

DESERT TORTOISE COUNCIL

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Via email only

17 April 2022

Attn: Mr. Chip Lewis
Regional Environmental Protection Officer
Bureau of Indian Affairs Western Regional Office
2600 North Central Avenue, 4th Floor Mailroom
Phoenix, Arizona 85004
chip.lewis@bia.gov

RE: "Scoping Comments," Chuckwalla Solar Projects, Draft EIS

Dear Mr. Lewis,

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 and that the Council was contacted directly by the Bureau of Indian Affairs (BIA) with links to environmental documents for the proposed project. Given the location of the proposed project in habitats known to be occupied by Mojave desert tortoise (*Gopherus agassizii*) (synonymous with Agassiz's desert tortoise), our comments include recommendations that will enhance protection of this species and its habitat during activities authorized by the BIA and cooperating agencies, which we recommend be added to project terms and conditions in the authorizing documents [e.g., Bureau of Land Management (BLM) right of way grant, etc.] as appropriate. Please accept, carefully review, and include in the relevant project file the Council's following comments and attachments for the proposed project.

Project Description

Unless otherwise noted, the referenced page numbers pertain to Volume 1 of the Draft Environmental Impact Statement for the Chuckwalla Solar Projects, dated January 2022 (DEIS). The Executive Summary reports “EDF Renewables Development, Inc. (EDFR or Applicant) has entered into an option agreement with the Moapa Band of Paiute Indians (Moapa Band or Band) to lease up to 6,500 acres for the development of the four solar projects that would total up to 700 megawatts (MWs) of solar energy generation each using photovoltaic (PV) technology and incorporating battery energy storage systems (BESS).” The Chuckwalla Solar Projects (Projects) would include access roads, temporary water pipeline, and connection with an existing transmission gen-tie line. The four projects would collectively would utilize a Shared Facilities Area of approximately 165 acres containing the Battery Energy Storage System facilities, operations and maintenance (O&M) facilities, helipad, site substations, laydown areas, batch plant, and a temporary water pond / water tank.

The water supply for the Projects would be provided by the Moapa Band from either existing tribal wells or a new well within the lease area. If the water is sourced from off-site wells, it could be delivered to the site via pipeline or truck. On the Reservation, the proposed Project would directly impact 6,833 acres of land including 12.7 miles of ROW.

Access to the Projects site would be provided via access roads from the Valley of Fire Highway and Interstate 15.

Although the BIA serves as the Lead Agency, BLM is a cooperating agency with a federal nexus to the project as per the following description given on page ES2: “The Projects would include two new generation interconnection (gen-tie) lines approximately 10 to 12 miles long that would interconnect the solar projects to the regional electrical grid – one to the existing Harry Allen substation (via the approved Moapa Solar Energy Center [MSEC] line) and one directly to the existing Crystal Substation. Portions of these gen-tie lines would cross lands managed by the Bureau of Land Management (BLM) – both within a federally designated utility corridor on the Reservation and federal lands south of the Reservation.” The proposed Projects would directly impact 363 acres of BLM land including 22.1 miles of ROW.

Cooperating agencies on the DEIS for the Projects include “the Band, BLM, Bureau of Reclamation, U.S. Environmental Protection Agency (EPA), U.S. Fish and Wildlife Service (USFWS), National Park Service (NPS), Nevada Department of Wildlife (NDOW), and Nevada Department of Transportation (NDOT).”

As per page 1-1, “The proposed Chuckwalla solar generating facilities would be constructed entirely within the Reservation within a lease study area of approximately 6,500 acres of tribal trust land. These lands are all located in the southeast corner of the Reservation in an area set aside by the Band exclusively for the Chuckwalla Projects. The solar fields and associated facilities would be in Sections 13, 14, 22, 23, 24, 25, 26, 27, 34, 35, and 36; Township 16 South, Range 65 East; Mount Diablo Base Meridian.”

Although the BIA's website refers to these as scoping comments under the "Getting Involved" tab (www.ChuckwallaSolarProjectsEIS.com), these are actually formal comments on a developed Draft Environmental Impact Statement (DEIS). The purpose of scoping is to allow the public to participate in an "early and open process for determining the scope of issues to be addressed, and for identifying the significant issues related to a proposed action" (40 Code of Federal Regulations (CFR) 1501.7). The Final EIS (FEIS) needs to discuss how this proposed Projects fits within the management structure of regional land management plans for the area [e.g., Las Vegas Resource Management Plan (BLM 1998)] and the USFWS revised Recovery Plan (USFWS 2011). Although the DEIS provides maps of critical habitat for the Mojave desert tortoise (USFWS 1994a) in Figure 4-2 of Volume 2, it fails to show Areas of Critical Environmental Concern (ACECs), and other areas identified for special management by BLM [e.g., National Conservation Lands (NCLs)]; USFWS linkage habitats between desert tortoise populations; and NDOW and other federal, state, and local agencies.

Compliance with Federal Statutes, Regulations, Policies and Executive Orders

The BIA and BLM are required to comply with all applicable statutes, regulations, Executive and Departmental Orders, BLM manuals, and other requirements as they pertain to this project. Where deficiencies exist in the DEIS, the BIA needs to demonstrate in the FEIS that the proposed Projects meets all these requirements with respect to the tortoise, that:

- The proposed Projects will be in conformance with decisions in current land use plan(s) and the Federal Land Policy and Management Act (FLPMA) with respect to sustained yield;
- the proposed Projects will be consistent with priority conservation, restoration, and/or adaptation objectives in the best available landscape-scale information (e.g., for tortoise population connectivity, etc.);
- the Applicant has coordinated with governments and agencies, including consideration of consistency with officially adopted plans and policies (e.g., recovery plans);
- the proposed project is in an area with low or comparatively low resource conflicts and where conflicts can be resolved;
- the proposed Projects will be located in, or adjacent to, previously contaminated or disturbed lands;
- the proposed Projects will minimize adverse impacts on important fish and wildlife habitats and migration/movement corridors including the desert tortoise;
- the proposed Projects will not adversely affect lands donated or acquired for conservation purposes, or mitigation lands identified in previously approved projects such as translocation areas for desert tortoise;
- significant cumulative impacts on resources of concern should not occur as a result of the proposed Projects (i.e., exceedance of an established threshold such population viability for the tortoise and connectivity of tortoise populations among recovery units); and,
- BIA's analysis would use current data on the tortoise for the Projects area, population, Northeastern Mojave Recovery Unit, and range wide, as population numbers and densities have substantially declined in most recovery units and the data/knowledge currently available on what is needed for habitat linkages for the tortoise is greater than in 2012.

We have serious concerns about BLM's commitment to manage effectively for the sustained yield of the tortoise. These concerns include past actions regarding:

- Mitigation to improve conditions within the connectivity areas, and if these options do not exist, mitigation may be applied toward the nearest tortoise conservation area (e.g., an ACEC for which tortoise had been identified in the Relevant and Important Criteria or critical habitat); and
- a plan included in the DEIS that would effectively monitor desert tortoise impacts, including verification that desert tortoise connectivity corridors are functional. The required Federal Endangered Species Act (FESA) consultation should further define this monitoring plan.

Regarding the first concern, we believe that a multiagency approach is best to ensure BIA is meeting its obligations, soliciting review and input from pertinent federal and state resource agencies, and non-governmental organizations (NGOs). Mitigation of impacts should include, in priority order, avoidance, minimization and compensation for unavoidable impacts. Mitigation should at a minimum offset all direct, indirect, and cumulative impacts, especially given the status and trend of the tortoise (please see *Affected Environment - Status of the Populations of the Mojave Desert Tortoise* below). BIA should ensure it is effectively implementing its section 7(a)(1) conservation mandate under the FESA.

Mitigation should be applied only in areas where the lands are effectively managed for the benefit of the tortoise for both the short-term and long-term. As currently managed, BLM ACECs in Nevada and the California Desert Conservation Area (CDCA) are not meeting this criterion. Consequently, mitigation should be implemented on lands with a durable conservation designation, or on privately owned lands with a conservation easement or other legal instrument that ensures conservation in perpetuity. Please see *Mitigation Plans* below for additional concerns and requested requirements.

