Beckstrom of Ascent Environmental for providing copies of the 1995 Biological Opinion (BO) and the 1996 MOU in an email on February 3, 2022. We note that the NOP references a 2017 BO but that it was not provided, so we are unsure how well it analyzed tortoise trend data available through 2017. We note that a significant paper on the status of tortoises was published a year after the 2017 BO, in Allison and McLuckie (2018), and that it should be included, among other references (USFWS 2020, 2021) in the EIR. Appendix A is provided for your information, and as a minimal sample of the kind of analysis of trend data we expect to see in the EIR. Given the severe declines in tortoises throughout the affected area in which SoCalGas operates, it is advisable that informal Section 7 Consultation be reinitiated with USFWS to ensure that the 2017 determinations are still applicable, which is not apparent from the description cited on page 1 of the NOP.

Table 1 lists six species, including least Bell's vireo, southwestern willow flycatcher, tricolored blackbird, Coachella Valley fringe-toed lizard, desert tortoise, and Mohave ground squirrel. Why isn't Joshua tree included in the list? As a Candidate species, it should be treated as if it is listed. Whereas we expect the California Fish and Game Commission could make a decision on the listing petition in April 2022, which was postponed from October 2021, we feel that it is prudent to include this species, unless the proponent is aware of the pending outcome that is not yet available to the public? In any case, we ask that Joshua tree be added to the list as a Covered Species, which can be removed if the Commission decides it will not formally list the species as either Threatened or Endangered. Note, even if not listed, Joshua Tree is still protected at the County level, by the San Bernardino County Development Code and at the State level, by the 1998 Food and Agricultural Code, Division 23: California Desert Native Plants, Chapter 3: Regulated Native Plants, Section 80073. Note that these codes also protect other Yucca species, numerous cacti, catclaw acacias, smoke trees, honey mesquites, and many other plant species. So, please be sure that this planning effort is not so truncated as to be limited to listed species; CDFW must ensure that all pertinent codes are enforced.

Even though the ITP necessarily pertains to state-listed species for the above six species, we understand that it is also important that this new planning effort address numerous special status species that are not listed but nevertheless warrant protection. How will this planning effort ensure that SoCalGas operation and maintenance activities will not significantly affect the following rare animals: Flat-tailed horned lizard, Mojave and Colorado fringe-toed lizards, burrowing owl, special status raptor species (particularly nesting Swainson's hawks), LeConte's thrasher, loggerhead shrike, American badger, desert kit fox, and numerous bat species. For these and other species, please indicate what current management is and how new management will enhance protections. Rare plant species are too numerous to list, but we ask that similar analyses are performed for them and that protective prescriptions be applied on a region-by-region basis.

For the EIR to be complete, all components of the Affected Environment must be analyzed; not just listed species, but also special status species. SoCalGas is obligated to perform a CEQA-significant impacts analysis for many resources, and particularly impacts and protection of non-listed species designated as special status species by CDFW (2022a, 2022b, 2022c), USFWS (2008), and California Native Plant Society (CNPS 2022). We note that CDFW's fully mitigated standard applies to all designated rare species, not only listed species. For example, if a project is covered by the ITP as it applies to desert tortoise and Mohave ground squirrel and results in impacts to burrowing owls within the right-of-way, the ITP will have effectively resulted in unlawful impacts to that special status species.

The following statement is given on page 3: "The 1995 Biological Opinion for Ongoing Maintenance Activities on SoCalGas's Pipeline System in the Southern California Deserts and 2017 Biological Opinion for Activities in the California Desert Conservation Area provided formal consultation from the U.S. Fish and Wildlife Service (USFWS) regarding the effects of SoCalGas pipeline activities on five of the Covered Species and their habitat (tri-colored blackbird was recently listed and thus not included in the previous documents). The CESA MOU along with the 1995 and 2017 Biological Opinions analyzed the impacts of SoCalGas O&M activities related to the natural gas pipelines."

Whereas the most recent BO is dated 2017, we note that the 1996 MOU is very old and requires significant modification to be updated. There is new guidance from USFWS in its Field Manual (USFWS 2009), new survey protocols (USFWS 2019), and new trend data (Allison and McLuckie 2018, USFWS 2020, 2021) that all need to be considered as the new MOU is drafted. It is equally important that SoCalGas implement all recent survey protocols for the following resources, at a minimum: (1) jurisdictional waters analysis and 1601 Streambed Alteration Agreements as needed; (2) protocol surveys for fringe-toed lizards (University of California Riverside, Center for Conservation Biology 2005) or equivalent; (3) records searches for special status plants (CDFW 2022a) and protocol surveys (CDFG 2009) by botanists to detect them; (4) protocol surveys for western burrowing owl (CDFG 2012); and on a case-by-case basis, as needed, protocol trapping surveys for Mohave ground squirrel [CDFG 2003 (revised 2010)].

