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Comment Received From: Edward Lee LaRue, Jr.
Submitted On: 2/25/2026
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Formal comments of the SA-EIR

See attached comments

Additional submitted attachment is included below.

DESERT TORTOISE COUNCIL
3807 Sierra Highway #6-4514
Acton, CA 93510
www.deserttortoise.org
eac@deserttortoise.org

DESERT TORTOISE PRESERVE COMMITTEE, INC.
P.O. Box 940
Ridgecrest, CA 93556
www.Tortoise-Tracks.org
roger.dale@tortoise-tracks.org

Via email only

February 25, 2026

To: Lisa Worrall
California Energy Commission
715 P Street
Sacramento, CA 95814
STEPsiting@energy.ca.gov

Re: Draft Environmental Impact Report (Included Within Staff Assessment) for the Proposed Soda Mountain Solar Project (24-OPT-03)

Dear Ms. Worrall,

The Desert Tortoise Council (DTC) is a non-profit organization comprising 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 DTC routinely provides information and other forms of assistance to individuals, organizations, and regulatory agencies on matters potentially affecting desert tortoises within their geographic ranges.

The Desert Tortoise Preserve Committee (DTPC) is a non-profit organization formed in 1974 to promote the welfare of the desert tortoise in its native wild state. DTPC members share a deep concern for the continued preservation of the tortoise and its habitat in the southwestern deserts and are dedicated to the recovery and conservation of the desert tortoise and other rare and endangered species inhabiting the Mojave and western Sonoran deserts. The DTPC has a long track record of protecting desert tortoises and their habitat through land acquisition, preserve management, mitigation land banking, and educational outreach.

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

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

Thank you for contacting the DTC o 12/29/2025 with the opportunity to comment on this proposed project. This enabled us to attend the webinar on February 5, 2026 where the ratio of opposition to support for the project was 10:1. Our opposition to the project is based on specific concerns that we have expressed in numerous comment letters since 2012. In fact, the DTC contends that most of the concerns expressed in the following comment letters remain valid [see green highlighted items in DTC (2025)], many of them are not addressed in the Staff Assessment Environmental Impact Report (SA-EIR), are herein incorporated by reference, and we expect will be addressed in the Final Environmental Impact Report (FEIR):

Desert Tortoise Council (2012): https://www.dropbox.com/scl/fi/ingb7rp1h8itqq44oatkr/Soda-Mountain-Desert-Tortoise-Council-Scoping-Comments.12-13-2012.pdf?rlkey=uj6xar4ri0pw97hiomlm2eb6d&dl=0

Desert Tortoise Council (2014): https://www.dropbox.com/scl/fi/dyuhk8vrbc8cjxak4uupx/Soda-Mountain-Comment-Letter.3-1-2014.pdf?rlkey=2iw350060qplbtq2zhmjcn1rx&dl=0

Desert Tortoise Council (2016): https://www.dropbox.com/scl/fi/415ngw90fczcvqos6fmya/Soda-Mountain-Comments.8-12-2016.pdf?rlkey=nwj44jqebbjhd3us83sodpwfu&dl=0

Desert Tortoise Council (2023): https://www.dropbox.com/scl/fi/0n30cj81lvua4gl138v3q/Soda-Mountan-Solar.2-16-2023.pdf?rlkey=4qs53z0gxv0xre8hksnj8nrdm&dl=0

Desert Tortoise Council (2025): https://www.dropbox.com/scl/fi/8jzzwys4o4tugu919xvp1/Soda-Mtn.-Solar-Project-Scoping-Comments-to-CEC.9-3-2025.pdf?rlkey=rlurds33ca5a4tzyxpym1u1ec&dl=0

Our review of the SA-EIR is that the project has not substantially changed from its most recent iteration, which was denied for a number of environmentally significant reasons. Unless otherwise noted, page numbers cited herein are from the SA-EIR dated December 2025.

(1) The proposed project still does not involve a valid alternative as this latest proponent continues to attempt to situate the proposed solar site in near-pristine habitats outside Development Focus Areas (DFAs) and outside Variance lands as designated by the Desert Renewable Energy Conservation Plan (DRECP, BLM 2016), place the gen-tie line in an Area of Critical Environmental Concern (ACEC), impact a key linkage point in desert-wide connectivity (page 5.2-12 quoting SC Wildlands 2012), and affect habitats where 182 “features were identified as potential tortoise burrows … that had been originally excavated by desert tortoise” were located during the most recent 2023 surveys (page 5.2-33), etc.