Regarding the second concern, a monitoring plan should (1) be scientifically and statistically credible; (2) be implementable; and (3) require BIA/project proponent to implement adaptive management to correct land management practices if the mitigation is not accomplishing its intended purposes.

Alternatives Analyzed

In the DEIS, BIA describes two alternatives, the No Action alternative and the Proposed Action alternative. While other alternatives are considered in the DEIS, BIA dismissed them. The primary reason for dismissal is that they would not meet the purpose and need of the proposed Projects. Two of these are to provide economic benefit to the Moapa Band and the third is to support the State of Nevada's 50 percent renewable portfolio standard requirement by 2030 and a goal of 100 percent carbon-free resources by 2050 (State Bill 358)." We view these three Purpose and Needs as a narrowly focused and unsupported in the DEIS.

Rather, the purpose of the DEIS is for BIA and BLM to analyze the impacts to approve, disapprove, or modify a business lease and ROW applications between the Moapa Band and the Applicants over or across lands held in trust for Indian tribes. We believe this should be the purpose and need addressed in the DEIS including the development of alternatives, as this action is what triggers the National Environmental Policy Act (NEPA) process.

We note that a federal appellate court has previously ruled that in an EIS a federal agency must evaluate a reasonable range of alternatives to the project including other project and mitigation sites, and must give adequate consideration to the public's needs and objectives in balancing ecological protection with the purpose of the proposed project, along with adequately addressing the proposed project's impacts on the desert's sensitive ecological system [*National Parks & Conservation Association v. Bureau of Land Management*, Ninth Cir. Dkt Nos. 05-56814 et seq. (11/10/09)]. Please ensure the FEIS complies with this ruling and that the FEIS fully analyzes the alternatives with respect to this ruling and adverse impacts to the tortoise.

The viable alternative of locating solar projects on bladed or highly degraded tracts of land (e.g., abandoned agricultural fields) is not considered in the alternatives analysis in Section 2.3. Such an alternative would not result in the destruction of desert habitats and mitigation for the lost functions and values of these habitats. These losses and mitigation are costly from an economic, environmental, and social perspective.

This alternative is important to consider to minimize or avoid the loss of vegetation that sequesters carbon. Studies around the world have shown that desert ecosystems can act as important carbon sinks. For example, the California deserts account for nearly 10 percent of the state's carbon sequestration; below ground in soil and root systems, and above ground in biomass. Protecting this biome can contribute to securing carbon stores in the state (MDLT 2021). This situation is likely true for Nevada. Given the current climate change conditions, there is an increasing need for carbon sequestration. Because vascular plants are a primary user of carbon and the proposed Projects would result in the loss/degradation of thousands of acres of plants and their ability to sequester carbon for decades or longer unless successful measures are implemented to restore the same biomass of native vegetation as it is being destroyed, it is imperative that proposed Projects not result in the loss of vegetation.

We read on page 3-30, that 50 tortoises were observed and on page 3-33 that as many as 164 tortoises may be displaced. There is no indication in the DEIS that BIA has used survey distribution and density data to avoid tortoise concentration areas. Rather, it seems to be a simple documentation of what would be lost. We believe the data should be used to determine areas that should be avoided where significant tortoise concentrations occur. If data were being effectively used, the concentration areas shown in Chuckwalla 2, 3, and Shared Facilities (Figure 4-1 in the Biological Assessment) should be abandoned based on the densities of tortoises. Like a majority of other proposed projects, the BIA has failed to use its survey results to select the site(s) with fewest tortoises and associated impacts. Rather, the DEIS, like so many others, simply documents the intended impacts on specific sites with no analysis that considers which among the sites is best suited for proposed development. In this respect, the DEIS is deficient, Chuckwalla 1a and 1b, and possibly Chuckwalla 2, with fewer tortoises should be the selected sites, rather than all of them like currently proposed. Given the tortoise densities, the Council feels strongly that Chuckwalla 3 and Shared Facilities should be removed from the proposed action for development.

The BIA has not considered the monitoring results of recently developed solar projects even on the Reservation where soils have been bladed versus those facilities where the vegetation has been mowed or crushed and allowed to revegetate the area. In the latter case, we see that BIA plans to allow tortoises to enter the facilities and re-establish residency (i.e., repatriate) under the solar panels as vegetation recolonizes the area. “The permanent perimeter fence would be installed to leave a 6 to 8-inch opening at the bottom of the fence to allow for the movement of desert tortoises and other wildlife across and through the site once the construction of the facility is complete.” If the BIA has data to support their statement that tortoises would move “across and through the site once the construction of the facility is complete,” then these data should be provided in the DEIS. Otherwise, the statement is a hypothesis and would need to be tested to see if it is correct.

The BIA is also considering reintroducing displaced tortoises back into the mowed areas. Such activities should be designed/implemented as a scientific experiment to add to the limited data on the effectiveness of this approach on Mojave desert tortoise populations and movements/connectivity between populations. This is an important issue for this species, particularly over the long-term (see *Desert Tortoise Habitat Linkages/Connectivity among Populations and Recovery Units* below). Long-term monitoring for the life of the Projects would need to be included to accurately evaluate the effectiveness of this strategy.

The FEIS should be augmented with a section that describes successes and failures to tortoise movements and population connectivity from previous solar projects where mowing was implemented. This consideration of allowing repatriation should be designed as an experiment to add to the limited data on this approach to determine the extent of effects on Mojave desert tortoise populations and movements/connectivity. To do this would require a plan that includes all steps in the scientific process. We strongly recommend that BIA include this approach in their Projects design, implementation, and analysis if the Projects are approved. and how this proposal will benefit from that information.

At the top of page 3-34, the DEIS references “Blythe et al. 2003” stating that “Capturing, handling, and relocating desert tortoises out of the solar site could also result in injury or death.” The FEIS needs to supplement this dated information with results of recent mass translocation studies throughout southern Nevada, at Fort Irwin (Esque et al. 2010), and 29 Palms Marine Corps Base (Henen 2020, 2021), among others.

We note the following statements on page 3-34, “Tortoises within approximately 500 meters (1,640 feet) of the exclusionary fence for each Project would be relocated outside the fence and those on the interior of the solar field (greater than 500 meters [1,640 feet] from the fence) would be moved to temporary holding pens and **returned to the site following construction** [bold emphasis added].” For how long will the displaced tortoises be monitored that are placed outside the fence? The FEIS should clarify that adjacent areas within a minimum of 100 meters will be surveyed prior to ground disturbances so that existing burrows can be measured and mapped and displaced tortoises can be placed in the openings of similar-sized burrows. Simply releasing tortoises into adjacent areas, particularly lands devoid of existing burrows, should be avoided.

We are also very concerned with the statement at the end of the above sentence indicating that tortoises would be "...returned to the site following construction." We assume this means that tortoises would be returned to areas recently mowed that are now occupied by solar panels. Would burrows be mapped and avoided during mowing, or would tortoises be reintroduced to sterile habitats devoid of the original burrows and vegetation lost during mowing? And as elsewhere, how will these reintroduced tortoises be affected if the site is subsequently mowed?

Please note that the referenced Translocation Plan is not included among the appendices listed in Volume 2, so we were unable to review its content. The Translocation Plan should be included in Volume 2 of the FEIS.

Connected and Similar Actions

Pursuant to Section 1508.25 of the Council on Environmental Quality's (CEQ) regulations (40 CFR 1508.25), the DEIS fails to cover the entire scope of a proposed action, considering all connected, cumulative, and similar actions in one document. Such discussion has been limited to previous development on the Reservation, which is too limited a scope to adequately assess regional impacts. Pursuant to Section 1506.1(a) of these regulations, an agency action cannot "[l]imit the choice of reasonable alternatives" before reaching a final decision in a published [Record of Decision] (ROD). These regulations ensure agencies will prepare a complete environmental analysis that provides a "hard look" at the environmental consequences of all proposed actions instead of segmenting environmental reviews (Novack 2015).