Page 3 indicates, "In the CESA MOU, CDFW concluded O&M activities would not result in jeopardy to the continued existence of the Covered Species if the terms and conditions therein were implemented. In the 1995 and 2017 Biological Opinions, USFWS concluded that O&M activities would not likely result in destruction or adverse modification of critical habitat for the desert tortoise or jeopardize the continued existence of the desert tortoise." As indicated above, the tortoise is now designated as critically endangered; it is worse off now than it was when CDFW and USFWS rendered the conclusions given above (see Appendix A). Whereas we understand that SoCalGas is likely to implement proven methods (e.g., biological monitoring to ensure protective measures are implemented) to avoid/minimize direct take of tortoises (see LaRue and Dougherty 1998), we ask for clarification on the statement that tortoise critical habitat will not be adversely affected. In other words, in referring to the classes given on page 4, would not activities under Class III and Class IV constitute adverse impacts of critical habitat if they occur within such designated areas? And if so, should we take the above statement at face value; namely that Class III and IV activities will not affect critical habitats?

It is essential that SoCalGas provide maps that show the locations of pipelines and appurtenances relative to tortoise critical habitat, Areas of Critical Environmental Concern (ACECs), National Conservation Lands (NCL), miscellaneous public lands identified in the CDCA Plan (BLM 1980) as amended [particularly by the Record of Decision (ROD) associated with the Desert Renewable Energy Conservation Plan (DRECP; BLM 2016)], etc. Because this is a linear project, the impacts to population connectivity and habitat fragmentation should be described and analyzed with respect to critical habitat for the tortoise and designated linkage areas, which are important connectors between populations.

We ask for an in-depth analysis and documentation of current management that is not reflected in the 1995 BO and definitely not the MOU. For example, we understand that several tortoises were accidentally crushed between 2016 and 2018 along the stretch of SoCalGas' pipeline that parallels Interstate 40, east of Newberry Springs, which resulted in reinitiation of Section 7 Consultation with the USFWS. Please include all such relevant documents in the EIR, as appendices. In response to this take, we understand that vehicle escorts were required for all activities. By documenting all current management, including mandatory vehicle escorts, we will be able to tell if future protection will be as stringent and effective as current protection. To adopt the phrase used on page 13, please indicate "past, current, and reasonably foreseeable" management prescriptions so comparisons can be made among the identified EIR alternatives. Given the plight of tortoises (Appendix A), we see no opportunity for SoCalGas to reduce levels of protection below current management, and expect there will be sufficient information in the EIR to make these comparisons.

Whereas the archaic MOU only briefly refers to impacts to the existing environment (Section 4, Impacts to Listed Species), it is essential that the EIR analyze the direct and indirect impacts to state-listed and special status species and their habitats. Some of these analyses include increases in threats from factors such as increased raven predation from road kills and nesting/roosting/perching sites; availability of routes to unregulated off-highway vehicle (OHV) use and the direct and indirect impacts from the public's use; spread and proliferation of nonnative plants from surface disturbance activities exacerbated by drought; increased likelihood of fire and destruction of native vegetation and plant communities needed for food and cover; and a discussion of climate change based on available scientific literature. We understand, for example, that SoCalGas prohibits idling vehicles on work sites as one means of minimizing the carbon footprint. In the footnote, we provide an extensive list of literature for vehicle impacts to help inform your assessment[1].

All impacts to vegetation would be long-term because of the decades required by desert vegetation to become established and grow following surface disturbance, even under ideal climate and land management conditions. We provide for your use a recent article funded by the Council to inform SoCalGas on appropriate restoration methods in arid environments[2].

Section 5.2 of the 1996 MOU requires a 50-ft buffer be surveyed beyond a given impact area that will be disturbed or experience overland travel. We request that CDFW revisit this recommendation and establish avoidance distances using the biology of the species such as the average daily distance a tortoise travels if tortoise surveys occur daily and average weekly distance if surveys occur weekly, etc. Also, we are unfamiliar with the "barefoot banded lizard" referenced on page 4 of the MOU, and ask that the EIR clarify what it is and how it fits into the ITP, if at all.

[1] https://www.dropbox.com/s/vcfxz7qs5bo0w2m/%23Road%20Impacts%20Bibliography.pdf?dl=0
[2] https://www.dropbox.com/s/nx1b5m2b5ehya12/%23Abella%20and%20Berry%202016.pdf?dl=0

We understand that the MOU is outdated and that it will functionally be replaced by the ITP. Please be sure that the following outdated recommendations are addressed in new the new permit (section references are to those appearing in the 1996 MOU):

• With regards to procedures given in Section 5.2.2, the paragraph on handling and moving tortoises should be updated to include the latest handling protocols (see footnote[3]).