Collectively, the SA-EIR clearly documents the poor site selection that continues to be associated with this project. During the webinar, the proponent claimed that it was obligated to situate this solar facility along the Meade-Adelanto Transmission Line as if that were the only available transmission corridor available and that other alternatives were not being pursued because they didn’t occur along this corridor. These and other factors have resulted in oppositional comments and controversary relative to desert bighorn sheep, desert tortoise, burrowing owl, Mojave fringe-toed lizard, and their habitats, air quality, visual resources, greenhouse gas emissions, battery energy storage system (BESS) fires, and impacts to hydrological resources (page 1-13), which may have been avoided had a less environmentally sensitive site been identified.

(2) It is not clear in the SA-EIR to where the energy that would be produced would be transmitted, even though we specifically asked for that information in our scoping comments of September 3, 2025. Surely, there are impaired habitats closer to the targeted communities consuming this energy that are better suited to this development than at the proposed location. But these alternative sites (as well as rooftop solar) are not analyzed in the SA-EIR, in part because they do not occur along the Meade-Adelanto Transmission Line and because they do not satisfy the proponent’s financial expectations for the project (i.e., the proponent would not benefit financially from implementing the rooftop solar alternative).

(3) Whereas we appreciate that the 2012-proposed arrays that would have occurred on the north and west side of I-15 were eliminated, there have always been relatively more tortoises on the east and southern sides of the interstate where this most recent proponent continues to propose development. When we walked the site in 2012, we found that the cobble substrates precluded most of the off-highway vehicle (OHV) traffic that would have otherwise emanated from the adjacent Rasor OHV Open Area, and that the site was in near-pristine condition. According to the SA-EIR (page 5.2-102), the project would result in "…2,074 acres of permanent and temporary impacts of desert tortoise habitat," which would be avoided if a less environmentally-damaging alternative were selected on brown fields or otherwise degraded habitats devoid of tortoises. We suspect that locating the solar site adjacent to the Rasor OHV Open Area will contribute to more dust on the mirrors and result in the use of more water than would be needed in more urban settings.

(4) Despite focal surveys and studies for bighorn sheep that continue to show the importance of this area to the conservation of this species, here is yet another proponent willing to ignore those studies and results and continue to propose this development at a location that has significant impacts that cannot be mitigated as per Table 1-1 on page 1-4 of the SA-EIR. The SA-EIR on page 5.2-170 concludes that "This short-term fragmentation, combined with noise and human presence, would contribute to a cumulative impact that is considered *significant and unavoidable* [*emphasis* added] for desert bighorn sheep during construction." Of course impacts are avoidable; just do not construct solar fields at this location.

Please note, on page 5.2-101, the error in the following statement, "…the desert tortoise is federal- and *state-listed* [*emphasis* added] as threatened under the ESA and California Endangered Species Act (CESA), respectively." Since July 2025, Mojave desert tortoise is now listed as Endangered by the Commission, which the DTC and DTPC believe warrants heightened protection than if the species were listed as Threatened. This error should be corrected in the Final EIR and may warrant additional analysis given the upgraded nature of the listing from Threatened to Endangered.

There is no indication in the literature cited section for biological resources (pages 5.2-271 to 5.2-280) that a CDFW 2081 incidental take permit (ITP) has been solicited, but we note on page 5.2-102 that "The ITP application provided by the applicant indicated that five protocol-level surveys for desert tortoise were performed in the proposed project area between 2009 and 2023 (261593 ITP App). A detailed description of each of the surveys can be found in the ITP application (261593 ITP App) and supporting application materials (RE 2024c)." We interpret this information to mean that an ITP application was submitted in 2024, but there is no indication if the ITP application was submitted to the CDFW or USFWS, or if an ITP was ever issued.

The SA-EIR (page 5.2-70) states that the California Energy Commission (CEC) is opting to pursue "in-lieu permitting" under the Warren-Alquist Act, but provides no more than this statement as to the analysis associated with this alternative permitting process. As such, the DTC and DTPC are unable to understand how exactly CEC is proposing to permit this project, how this alternate approach compares to the proactive protection we have come to expect from CDFW's permitting process, or if there will be future opportunities for affected interests to review and comment on this future permitting procedure. This missing information should be explained in the Final EIR, ensuring that the tortoise is analyzed as a State-listed Endangered species rather than a Threatened species and that CEC's alternative permitting approach will be as stringent and effective as that of the CDFW.