The Council is concerned that the proposed Projects along with the following utility-scale solar PV projects appear to be similar and connected actions:

- K Road Moapa Solar Facility (K Road)/Southern Paiute Solar Project (Record of Decision published in 2012),
- Aiya Solar Project (ROD published in 2016),
- Eagle Shadow Mountain Solar Project (ROD published in February 2020),
- Moapa Solar Energy Center (MSEC) / Arrow Canyon Solar Project (ACSP) (ROD published in 2014; Supplemental EIS in 2020),
- Southern Bighorn Solar Project I (SBSP I) (Final EIS published in 2021), and
- Southern Bighorn Solar Project II (SBSP II) (Final EIS published in 2021)

All were approved by BIA, are connected, and similar actions. These five solar projects previously approved /evaluated by BIA are located about 2.0 miles west, 9 miles north, 5 miles west, 7.5 miles west, 4 miles west and 2.4 miles northwest of the proposed Projects, respectively. Please explain whether these listed actions are connected or similar and if not, why not.

Affected Environment

Status of the Population of the Mojave Desert Tortoise: The Council provides the following information for the proponent so that these or similar data may be included in the FEIS; as it is, the DEIS is deficient in providing this information. The Council believes that Federal agencies' failures to implement recovery actions for the Mojave desert tortoise as given in the recovery plan (both USFWS 1994b and 2011) has contributed substantially to tortoise declines between 2004

and 2022 (Please see “Attachment - Status of the Mojave Desert Tortoise (*Gopherus agassizii*)”). There are 17 populations of Mojave desert tortoise described below that occur in Critical Habitat Units (CHUs) and Tortoise Conservation Areas (TCAs); 14 are on lands managed by the BLM; 8 of these are in the California Desert **Conservation** Area (CDCA) [emphasis added].

Important points regarding the status of the tortoise include the following:

Change in Status for the Mojave Desert Tortoise Range-wide

- Ten of 17 populations of the Mojave desert tortoise declined from 2004 to 2014.
- Eleven of 17 populations of the Mojave desert tortoise are no longer viable. These 11 populations represent 89.7 percent of the range-wide habitat in CHUs/TCAs.

Change in Status for the Eastern Mojave Recovery Unit – Nevada and California

- This recovery unit had a 67 percent decline in tortoise density from 2004 to 2014, the largest decline of the five recovery units for the tortoise.
- Tortoises in this recovery unit have densities that are below viability.

Change in Status for the El Dorado Valley and Ivanpah Valley Tortoise Populations in the Eastern Mojave Recovery Unit.

- Both populations in this recovery unit experienced declines in densities of 61 percent and 56 percent, respectively from 2004 to 2014. In addition, there was a 67 percent decline in tortoise abundance.
- Both populations have densities less than needed for population viability.

Change in Status for the Mojave Desert Tortoise in California

- Eight of 10 populations of the Mojave desert tortoise in California declined from 29 to 64 percent from 2004 to 2014 with implementation of tortoise conservation measures in the Northern and Eastern Colorado Desert (NECO), Northern and Eastern Mojave Desert (NEMO), and Western Mojave Desert (WEMO) Plans.
- Eight of 10 populations of the Mojave desert tortoise in California are no longer viable. These eight populations represent 87.45 percent of the habitat in California that is in CHU/TCAs.
- The two viable populations of the Mojave desert tortoise in California are declining. If their rates of decline from 2004 to 2014 continue, these two populations will no longer be viable in about 2020 and 2031.

Change in Status for the Mojave Desert Tortoise on BLM Land in California

- Eight of eight populations of Mojave desert tortoise on lands managed by the BLM in California declined from 2004 to 2014.
- Seven of eight populations of Mojave desert tortoise on lands managed by the BLM in California are no longer viable.

Change in Status for Mojave Desert Tortoise Populations in California that Are Moving toward Meeting Recovery Criteria

- The only population of Mojave desert tortoise in California that is not declining is on land managed by the National Park Service, which has increased 178 percent in 10 years.

The Endangered Mojave Desert Tortoise: The Council believes that the Mojave desert tortoise meets the definition of an endangered species. In the FESA, Congress defined an “endangered species” as “any species which is in danger of extinction throughout all or a significant portion of its range...” In the California Endangered Species Act (CESA), the California legislature defined an “endangered species” as a native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant, which is in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes (California Fish and Game Code § 2062). Because most of the populations of the Mojave desert tortoise were non-viable in 2014, most are declining, and the threats to the Mojave desert tortoise are numerous and have not been substantially reduced throughout the species’ range, the Council believes the Mojave desert tortoise should be designated as an endangered species by the USFWS and California Department of Fish and Wildlife (CDFW).

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), which 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.

The summary of data above and data include in the attachment on the “Status of the Mojave Desert Tortoise (*Gopherus agassizii*)” indicates that current management actions for the Mojave desert tortoise, whose range occurs primarily on BLM land, are inadequate to help recover the desert tortoise. All Federal agencies are obligated to implement effective recovery actions to contribute to the recovery of species listed under section 7(a)(1) of the FESA. This includes the BIA and BLM. Federal agencies have been ineffective in halting population declines, which has resulted in non-viable populations. The Council believes that the management actions proposed in the DEIS are inadequate in preventing the extirpation of the Mojave desert tortoise in California and Nevada in the foreseeable future. Although BIA’s involvement in desert tortoise recovery is not as significant in scope as the BLM’s, we believe that BIA’s FEIS for this project needs to document and inform the public of the plight of the tortoise and the current project’s contribution to that decline in the region and range-wide.

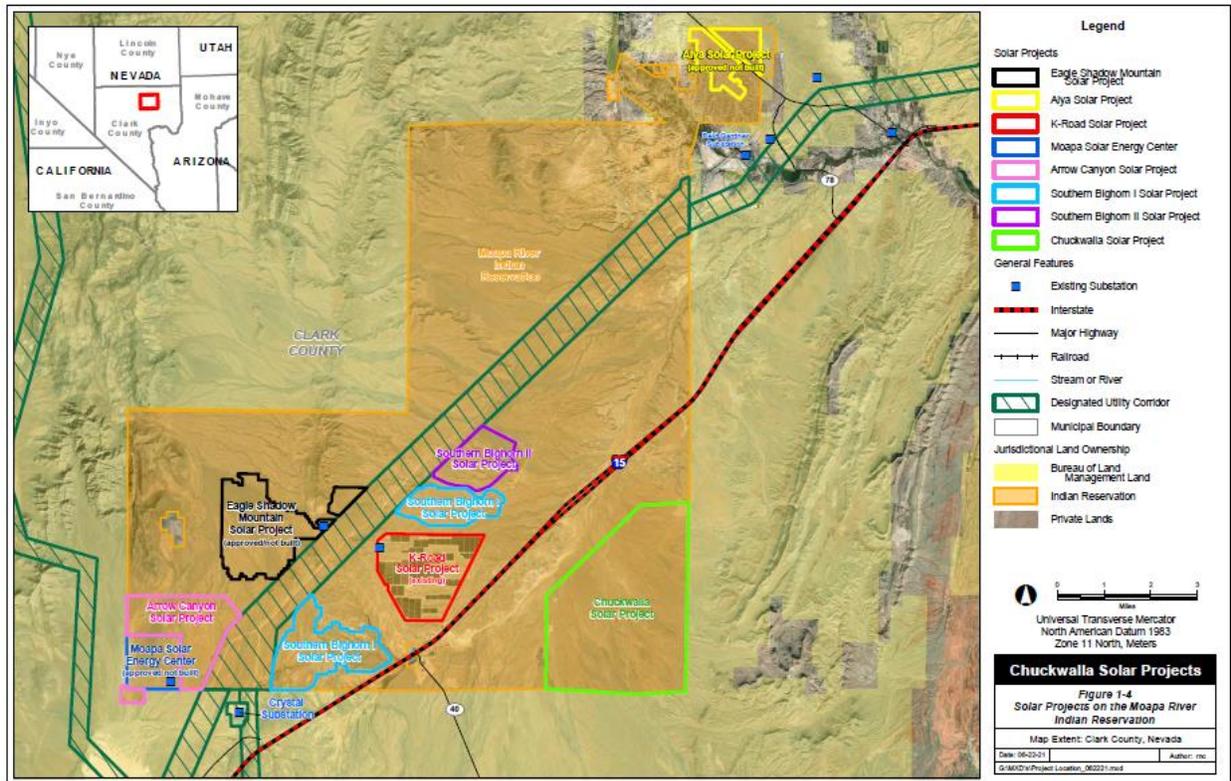
Because the DEIS fails to do so, the FEIS should include a thorough analysis of the status and trend of the tortoise in the “action area,” tortoise conservation area(s), recovery unit(s), and range wide. Tied to this analysis should be a discussion of all likely sources of mortality for the tortoise and degradation and loss of habitat from implementation of solar development including construction, operation and maintenance, decommissioning, and restoration of the public lands. The FEIS should use the data from focused plant and wildlife surveys in their analysis of the direct, indirect, and cumulative impacts of the proposed project on the Mojave desert tortoise and its habitat, other listed species, and species of concern/special status species.