• Section 5.3 requires that monitors inspect trenches and holes daily for trapped animals. This inspection should occur more frequently during warmer months as tortoise may become stressed or die from hyperthermia if left in the sun all day. Minimum checks of three times per day reflects current management and should be required.

• Section 5.8 requires annual reporting but does not require monitoring. Unless SoCalGas monitors changes in resource issues such as nonnative plant species distribution, tortoise predator presence, etc., it is impossible to determine if the avoidance/minimization measures are working. CDFW should require SoCalGas to implement a science-based monitoring plan to determine the extent of especially indirect impacts to the tortoise/tortoise habitat to accurately determine the amount of take that occurs.

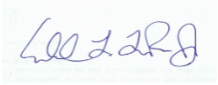
• Section 5.11, Habitat Management Lands: The acquisition and funding of management for compensation lands should be done by SoCalGas. The acreage of land acquisition should be based on the functions and values of the lands acquired to fully compensate for the functions and values of habitats lost/degraded/fragmented to the tortoise. Because linear projects have greater impacts on tortoise populations and habitats than projects with a polygon footprint (LaRue and Dougherty 1998), a simple mathematical formula to calculate acreage directly impacted is not sufficient to replace the impacted functions and values. The land acquired should have a permanent conservation easement placed on it and be managed by an entity with the authority to manage the land for the benefit of the tortoise and other taken species. This would exclude the BLM, especially because Congress can take and has taken BLM land and given it to the military to use for defense purposes, which has occurred several times since the tortoise was listed (e.g., Fort Irwin into designated critical habitat and 29 Palms Marine Corps Base into a BLM-designated vehicle open area).

• Section 7, Department Findings: CDFW needs to revisit this section especially given the non-viability of tortoise populations in California. Please see Appendix A.

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 permitted by the CDFW 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.

[3] https://www.fws.gov/nevada/desert_tortoise/documents/reports/2015/Chapter%202_DesertTortoise_Handling_4Feb2015.pdf

Respectfully,



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

cc: California State Clearinghouse, state.clearinghouse@opr.ca.gov
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Literature Cited (for above text; additional references are in Appendix A, below)

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

To assist the Agencies with their analysis of the direct, indirect, and cumulative impacts of the Proposed Project on the Mojave desert tortoise, we provide the following information on its status and trend.

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, within the Tortoise Conservation Areas (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 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, densities of 10 of 17 monitored populations of the Mojave desert tortoise declined from 26% to 64% and 11 have a density that is less than 3.9 adult tortoises per km^2 (USFWS 2015). The Fremont-Kramer population is near the Proposed Project and has a population below the minimum viable density, and an 11-year declining trend (–50.6%)(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 Table 1).

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**

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 Western Mojave adult numbers at 49% (a 51% 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 Western Mojave Recovery Unit the proportion of juveniles in 2014 declined to 91% (a 9 % decline) of their representation since 2004 (Allison and McLuckie 2018).

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 km^2 so far on Fort Irwin and the Marine Corps Air Ground Combat Center), intense or large scale fires (e.g., 576.2 km^2 of critical habitat that burned in 2005), development of utility-scale solar facilities (as of 2015, 194 km^2 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 2.

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).

Table 2. 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.

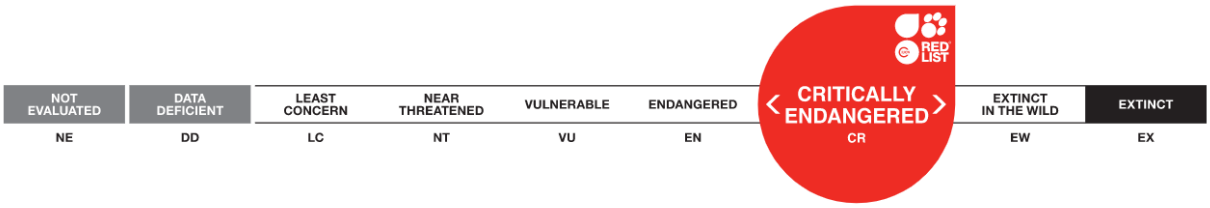
Recovery Unit	Modeled Habitat (km^2)	2004 Abundance	2014 Abundance	Change in Abundance	Percent Change in Abundance
Western Mojave	23,139	131,540	64,871	-66,668	-51%
Colorado Desert	18,024	103,675	66,097	-37,578	-36%
Northeastern Mojave	10,664	12,610	46,701	34,091	270%
Eastern Mojave	16,061	75,342	24,664	-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 loss would also disrupt the prevailing population structure of this widely distributed species with geographically limited dispersal (isolation by distance; Murphy et al. 2007; Hagerty and Tracy 2010). 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. 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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