We note on page 5.2-103 that a 2016 federal biological opinion is referenced for this project. Given the substantial declines in tortoises (Allison and McLuckie 2018), 2023 surveys that document far more tortoise burrows than earlier surveys (page 5.2-102), and recent uplisting of the tortoise from Threatened to Endangered (California Fish and Game Commission 2025), we expect that the Bureau of Land Management (BLM) will need to reinitiate formal consultation with the USFWS, because the project is located on BLM-administered lands and would need their authorization. The SA-EIR (page 5.2-105) estimates that "that a maximum of 10 adult or subadult (>180 mm) and 68 juvenile or hatchling (<180 mm) desert tortoises could occur in the area," which constitutes a California Environmental Quality Act (CEQA)-significant impact even if proposed mitigation is implemented.

Although the following explanation is given on page 5.2-68, "Take of federally listed species as defined in the ESA [endangered species act] is prohibited without incidental take authorization, which may be obtained through Section 7 consultation (between federal agencies) or a Section 10 Habitat Conservation Plan," the SA-EIR does not clearly describe which federal permitting process would be pursued. We remind the CEC, BLM, and USFWS that there is new information on the status, trend, and threats to the tortoise including threats from utility-scale solar energy development since the issuance of the USFWS's biological opinion on the DRECP. Please see Appendix A: Some Recent Findings on Impacts to the Mojave Desert Ecosystem and Mojave Desert Tortoises from Utility-scale Solar Projects (attached).

The reinitiation requirements in 50 Code of Federal Regulations (CFR) §402.16 explain that reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. We contend that the second requirements has been triggered, and that the USFWS needs to reconsider its10-year-old biological opinion because its analysis of the impacts of the taking are likely not appropriate given new information available since 2016.

The SA-EIR is not clear on how the BLM may still be involved (or not) in the proposed project or if reinitiation of formal Section 7 consultation is being sought. Alternatively, will the CEC require that a Section 10(a)(1)(B) ITP be issued by the USFWS? Please describe in detail the specific federal permitting process being pursued in the Final EIR.

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 DTC and DTPC want to be identified as Affected Interests for this and all other projects funded, authorized, or carried out by the CEC 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 request that you notify the DTC (eac@deserttortoise.org) and DTPC (roger.dale@tortoise-tracks.org) of any future proposed projects that CEC may authorize, fund, or carry out in the range of the desert tortoise in California.

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

Roger Dale
Desert Tortoise Preserve Committee, Vice President

Attachment: Appendix A: Some Recent Finding on Impacts to the Mojave Desert Ecosystem and Mojave Desert Tortoises from Utility-scale Solar Projects

cc. Brian Croft, Assistant Field Supervisor, Palm Springs Fish and Wildlife Office, U.S. Fish and Wildlife Office, brian_croft@fws.gov
Steven Recinos, Environmental Scientist, Region 6, Inland Deserts Region, California Department of Fish and Wildlife, steven.recinos@wildlife.ca.gov
Joseph Stout, State Director, Bureau of Land Management, Sacramento, CA, castatedirector@blm.gov
Brandon Anderson, Acting District Manager California Desert District, Bureau of Land Management, BLM_CA_Web_CD@blm.gov
Lisa Belinky, Center for Biological Diversity, Oakland, CA, lbelenky@biologicaldiversity.org
Ileene Anderson, Center for Biological Diversity, Los Angeles, CA, IAnderson@biologicaldiversity.org

Literature Cited

Allison L.J. and A.M. McLuckie. 2018. Population trends in Mojave desert tortoises (*Gopherus agassizii*). Herpetological Conservation and Biology. 2018 Aug 1;13(2):433-52. http://www.herpconbio.org/Volume_13/Issue_2/Allison_McLuckie_2018.pdf

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

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

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Defenders of Wildlife, Desert Tortoise Preserve Committee, and Desert Tortoise Council. 2020. A Petition to the State of California Fish And Game Commission to move the Mojave desert tortoise from listed as threatened to endangered. Formal petition submitted 11 March 2020. https://defenders.org/sites/default/files/2020-03/Desert%20Tortoise%20Petition%203_20_2020%20Final_0.pdf

[DTC] Desert Tortoise Council. 2012. Public scoping comments on the proposed Soda Mountain Solar project (CACA 49584). Comment letter submitted to Mr. Jeffrey Childers of the BLM on 12/13/2012. Ridgecrest, CA. Pages A-1 through A-6.