Function of Desert Tortoise Surveys

Alternative Project Locations: The Council's persisting concern is that proponents of solar projects continue to identify specific sites for development without any attempt to identify alternative sites. As such, when focused studies reveal significant accumulations of tortoises on the proponent's selected site(s), because there are only preferred project sites and no alternative sites identified for the project, there is no opportunity to select alternative site(s) that "give adequate consideration to the public's needs and objectives in balancing ecological protection with the purpose of the proposed project, along with adequately addressing the proposed project's impacts on the desert's sensitive ecological system" [National Parks & Conservation Association v. Bureau of Land Management, Ninth Cir. Dkt Nos. 05-56814 et seq. (11/10/09)]. One of the purposes of NEPA is to identify and assess the reasonable alternatives to proposed actions that will avoid or minimize adverse effects of these actions upon the quality of the human environment (40 CFR 1500.2). If alternative sites are identified and have impacts that are less than at the proposed project site, the alternative should be selected.

Too often, like this project a specific impact footprint is identified, all surveys are restricted to that site, and no alternative sites are assessed, as required by NEPA. We are concerned that this project has already pre-determined the project footprint. As such, there may be other areas of lower tortoise densities where the Projects could be located and impacts could be minimized. However, those areas would not be considered if the Projects footprint is predetermined before survey data are available. Proponents of the Gemini Solar Site in southern Nevada, for example, ignored these recommendations, and displaced more than 100 tortoises, when based on their presence-absence tortoise surveys, a shift of the site to the east would have avoided many of those animals. It appears that the proponent is destined to repeat that same mistake here as the action area has been restricted to the direct impact area.

Tortoise Translocation Sites: The current management practice is to conduct desert tortoise protocol surveys (USFWS 2019) on a given site, but all too often translocation sites are ignored. We feel strongly that protocol surveys should occur on multiple or enlarged sites as given above *and* on all proposed translocation sites (see USFWS 2020, 2021). Figure 1-4 in the DEIS shows that BIA seems committed to eliminating all existing tortoise habitats from south of the designated utility corridor, however we could not find a map that shows previous and future translocation areas for this and other BIA-approved solar projects and other projects in the area. Please revise the following map to show where tortoises have been translocated from the six existing solar sites and into which these 150+ tortoises would be translocated:



Mojave Desert Tortoise Impacts Analysis:

Analysis of Direct, Indirect, Temporary, and Permanent Impacts: The alternatives analysis fails to include an economic analysis that provides the total cost of constructing the proposed project versus other alternatives, so the public can see how much the total cost of each alternative is, which should be rectified in the FEIS. This would include an analysis of the costs of replacing all public resources that would be lost from granting the proposed project including direct, indirect, and cumulative impacts. Please note, this analysis would include habitat replacement or restoration costs including the time needed to achieve full replacement of current ecological functions and values, not just acquisition, management, monitoring, and adaptive management costs. The DEIS has a single paragraph on page 3-27 but fails to divulge how these fees would be expended. If this project were being developed in California, the proponent would be required to replace the habitat, typically at a minimum ration of 3:1, through land acquisition, but that does not appear to be the case for this project. So, we question whether these fees would satisfy regulatory requirements that impacts must be fully mitigated.

Although the DEIS documents how many acres would be “temporarily” and “permanently” impacted directly by the project, we question the assertion that mowing will result in temporary impacts. There is no indication that tortoises are repatriating areas that have been mowed on previous solar projects, which needs to be discussed in the FEIS. How many of the previous six solar sites on the Reservation were mowed? Have there been studies that show tortoises are using these mowed areas? These data and analyses are missing from the DEIS and should be addressed in the FEIS.

The DEIS also fails to fully describe direct and indirect impacts (e.g., road effect zone, heat sink effects to adjacent areas, etc.) by the proposed Project. Based on existing studies, how many tortoises on how many acres adjacent to the 5,045 acres of “Total Acres Disturbance” (Table 2 3, page 2-11) may be exposed to increased, potentially lethal heat levels? We note that this impact is also missing from the Biological Assessment in Appendix M. This is only one of several foreseeable indirect impacts that needs to be addressed in the FEIS. Nor does the DEIS document the acreages of habitats that would be temporarily and permanently lost that are currently occupied or not by tortoises. The FEIS should quantify the acreage of occupied tortoise habitat that would be lost.

Additionally, we read the following sentence on page 2-20, which suggests that ALL impacts would be of a permanent nature: “It is possible, because much of the needed electrical infrastructure would have been developed, the Projects would continue to be upgraded and used to generate solar energy even beyond the term of the initial energy purchase agreements and/or lease. Therefore, **it is possible that the sites would remain in solar energy production for the foreseeable future** [bold emphasis added].”

We see that the permanent perimeter fence is to be constructed with a gap at the bottom that will allow tortoises to enter the site after the facilities are developed (page 3-35). However, on pages 2-19 and 2-20, under Operations and Maintenance, and on page 3-35 there is no discussion of the proponent’s intent to periodically mow the site in the future when vegetation threatens solar structures. It has been our observation that sites that are initially mowed are subsequently mowed when plant growth threatens the solar panels and other infrastructure. Please clarify if there is to be future mowing, and if so, which procedures would be followed to ensure that tortoises reintroduced to the site (see description on page 3-34) are not harmed by that activity. It is not clear to us how this reoccurring impact fits within the eight bulleted impacts listed on page 3-33, which needs to be clarified in the FEIS.

Noting that Best Management Practices (BMPs) are included in Appendix C to the DEIS, we provide the Council’s proposed BMPs for your use (Desert Tortoise Council 2017¹). If there are any BMPs in our document that are not included in Appendix C, we ask that the proponent and applicant implement those measures that would supplement tortoise protection during construction, operation and maintenance, and decommissioning.

Similarly, we note that Appendix E to the DEIS is a Site Restoration Plan. In 2016, the Council funded a summary of restoration techniques in arid habitats occupied by tortoises (Abella and Berry 2016²), and provides that document for your use to supplement the restoration plan given in the DEIS.

Road Effect Zone: We request that the FEIS include information on the locations, sizes, and arrangements of roads to the proposed project and within it, who will have access to them, whether the access roads will be secured to prevent human access or vandalism, and if so, what methods would be used. The presence/use of roads even with low vehicle use has numerous

¹ <https://www.dropbox.com/s/fbx0uw43hs44i1w/%23DTC%20Construction%20Best%20Management%20Practices%20082117.pdf?dl=0>

² <https://www.dropbox.com/s/nx1b5m2b5ehya12/%23Abella%20and%20Berry%202016.pdf?dl=0>

adverse effects on the desert tortoise and its habitats that have been reported in the scientific literature. These include the deterioration/loss of wildlife habitat, hydrology, geomorphology, and air quality; increased competition and predation (including by humans); and the loss of naturalness or pristine qualities.

Vehicle use on new roads and increased vehicle use on existing roads equates to increased direct mortality and an increased road effect zone for desert tortoises. Road construction, use, and maintenance adversely affect wildlife through numerous mechanisms that can include mortality from vehicle collisions, and loss, fragmentation, and alteration of habitat (Nafus et al. 2013; von Seckendorff Hoff and Marlow 2002).

In von Seckendorff Hoff and Marlow (2002), they reported reductions in Mojave desert tortoise numbers and sign from infrequent use of roadways to major highways with heavy use. There was a linear relationship between traffic level and tortoise reduction. For two graded, unpaved roads, the reduction in tortoises and sign was evident 1.1 to 1.4 km (3,620 to 4,608 feet) from the road. Nafus et al. (2013) reported that roads may decrease tortoise populations via several possible mechanisms, including cumulative mortality from vehicle collisions and reduced population growth rates from the loss of larger reproductive animals. Other documented impacts from road construction, use, and maintenance include increases in roadkill of wildlife species as well as tortoises, creating or increasing food subsidies for common ravens, and contributing to increases in raven numbers and predation pressure on the desert tortoise.

Please include in the FEIS analyses, the five major categories of primary road effects to the tortoise and special status species: (1) wildlife mortality from collisions with vehicles; (2) hindrance/barrier to animal movements thereby reducing access to resources and mates; (3) degradation of habitat quality; (4) habitat loss caused by disturbance effects in the wider environment and from the physical occupation of land by the road; and (5) subdividing animal populations into smaller and more vulnerable fractions (Jaeger et al. 2005a, 2005b, Roedenbeck et al. 2007). These analyses should be at the population, recovery unit, and rangewide levels.

In summary, road establishment/increased use is often followed by various indirect impacts such as increased human access causing disturbance of species' behavior, increased predation, spread of invasive species that alters/degrades habitat, and vandalism and/or collection. The analysis of the impacts from road establishment and use should include cumulative effects to the tortoise with respect to nearby critical habitat and other Tortoise Conservation Areas (TCAs), areas identified as important linkage habitat for connectivity between nearby critical habitat units/TCAs as these linkage areas serve as corridors for maintaining genetic and demographic connectivity between populations, recovery units, and rangewide (see *Desert Tortoise Habitat Linkages/Connectivity among Populations and Recovery Units* below). These and other indirect impacts to the Mojave desert tortoise are missing from the DEIS and should be analyzed in the FEIS for project construction, operations and maintenance, decommissioning, and habitat restoration.

Desert Tortoise Habitat Linkages/Connectivity among Populations and Recovery Units: Although the DEIS does describe how the proposed project will impact the movement of tortoises relative to linkage habitats/corridors on page 3-36, the FEIS needs to include an analysis of the minimum linkage design necessary for conservation and recovery of the desert tortoise (e.g.,

USFWS 2011, Averill-Murray et al. 2013, Hromada et al. 2020), and how the project, along with other existing projects, would impact the linkages between tortoise populations and all recovery units that are needed for survival and recovery. We strongly request that the environmental consequences section of the DEIS include a thorough analysis of this indirect effect (40 Code of Federal Regulations 1502.16) and appropriate mitigation to maintain the function of population connectivity for the Mojave desert tortoise and other wildlife species be identified. Similarly, please document how this project may impact proximate conservation areas, such as BLM-designated ACECs and nearby tortoise critical habitats.

Mitigation/Monitoring/Adaptive Management Plans

Generally, mitigation should use the best available science with a commitment to implement the mitigation commensurate to impacts to the tortoise and its habitats. Mitigation plans for the proposed Projects should include a fully-developed desert tortoise translocation plan, including protection of tortoise translocation area(s) from future development and human disturbance in perpetuity; raven management plan; non-native plant species management plan; fire prevention plan; compensation plan for the degradation and loss of tortoise habitat that includes protection of the acquired, improved, and restored habitat in perpetuity for the tortoise from future development and human use; and habitat restoration plan when the lease is terminated and the proposed project is decommissioned.

BIA Policy requires the following: BIA (2012) NEPA Guidebook: Section 6.4.6 Mitigation Measures – “Mitigation measures are critical elements for the decision maker to allow an action to move forward. The CEQ regulations (40 CFR 1505.3) require agencies to (a) include appropriate conditions in grants, permits or other approvals; (b) condition funding of actions on mitigation; (c) upon request, inform cooperating or commenting agencies on progress in carrying out mitigation measures which were adopted by the agency making the decision; and (d) upon request, make available to the public the results of relevant monitoring.

Any mitigation measure must be enforceable and it is important for BIA Regional and Agency Offices to establish monitoring programs to ensure that mitigation is carried out (See Section 9 and Appendix 21).”

Section 8.4.9 Mitigation – “Analysis of alternatives must include a discussion of mitigation measures where mitigation is feasible, and of any monitoring designed for adaptive management. The purpose of including mitigation measures is to permit a full and accurate comparison of the environmental effects of the alternatives.”

Section 9.1 Monitoring – “As specified in 40 CFR 1505.2(c), and in accordance with guidance offered by CEQ in Appendix 21, the BIA will implement monitoring programs for mitigation activities. Monitoring has two basic goals:

- (1) **Implementation.** Implementation monitoring should be undertaken to ensure that actions taken comply with the terms, conditions, and mitigation measures.
- (2) **Effectiveness.** Effectiveness monitoring should measure and evaluate the effects of the mitigation efforts. If the mitigation measures are not achieving their designed goals, then monitoring should provide a mechanism to adjust the mitigation measures.

BLM policy requires the following: BLM Manual 6840: Special Status Species Management includes the following BLM directives (BLM 2008b) that are applicable to the Mojave desert tortoise:

6840.01 Purpose. The purpose of this manual is to provide policy and guidance for the conservation of BLM special status species and the ecosystems upon which they depend on BLM-administered lands. BLM special status species are: (1) species listed or proposed for listing under the FESA, and (2) species requiring special management consideration to promote their conservation and reduce the likelihood and need for future listing under the FESA, which are designated as BLM sensitive by the State Director(s).

6840.02 Objectives. The objectives of the BLM special status species policy are A. To conserve and/or recover FESA-listed species and the ecosystems on which they depend so that FESA protections are no longer needed for these species. B. To initiate proactive conservation measures that reduce or eliminate threats to Bureau sensitive species to minimize the likelihood of and need for listing of these species under the FESA.

With respect to the Mojave desert tortoise, we request that the Proposed action or other alternatives contribute to meeting objectives in BLM Manual 6840 – Special Status Species Management (BLM 2008b).

Many of these mitigation plans are mentioned in the DEIS but not provided. For example, BIA says, “the Fire Prevention Plan would be prepared prior to construction.”

The DEIS should describe the mitigation that would be implemented to offset the direct, indirect, and cumulative impacts of the proposed Project for the tortoise. The mitigation plans should be completed and provided in the NEPA document so the public and the decisionmaker can review them and determine the effectiveness of the proposed mitigation. Stating that a mitigation plan will be developed using the best available science is not adequate or appropriate, as the preparers are not always experts on the best available science for that specific subject. When mitigation plans are included in the public review process, this provides the project proponent and approving agency/decisionmaker with the opportunity for the public to provide comments based on their diverse knowledge and experience to the approving agency regarding the adequacy and soundness of the proposed mitigation plans. This review process increases the likelihood of their effectiveness, when implemented.

We find that the DEIS fails to identify implementation schedules that are tied to key actions of the construction, operation, maintenance, decommissioning, and restoration phases of the project so that mitigation occurs concurrently with or in advance of the impacts. The plans should specify success criteria, include an effectiveness monitoring plan to collect data to determine whether success criteria have been met, and identify/implement actions that would be required if the mitigation measures do not meet the success criteria.

Comments Specific to Appended Plans

(Note: There are no page numbers in Volume 2 of the DEIS, which makes it difficult to reference specific items. Please be sure there are page numbers in the FEIS.)

Appendix C. Project Design Features/BMPS

- With regards to Air Quality, we recommend that speed limits on dirt roads through tortoise-occupied habitats be set at 15 miles per hour instead of the cited 25 miles per hour. For consistency, we recommend that the Raven Control Plan in Appendix I be similarly modified, and elsewhere as needed.