[DTC] Desert Tortoise Council. 2014. Formal comments on the Draft Environmental Impact Statement for Soda Mountain Solar project (CACA 49584). Comment letter submitted to Mr. Jeffrey Childers of the BLM on 3/1/2014. Ridgecrest, CA. Pages A-7 through A-13.

[DTC] Desert Tortoise Council. 2016. RE: Issuance of a well permit to proponents for Soda Mountain Solar Project. Comment letter submitted to Supervisors James Ramos and Robert Lovingood, San Bernardino, CA.

[DTC] Desert Tortoise Council. 2023. Soda Mountain Solar Project, San Bernardino County, California – Notice of Preparation (NOP) of a Draft Environmental Impact Report. Comment letter submitted to Dr. Shankar Sharma of the CDFW on 2/16/2023. Acton, CA. Pages A-15 to A-68.

Dear CEC,

It is apparent from reading the SA-EIR that the writers were not familiar with the information included in this appendix. As such, we believe that the Final EIR needs to be amended. Otherwise, CEC has not relied on the latest, best available science to complete its environmental review.

Ed LaRue

Appendix A: Some Recent Findings on Impacts to the Mojave Desert Ecosystem and Mojave Desert Tortoises from Utility-scale Solar Projects

Surface Hydrology and Impacts to Soil Moisture and Vegetation:
Devitt et al. (2022) reported that "[c]onstruction of roads, transmission lines and utility scale solar photovoltaic facilities can decouple up-gradient washes from down-gradient locations." They reported that the decoupling of the wash system at a solar site "led to a significant decline in soil moisture, canopy level NDVI [normalized difference vegetation index] values and mid-day leaf xylem water potentials." Over time especially combined with climate change, this impact may result in reduced plant reproduction, growth, and survival for plants down-gradient of the decoupling sites including plants not on the project site.

When plants die, they release carbon from their roots, stems, and leaves into the atmosphere and contribute to climate change (Devitt et al. 2022). Given the current climate change conditions, there is an increasing need for carbon sequestration, not carbon release, therefore, an increasing need to, as a minimum, maintain native plants and not disrupt the surface hydrology of the project site. These indirect impacts should be analyzed in the EIR with respect to impacts on vegetation, wildlife and special status species including the tortoise.

Heat Island Effects to Vegetation and Soils:
Utility-scale PV facilities have significant impacts on local air and ground temperatures. Utility-scale PV solar projects produce increased heat. PV panels create a black barrier between the ground and the atmosphere, which alters heat flux dynamics by restricting movement of warm air up into the atmosphere similar to a greenhouse effect (Barron-Gafford et al. 2016). PV solar panels raise ambient air temperatures by as much as 3-4 degrees C in the summer, creating a "Photovoltaic Heat Island Effect." A PV "heat island" effect refers to the temperatures in and around PV solar facilities increasing from the ambient temperature due to replacement of native land cover with solar panels that absorb heat. This is similar to the "urban heat island" effect, where native cover is replaced with pavement and concrete buildings.

PV solar panels convert solar radiation into heat, which can alter the air flow, energy flux dynamics, and temperatures near the panels (Fthenakis and Yu, 2013; Barron-Gafford et al, 2016). Soils, vegetation, and wildlife may be affected by such changes and increases in temperature in and around utility-scale solar facilities.

Fthenakis and Yu (2013) found that annual average air temperature in the center of a solar project at heights approximately 2.5 meters (8 feet) above the ground can reach up to 1.9 degrees C (3.5 degrees F) above ambient temperature. This thermal energy dissipates and reaches ambient temperature at 5-18 meters (16-60 feet) above the ground. This same study found a prompt dissipation of thermal energy and decrease to ambient temperatures around the PV panels at 300 meters (984 feet) away (horizontal distance) from the perimeter of the solar farm and that access roads between solar fields allowed for substantial cooling.

Devitt et al. (2022) reported that large photovoltaic facilities similar to the proposed Purple Sage Solar Project raised the air and soil temperatures not only on the project site but significant heat was moving from the solar facility into the plant community, especially in the first 200–400 m (656 to 1,312 feet) off the project site. This rise in temperature also impacts the availability of soil moisture and the ability of burrowing animals such as the tortoise in nearby areas to reduce their body temperatures at night to conserve energy and moisture. The impacts of elevated soil and air temperatures to areas adjacent to the proposed project should be analyzed in the revised DEIS including impacts to the survival, growth, and recruitment of native vegetation if this area is to be managed for wildlife use including use by tortoises.