- For General Biological Mitigation Measures,

- In the first bullet, please note that “Clearance” surveys, rather than “Preconstruction” surveys should be performed. This may seem like semantics, but Clearance surveys employ a higher level of survey coverage, where transects are walked at 5-meter intervals and the site is surveyed until which time no tortoises are found in two consecutive surveys (USFWS 2009). This may mean that multiple surveys are performed until two consecutive surveys reveal the absence of tortoises.

- In the second bullet, we recommend dropping the strike-out words: “~~Where appropriate,~~ monitors will flag the boundaries of areas where activities would need to be restricted to protect native plants and wildlife or special status species.”

- In the sixth bullet, “Any trenches or excavations should be covered if left overnight or have escape ramps to allow wildlife to safely exit,” please add that uncovered trenches will be checked a minimum of three times per day, which reflects current management by federal agencies.

- With regard to the Worker Environmental Awareness Program (WEAP), it represents current management to perform annual refresher courses for both new and experienced staff, which we also recommend for these sites.

- There is no stated commitment to monitoring mowing. Although tortoises would have been removed from the impact area during Clearance surveys, it is equally important that blading be monitored with biologists walking ahead of the equipment to rescue any tortoises that were missed AND biologists walking behind the equipment to look for any tortoises that may have been injured.

Appendix I. Raven Control Plan

- Although it may be implied, we recommend that routine mirror washing be specifically addressed as one potential source of puddling, which should be avoided. Furthermore, we suggest that the monitoring plan be revised as needed to perform visit(s) after mirror washing to see if that activity results in increased levels of ravens. If so, the proponent or applicant should consult with USFWS to determine how that activity could attract fewer ravens (e.g., reduced frequency and strategic timing of washing).

Translocation Plan - Translocated Tortoises & Translocation Sites: In the absence of the referenced Translocation Plan in Volume 2, we do not have answers to the following questions. How many tortoises will be displaced by the proposed project? How long will translocated tortoises be monitored? Will the monitoring report show how many of those tortoises lived and died after translocation and over time? Are there any degraded habitats or barren areas that may impair

success of the translocation? Are there incompatible human uses in the new translocation area that need to be eliminated or managed to protect newly-translocated tortoises? Were those translocation areas sufficiently isolated that displaced tortoises were protected by existing or enhanced land management? How will the proponent minimize predation of translocated tortoises and avoid adverse climatic conditions, such as low winter rainfall conditions that may exacerbate translocation success? For the existing six sites, were tortoises translocated to sites where they would be protected from threats (e.g., off-highway vehicles, future development, etc.)? Will these tortoises be intermixed with translocated tortoises from previous projects? These questions should be answered in the Environmental Consequences section of the FEIS.

The project proponent should implement the USFWS' Translocation Guidance (USFWS 2020). In addition, the proponent's project-specific translocation plan should be based on current data and developed using lessons learned from earlier translocation efforts (e.g., increased predation, drought). (see *Desert Tortoise Translocation Bibliography Of Peer-Reviewed Publications*³ in the footnote).

The Translocation Plan should include implementation of a science-based monitoring plan approved by the Desert Tortoise Recovery Office that will accurately assess these and other issues to minimize losses of translocated tortoises and impacts to their habitat. For example, the health of tortoises may be jeopardized if they are translocated during drought conditions, which is known to undermine translocation successes (Esque et al. 2010). If drought conditions are present at the time of project development, we request that the proponent confer with the USFWS immediately prior to translocating tortoises and seek input on ways to avoid loss of tortoises due to stressors associated with drought. One viable alternative if such adverse conditions exist is to postpone site development until which time conditions are favorable to enhance translocation success.

Moving tortoises from harm's way, the focus of the Translocation Guidance, does not guarantee their survival and persistence at the translocation site, especially if it will be subject to increased human use or development. In addition to the Translocation Guidance and because translocation sites are mitigation for the displacement of tortoises and loss of habitat, these sites should be managed for the benefit of the tortoise in perpetuity. Consequently, a conservation easement or other durable legal designation should be placed on the translocation sites. The project proponent should fully fund management of the site to enhance it for the benefit of the tortoise in perpetuity.

Tortoise Predators and a Predator Management Plan: Common ravens are known predators of the Mojave desert tortoise and their numbers have increased substantially because of human subsidies of food, water, and sites for nesting, roosting, and perching to hunt (Boarman 2003). Coyotes and badgers are also predators of tortoises. Because ravens can fly at least 30 miles in search of food and water daily (Boarman et al. 2006) and coyotes can travel an average of 7.5 miles or more daily (Servin et al. 2003), this analysis should extend out at least 30 miles from the proposed project site.

³ https://www.fws.gov/nevada/desert_tortoise/documents/reports/2017/peer-reviewed_translocation_bibliography.pdf

The FIES should analyze if this new use would result in an increase in common ravens and other predators of the desert tortoise in the action area. During construction, operations and maintenance, decommissioning, and restoration phases of the proposed project, the BIA should require science-based management of common raven, coyote, and badger predation on tortoises in the action area. This would include the translocation sites. We note on page 2-9 the noncommittal suggestion of: “Additional measures from the Raven Control Plan such as affixing perch deterrents on cross-members of structures **could also be implemented** [bold emphasis added].” In the FEIS, there should be a commitment to all available measures to avoid subsidizing ravens.

For local impacts, the Raven Control Plan should include reducing/eliminating human subsidies of food and water, and for the common raven, sites for nesting, roosting, and perching to address local impacts (footprint of the proposed project). This includes buildings, fences, and other vertical structures associated with the project site. In addition, the Raven Control Plan should include provisions that eliminate the pooling of water on the ground or on roofs.

The Raven Control Plan should include science-based monitoring and adaptive management throughout all phases of the project to collect data on the effectiveness of the Plan’s implementation and implement changes to reduce/eliminate predation on the tortoise if existing measures are not effective.

For regional and cumulative impacts, the BIA should require the project proponent to participate in efforts to address regional and cumulative impacts. For example, in California, the project proponent should be required to contribute to the National Fish and Wildlife Foundation’s Raven Management Fund to help mitigation for regional and cumulative impacts. Unfortunately, this Fund that was established in 2010 has not revised its per acre payment fees to reflect increased labor and supply costs during the past decade to provide for effective implementation. The National Fish and Wildlife Foundation should revise the per acre fee.

We request that for any of the transmission options, the project use infrastructure (particularly towers) that prevent raven nesting and perching for hunting. For example, for gen-ties/transmission lines the tubular design pole with a steep-pointed apex and insulators on down-sloping cross arms is preferable to lattice towers, which should not be used. New fencing should not provide resources for ravens, like new perching and nesting sites.

Fire Prevention/Management Plans: The proposed project could include numerous infrastructure components that have been known to cause fires. Lithium-ion batteries at the project site have the potential to explode and cause fires and are not compatible with using water for fighting fires. Photovoltaic panel malfunctions have caused vegetation to burn onsite. Currently missing from Volume 2 of the DEIS, we request that the FEIS include a Fire Prevention Plan in addition to a Fire Management Plan specifically targeting methods to deal with explosions/fires produced by these batteries/panels as well as other sources of fuel and explosives on the project site.

Climate Change and Non-native Plants

Climate Change: Absent from the DEIS, we request that the FEIS address the effects of the proposed action on climate change warming and the effects that climate change may have on the proposed action. For the latter, we recommend including: an analysis of habitats within the project area that may provide refugia for tortoise populations; an analysis of how the proposed action would contribute to the spread and proliferation of nonnative invasive plant species; how this spread/proliferation would affect the desert tortoise and its habitats (including the frequency and size of human-caused fires); and how the proposed action may affect the likelihood of human-caused fires.

Federal Land Policy and Management and Federal Endangered Species Act

Federal Land Policy and Management Act (FLPMA): Congress wrote a lengthy definition of “multiple use” for the management of public lands and their various resource values. The definition included “... the use of some land for less than all of the resources; a combination of balanced and diverse resource uses that takes into account the long-term needs of future generations for renewable and non-renewable resources, including, but not limited to, recreation, range, timber, minerals, watershed, wildlife and fish, and natural scenic, scientific and historical values; and harmonious and coordinated management of the various resources without permanent impairment of the productivity of the land and the quality of the environment with consideration being given to the relative values of the resources and not necessarily to the combination of uses that will give the greatest economic return or the greatest unit output.”