Photovoltaic facilities can also alter the energy balance by generating heat (Broadbent et al. 2019). Nighttime temperatures over photovoltaic plants are regularly 3–4 degrees C warmer than over wildlands, representing a heat island effect (Devitt et al 2022). As the warmer air was displaced down gradient, the temperature front advanced into the creosote—bursage plant community with values 5 to 8 degrees C warmer at the 1-meter height.

Similarly, Broadbent et al. (2019) found increased temperatures during the day, with an average 1.3 degrees C increase in air temperature in the solar field at a height of 1.5 meters (5 feet). The nighttime soil temperatures at the solar site were warmer than the reference site. The study demonstrated that shading from solar panels causes warmer soil temperatures at night.

Barron-Gafford et al. (2016) monitored three study sites (natural desert ecosystem, traditional built environment (parking lot with commercial buildings), and PV power plant), measuring air temperature at 2.5 meters (8 feet) off the ground. The average annual air temperature was greater at the PV power plant, increasing 2.5 degrees C during the day. Contrary to other studies, a delayed cooling of ambient temperatures was detected in the evenings, with average annual midnight temperatures increasing 3.5 degrees C, compared with the natural desert ecosystem. The authors hypothesized that by removing vegetation, heat-dissipating transpiration from vegetation is decreased, and compared to natural systems, the greater amount of exposed ground surfaces absorbs more solar radiation during the day, which may increase soil temperatures (Barron-Gafford et al, 2016). During the night, stored heat is reradiated, where warming under the panels may be due to the heat trapping of reradiated heat flux (Barron-Gafford et al, 2016).

Devitt (2022) evaluated a large solar facility in the Mojave Desert and the effect it had on adjacent down-gradient creosote communities. The study monitored changes in soil and plant water status over a 900-meter transect where a built service road resulted in decoupling of up-gradient washes from down-gradient locations leading to a decline in soil water in storage. Similar to other studies, air temperatures were significantly warmer near the solar facility compared to a reference point. Consistent with Barron-Gafford (2016), night temperatures were found to be higher closest to the solar facility.

The results of these studies indicate that PV solar projects increase air temperatures in the areas adjacent to the solar field – in some cases by more than 1,000 feet, change soil temperatures, and reduce soil moisture.

Notably, these studies were performed on solar sites that were graded and unvegetated. Barron-Gafford postulated that mitigation of the PV heat island effect would be achieved in part through targeted revegetation, which could ease ecosystem degradation associated with development of utility scale solar projects (Barron-Gafford et al, 2016). Regarding nighttime temperatures, the study suggested that if the panels are mounted on a tracking system, the panels could be situated in a perpendicular position relative to the ground at night, allowing longwave radiation and trapped heat to escape to the sky, reducing the heat displacement into adjacent plant communities during the early morning hours.

Heat Island Effects to Tortoises and Other Reptiles/Wildlife:
How would these heat island effects affect the tortoise? Slade (2023) found that solar arrays significantly altered the surface-level thermal environment for tortoises and other reptilian species. Beside increased daytime temperatures when compared to undisturbed desert areas, Slade (2023) reported that solar arrays create a shade-warming effect; artificial shade under solar panels have significantly greater temperatures than natural shade. In addition, both fixed, shorter and the taller, sun-tracking panels of solar arrays exhibited warmer nighttime air temperatures than undisturbed sites (Slade 2023). The shade-warming effect from solar panels was most pronounced during the hottest, most thermally challenging months for reptiles.

These altered thermal environments could have unintended physiological and behavioral consequences for ectotherms such as the tortoise, given the tortoise's innate dependence on appropriate environmental temperatures for physiological function and activity. These negative consequences include extended exposure times of clutches of eggs at temperatures above thermal maximum for embryo development resulting in reproductive failure, an upward shift in their resting body temperatures that increase metabolic expenditure and water loss, negatively affecting energy balance (Nagy and Medica 1986, Sowell 2001) and therefore survival, among other physiological and behavioral concerns. Tortoises are already living on the upper edge of their thermal limits and could be pushed closer toward extinction by an additional heating effect created by utility-scale solar arrays (Sinervo 2014). Thus, allowing federally protected species such as the tortoise access to certain areas inside solar arrays post-construction in the hopes that they can persist and move through their native home ranges beneath a newly-installed canopy of solar panels appears to be problematic based on the results of Slade's (2023) research. Until demonstrated otherwise, this treatment of solar projects as providing possible value/mitigation to the tortoise for movement and other life history requirements should be considered experimental and not mitigation for the impacts to the tortoise and tortoise habitat.

Desert tortoises are herbivores with low and narrow thermal tolerance ranges relative to other desert reptiles (Berry et al. 2021, Zimmerman et al. 1994). As their environment warms and drought periods increase, their ability to meet their increasing energetic requirements may be thwarted by decreased periods of potential activity time (e.g., reduced time for foraging) and lack of plant food and water availability, pushing them to the brink of their physiological limits (Lovich and Ennen 2011). Under current climate change scenarios without a reduction in carbon dioxide emissions, models predict that Mojave desert tortoises could approach extinction by 2080. When a 0.4 to 0.75 degrees C increase in air temperatures created by a photovoltaic heat island is included, these models indicate an even more rapid decline (Slade 2023).

In addition, Slade (2023) reported that “species richness is lowest in a solar array and increases with distance into natural desert habitat” and “solar arrays decrease vertebrate species richness on their edge habitats.” Thus “solar arrays have a deleterious effect on species richness, with extremely few species detected compared to adjacent and control habitats.”

Similar changes to the below-ground thermal environment at a solar array could be similarly problematic to the tortoise and other wildlife species. Slade (2023) reported that soil temperatures directly influence the body temperatures of burrowing reptiles (e.g., desert tortoise.). Any increase in underground temperatures could heighten water loss and resting metabolic rates for dormant reptiles and compromise their fitness and survival. This impact would be more severe for hatchling and juvenile tortoises than adults because of their small body size and larger surface to volume ratio. Thus, recruitment of young tortoises into the population would be adversely affected.

Desert tortoises, like most other turtles, exhibit temperature-dependent sex determination. Soil temperatures directly influence the incubation temperatures of tortoise nests, which affect hatchling survival and sex ratios (Slade 2023). Proper soil temperatures during incubation are critical to the survival of tortoises. With warmer ambient and soil temperatures from solar arrays, eggs laid in nests located in heat island areas of solar arrays would likely result in more hatchling female tortoises and fewer hatchling male tortoises. In addition, long-term exposure to higher temperatures results in deformities and high levels of clutch mortality (Spotila et al. 1994). Climate change would exacerbate this heat island impact on clutch survival and sex determination. Because desert tortoises depend on the suitability and reliability of their thermal environment, this makes them extremely vulnerable to temperature increases imposed by climate change, a photovoltaic heat island, or both (Slade 2023).

Parandhaman (2023) reported that temperature, precipitation, and soil conditions are very important factors in determining habitat suitability for the desert tortoise

Karban et al. (2024) described wildlife responses to utility-scale solar energy disturbance with three response strategies: avoid, tolerate, and exploit. Avoidant species avoid the disturbance, partially or entirely, to forestall negative effects of utility-scale solar energy disturbance. These species are not persistent in solar energy areas and decline if disturbance cannot be avoided. Avoidant wildlife typically has narrow or inflexible ecological niches that make them vulnerable to disturbance, such as specific habitat requirements and specialized diets. Karban classified tortoises as disturbance avoiders, possessing a number of traits (e.g., diet of diverse forb species, susceptibility to road mortality) that make them vulnerable to disturbance (Karban et al. 2024).

Based on these studies, impacts to vegetation, soils, and tortoises at solar facilities related to the PV heat island effect include increased air temperatures in the vicinity of the solar field during the day and at night as well as higher soil temperatures. Increased temperatures would impact the species composition of vegetation and wildlife at and in the vicinity of the solar facility, where temperatures could be too high and soil moisture too low for certain plant and animal species, including the tortoise to persist. Wildlife species would be displaced as they are forced to vacate the area of increased temperatures. Changes in surface hydrology at and down-gradient from features of utility scale PV solar projects may reduce water availability for vegetation communities, and increases or decreases in soil temperatures could affect persistence of vegetation and habitat suitability for burrowing wildlife forcing some species to avoid solar facilities.

The heat island effects should be analyzed with respect to impacts to other special status species, such as desert bighorn sheep, and their habitats needed for life requisites including cover from predators, forage, and connectivity habitat.