Congress defined “sustained yield” as the achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources of the public lands consistent with multiple use. The Mojave desert tortoise and its habitats are renewable resources.

The definition of “environmental quality” is a set of properties and characteristics of the environment, either generalized or local, as they impinge on human beings and other organisms. It is a measure of the condition of an environment relative to the requirements of one or more species and or to any human need or purpose. Thus, BIA must consider the quality or condition of the environment of the Mojave desert tortoise with respect to the species’ requirements for persistence and must maintain this habitat quality.

The Council believes that BLM’s management of the Mojave desert tortoise and its habitats in California and Nevada is not in compliance with FLPMA or the purposes for establishing the CDCA. The large number of non-viable populations and downward trend in population densities for the Mojave desert tortoise in the CDCA confirm non-compliance with the “immediate and future protection of public lands,” “conserving resources for future generations,” and definitions of multiple use, sustained yield, and environmental quality.

Section 7(a)(1) of the Endangered Species Act: Section 7(a)(1) of the Endangered Species Act states that all federal agencies “...shall... utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species and threatened species listed pursuant to Section 4 of this Act.” In Section 3 of the FESA, “conserve,”

“conserving,” and “conservation” mean “to use and the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this Act are no longer necessary. Such methods and procedures include, but are not limited to, all activities associated with scientific resources management such as research, census, law enforcement, habitat acquisition...”

The Council believes that the data given herein demonstrate that BLM’s management of the Mojave desert tortoise and its habitat under the CDCA Plan and Plan Amendments has not been effective in meeting BLM’s Section 7(a)(1) mandate of carrying out programs for its conservation. To meet its Section 7(a)(1) responsibilities, the BIA needs to adopt and implement the management actions of the one population of the Mojave desert tortoise in California that is increasing, which is managed by the National Park Service. The NPS’ land management practices are closer to managing areas of land as reserves, which is what the 1994 recovery plan (USFWS 1994b) described as part of the recovery strategy for the Mojave desert tortoise.

While BLM designated Desert Wildlife Management Areas (DWMAs) as one part of the recovery strategy, it did not implement the other parts of the recovery strategy. According to the Recovery Plan, DWMAs were to be managed as reserves; that is, they were areas of land to keep, save, preserve, or protect tortoises and their habitats. BLM not only did not identify and implement needed recovery actions within each DWMA to manage the DWMAs as protected areas for the Mojave desert tortoise, in California, DWMAs were eliminated with the BLM’s Record of Decision for the Desert Renewable Energy Conservation Plan (DRECP) (BLM 2015).

When analyzing and implementing aspects of the project, we request that BIA demonstrate how it is contributing effectively to the conservation and recovery of the Mojave desert tortoise in southern Nevada. We request that BIA show how mitigation for the project will do more than offset all direct, indirect, and cumulative impacts so that the status of the Mojave desert tortoise as described herein will improve. By providing this information, BIA would demonstrate its compliance with section 7(a)(1) of the FESA for the Mojave desert tortoise.

Cumulative Effects

The Council on Environmental Quality (CEQ) issued the following document, “Considering Cumulative Effects under the National Environmental Policy Act” (1997) to ensure that Federal agencies provided a complete cumulative impacts analysis in their EISs. Please ensure that this document is followed, including the eight principles, when analyzing cumulative effects of the proposed action to the tortoise and its habitats. CEQ states, “Determining the cumulative environmental consequences of an action requires delineating the cause-and-effect relationships between the multiple actions and the resources, ecosystems, and human communities of concern. The range of actions that must be considered includes not only the project proposal but all connected and similar actions that could contribute to cumulative effects.” The analysis “must describe the response of the resource to this environmental change.” Cumulative impact analysis should “address the sustainability of resources, ecosystems, and human communities.” For example, the FEIS should include data on the estimated number of acres of tortoise habitats degraded/lost and the numbers of tortoises that may be lost to growth-inducing impacts in the region.

CEQs guidance on how to analyze cumulative environmental consequences, which contains eight principles listed below:

1. Cumulative effects are caused by the aggregate of past, present, and reasonable future actions.

The effects of a proposed action on a given resource, ecosystem, and human community, include the present and future effects added to the effects that have taken place in the past. Such cumulative effects must also be added to the effects (past, present, and future) caused by all other actions that affect the same resource.

2. Cumulative effects are the total effect, including both direct and indirect effects, on a given resource, ecosystem, and human community of all actions taken, no matter who (federal, non-federal, or private) has taken the actions.

Individual effects from disparate activities may add up or interact to cause additional effects not apparent when looking at the individual effect at one time. The additional effects contributed by actions unrelated to the proposed action must be included in the analysis of cumulative effects.

3. Cumulative effects need to be analyzed in terms of the specific resource, ecosystem, and human community being affected.

Environmental effects are often evaluated from the perspective of the proposed action. Analyzing cumulative effects requires focusing on the resources, ecosystem, and human community that may be affected and developing an adequate understanding of how the resources are susceptible to effects.

4. It is not practical to analyze the cumulative effects of an action on the universe; the list of environmental effects must focus on those that are truly meaningful.

For cumulative effects analysis to help the decision maker and inform interested parties, it must be limited through scoping to effects that can be evaluated meaningfully. The boundaries for evaluating cumulative effects should be expanded to the point at which the resource is no longer affected significantly or the effects are no longer of interest to the affected parties.

5. Cumulative effects on a given resource, ecosystem, and human community are rarely aligned with political or administrative boundaries.

Resources are typically demarcated according to agency responsibilities, county lines, grazing allotments, or other administrative boundaries. Because natural and sociocultural resources are not usually so aligned, each political entity actually manages only a piece of the affected resource or ecosystem. Cumulative effects analysis on natural systems must use natural ecological boundaries and analysis of human communities must use actual sociocultural boundaries to ensure including all effects.

6. Cumulative effects may result from the accumulation of similar effects or the synergistic interaction of different effects.

Repeated actions may cause effects to build up through simple addition (more and more of the same type of effect), and the same or different actions may produce effects that interact to produce cumulative effects greater than the sum of the effects.

7. Cumulative effects may last for many years beyond the life of the action that caused the effects.

Some actions cause damage lasting far longer than the life of the action itself (e.g., acid mine damage, radioactive waste contamination, species extinctions). Cumulative effects analysis need to apply the best science and forecasting techniques to assess potential catastrophic consequences in the future.

8. Each affected resource, ecosystem, and human community must be analyzed in terms of its capacity to accommodate additional effects, based on its own time and space parameters.

Analysts tend to think in terms of how the resource, ecosystem, and human community will be modified given the action's development needs. The most effective cumulative effects analysis focuses on what is needed to ensure long-term productivity or sustainability of the resource.

Listing the six previously approved/constructed utility-scale solar projects on tribal lands of the Moapa Band on pages ES-5 and -6 does not constitute a cumulative effects analysis, which is missing from the DEIS. Similarly, the cumulative effects "analysis" given in the Biological Assessment (Appendix M) only lists these same sites without referring to solar development outside the Reservation that have displaced significant numbers of tortoises in southern Nevada and eastern California (e.g., BrightSource solar towers in Ivanpah Valley, etc.).

With regards to cumulative effects, the FEIS needs to list and analyze [emphasis added] how the collective construction, operation, maintenance, and decommissioning of these solar projects and their associated direct and indirect impacts would affect the tortoise, especially with respect to population connectivity, genetic diversity, and ability to recover the tortoise at the population, recovery unit, and range-wide levels. After completing this analysis, the numerous other human-caused impacts to the tortoise and its habitat should be added to the analysis with respect to population connectivity, genetic diversity, and ability to recovery the tortoise at the population, recovery unit and range-wide levels. Finally, the FEIS should analyze all project impacts within the region including future state, federal, and private actions affecting listed species on state, federal, and private lands and – importantly – not be restricted to solar development on the Reservation. This scope of analysis is required by CEQ (1997) in numbers 6 and 8 above.