Translocation of Tortoises:
Mack and Berry (2023) monitored translocated tortoise for 10 years. They reported that 17.7 percent of the tortoises survived, 65.8 percent died, 15.2 percent were missing, and 1.3 percent were removed from the study because they returned to the original site. Mortality was high during the first three years – more than 50 percent of the tortoises died primarily from predation. (A similar result occurred from translocation of tortoise from the Yellow Pine Solar Project.) Thereafter, mortality declined but remained high. Although the translocation efforts by the Marine Corps at Twentynine Palms considered some of these factors, tortoise mortality from predation was high (Henen 2024). To minimize mortality to small tortoises, these animals have been brought into headstart facilities. The Marine Corps continues to monitor the translocated tortoises.

In addition, Mulder (2017) studied translocated tortoises during the first four years and learned that male translocated tortoises did not produce offspring with resident or translocated female tortoises. This absence of successful mating at the translocation site is concerning, because it means the genes from the male translocated tortoises were not added to the population at the translocation site. Thus, the perceived benefits of genetic diversity from translocation are not fully realized.

The "success" of translocation depends on a myriad of factors including the absence of drought, the ability of the translocation area to support additional tortoises (e.g., availability of native nutritious forage (Drake et aldrak. 2016, etc.), social interactions between resident and translocated tortoises (Sullivan, 2015, Mulder et al. 2017, etc.), the distance translocated tortoises are moved (Mack and Berry 2023), effective management of translocation lands to eliminate human-caused threats (Berry et al. 2014, Hromada et al. 2023), the time of year tortoises are moved (Mack and Berry 2023), their physiological/hydration state (Field et al. 2018, USFWS 2019), and elevated predation (Mack and Berry 2023, Henen 2024, etc.), Translocations sites should not be managed for multiple use or any use that does not provide for the conservation of the tortoise/tortoise habitat (Berry et al. 2014).

Aa a minimum, a translocation plan for the tortoise should address the following questions and provide effective solutions:

- where is the translocation site and what are the adjacent land ownership and uses (please include a map)
- how far is the translocation site from the project area (translocation sites located close to the site from which tortoises are removed appear to contribute to higher tortoise survival than those that are farther away (Mack and Berry 2023))
- who will manage the translocation site
- how will it be managed because it is a mitigation site and no longer a multiple use site
- will tortoises be released in years with less than average rainfall
- what time of year will tortoises be released
- what are the results of tortoise surveys at the translocation site and of native vegetation surveys including annual vegetation at the translocation site

- are non-native invasive annual plants species present and if so, are they abundant
- what other activities will be allowed to occur at the translocation site and adjacent areas (e.g., mining, grazing, OHV access, utility access, other activities that result in surface disturbance)
- how will management of the translocation site, a mitigation site, be implemented and effectively enforced
- how and when will monitoring occur (monitoring schedule) and what environmental parameters besides tortoises will be monitored
- how long will tortoises and environmental parameters be monitored – monitoring should occur for multiple years
- when monitoring indicates a change in management is needed, when will this change occur (adaptive management)
- who will fund the translocation plan and for how long
- will the translocation plan include management of tortoise predators
- how will small tortoises be managed and monitored

We contend the results of these studies and the inability of government agencies to secure mitigation lands that are properly managed for the long-term management of translocation sites indicate that translocation of Mojave desert tortoises to date has not been an effective, successful mitigation method. Thus, avoidance of impacts to tortoises/tortoise habitat should be the preferred solution when projects that may result in the loss of tortoises are proposed. Translocation should be a last mitigation choice, not the first one.

Rather than approving development projects in tortoise habitat, the CEC should approve projects located outside of occupied tortoise habitat, critical habitat, and wildlife habitat needed for connectivity/movement in response to climate change.

If translocation for the tortoise is implemented, we strongly recommends that the Desert Tortoise Recovery Office (DTRO) have final review and approval of the translocation plan. The DTRO contains the biologists that are the species lead for the tortoise. The DTRO is the office that oversees the health assessments, develops translocation guidance for the tortoise, and analyzes its effectiveness to contribute to recovery. The Southern Nevada Fish and Wildlife Office focuses on implementing the regulatory aspects of the FESA, while the DTRO has traditionally focused on the science of what is needed for survival and recovery. Consequently, we recommend that the DTRO review and approve this Translocation Plan for the tortoise and how it is implemented.

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