We also expect that the FEIS will provide a detailed analysis of the "heat sink" effects of solar development on adjacent desert areas and particularly the Mojave desert tortoise and its habitat in addition to climate change.

In summary, we request that the FEIS (1) correctly describe the Purpose and Need for the proposed Federal authorization; (2) explore and analyze viable alternatives in addition to the No Action and Proposed Action alternatives; (3) expand the analysis of impacts to include connected and similar actions on the Reservation of the Moapa Band and nearby areas; (4) expand the Affected Environment to include current scientific data on the Mojave desert tortoise at the population and recovery unit levels, and range-wide; (5) provide an analysis of direct and especially indirect impacts to the tortoise and its habitat at the population level and connectivity to other populations. Indirect impacts should include but are not limited to degradation and loss of habitat, promotion of invasive non-native plant species; the impacts from roads and increase vehicle access and use,

and increased levels of predation from subsidized predators; and (6) include science-based mitigation and monitoring plans with adaptive management that protect desert tortoises and their habitats during construction, operation and maintenance, decommissioning, and restoration of the Projects site.

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 BIA 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,



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Literature Cited

- 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):xx-xx; e1944-687X. doi: 10.3996/052015-JFWM-046.
- Allison L.J. and McLuckie, A.M. 2018. Population trends in Mojave desert tortoises (*Gopherus agassizii*). *Herpetological Conservation and Biology*. 2018 Aug 1;13(2):433-52.
- Averill-Murray, R.C., C.R. Darst, N. Strout, and M. Wong. 2013. Conserving population linkages for the Mojave desert tortoise (*Gopherus agassizii*). *Herpetological Conservation and Biology* 8(1):1-15.
- 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>
- [BIA] Bureau of Indian Affairs. 2012. Indian Affairs National Environmental Policy Act (NEPA) Guidebook. 59 IAM 3-H. Division of Environmental and Cultural Resources Management. August 2012.

- [BLM] U.S. Bureau of Land Management. 1998. Record of Decision for the Approved Las Vegas Resource Management Plan and Final Environmental Impact Statement. BLM/LV/PL-99/002+1610. Las Vegas Field Office, October 1998.
- [BLM] U.S. Bureau of Land Management. 2008a. National Environmental Policy Act Handbook H-1790-1. Washington, D.C. January 2008.
- [BLM] U.S. Bureau of Land Management. 2008b. Manual 6840 – Special Status Species Management. Washington, D.C. December 12, 2008.
- [BLM and DOE] U.S. Bureau of Land Management and U.S. Department of Energy. 2012. Final Programmatic Environmental Impact Statement for Solar Energy Development in Six Southwestern States. FES 12-24, DOE/EIS-0403. Washington, D.C.: U.S. Bureau of Land Management and U.S. Department of Energy. <http://solareis.anl.gov/documents/fpeis>.
- [BLM] U.S. Bureau of Land Management. 2015. Desert Renewable Energy Conservation Plan proposed land use plan amendment and final environmental impact statement (BLM/CA/PL-2016/03+1793+8321). Prepared by the BLM in partnership with U.S. Fish and Wildlife Service, California Energy Commission, and California Department of Fish and Wildlife. Sacramento, CA.
- [BLM] U.S. Bureau of Land Management. 2016. Record of Decision for the Land Use Plan Amendment to the California Desert Conservation Plan, Bishop Resource Management Plan, and Bakersfield Resource Management Plan for the Desert Renewable Energy Conservation Plan (DRECP). Dated September 2016. Sacramento, CA.]
- Boarman, W.I, M.A. Patten, R.J. Camp, and S.J. Collis. 2006. Ecology of a population of subsidized predators: Common ravens in the central Mojave Desert, California. *Journal of Arid Environments* 67 (2006) 248–261.
- [CDFG] California Department of Fish and Game. 2012. Staff report on burrowing owl mitigation. [The 7 March 2012 memo replaces the 1995 staff report and includes the Burrowing owl survey protocol], State of California Natural Resources Agency, Department of Fish and Game. Sacramento, CA.
<https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=83843&inline>
- [CEQ] Council on Environmental Quality. 1997. Considering Cumulative Effects under the National Environmental Policy Act.
- Desert Tortoise Council. 2017. A compilation of frequently implemented best management practices to protect Mojave desert tortoise during implementation of federal actions. <https://deserttortoise.org/library/plans-bmps/>. Palmdale, CA.
- Driscoll, D.E. 2010. Protocol for golden eagle occupancy, reproduction, and prey population assessment. American Eagle Research Institute, Apache Jct., AZ. 55pp.
<https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=83955&inline>

- Esque, T.C., K.E. Nussear, K.K. Drake, A.D. Walde, K.H. Berry, R.C. Averill-Murray, A.P. Woodman, W.I. Boarman, P.A. Medica, J. Mack, and J.H. Heaton. 2010. Effects of subsidized predators, resource variability, and human population density on desert tortoise populations in the Mojave Desert, U.S.A. *Endangered Species Research*, Vol. 12-167-177, 2010, doi: 10.3354/esr00298.
- Henen, B.T. 2020. Presentation at Desert Tortoise Council Symposium, 2020.
- Henen, B.T. 2021. Presentation at Desert Tortoise Council Symposium, 2021.
- Hromada, S. J., T.C. Esque, A.G. Vandergast, K.E. Dutcher, C.I. Mitchell, M.E. Gray, T. Chang, B.G. Dickson, and K.E. Nussear. 2020. Using movement to inform conservation corridor design for Mojave desert tortoise. *Movement Ecology* 8, 38 (2020). <https://movementecologyjournal.biomedcentral.com/track/pdf/10.1186/s40462-020-00224-8.pdf>
- Jaeger, J., L. Fahrig, and K. Ewald. 2005a. Does the configuration of road networks influence the degree to which roads affect wildlife populations? *International Conference on Ecology and Transportation 2005 Proceedings, Chapter 5 - Integrating Transportation and Resource Conservation Planning - Landscapes and Road Networks*, pages 151-163. August 29, 2005.
- Jaeger, J., J. Bowman, J. Brennan, L. Fahrig, D. Bert, J. Bouchard, N. Charbonneau, K. Frank, B. Gruber, and K. Tluk von Toschanowitz. 2005b. Predicting when animal populations are at risk from roads: an interactive model of road avoidance behavior. *Ecological Modelling* 185 (2005) 329–348.
- [MDLT] Mojave Desert Land Trust. 2021. Climate change. <https://www.mdlr.org/climate-change/>.
- Nafus, M.G., T.D. Tuberville, K. A. Buhlmann, and B.D. Todd. 2013. Relative abundance and demographic structure of Agassiz's desert tortoise (*Gopherus agassizii*) along roads of varying size and traffic volume. *Biological Conservation* 162 (2013) 100–106.
- Novack, E. 2015. Segmentation of Environmental Review: Why Defenders of Wildlife v. U.S. Navy threatens the effectiveness of NEPA and the FESA, 42 B.C. *Envtl. Aff. L. Rev.* 243 (2015). <http://lawdigitalcommons.bc.edu/ealr/vol42/iss1/9>.]
- Pagel, J.E., D.M. Whittington, and G.T. Allen. 2010. Interim Golden Eagle inventory and monitoring protocols; and other recommendations. Division of Migratory Bird Management, U.S. Fish and Wildlife Service. https://www.fws.gov/southwest/es/oklahoma/documents/te_species/wind%20power/usfws_interim_goea_monitoring_protocol_10march2010.pdf

- Roedenbeck, I., L. Fahrig, C. Findlay, J. Houlahan, J. Jaeger, N. Klar, S. Kramer-Schadt, and E. van der Grift. 2007. The Rauschholzhausen Agenda for Road Ecology. *Ecology and Society* 12(1): 11. [online] URL: <http://www.ecologyandsociety.org/vol12/iss1/art11/>
- Servin, J., V. Sanchez-Cordero, and S. Gallina. 2003. Distances traveled daily by coyotes, *Canis latrans*, in a pine–oak forest in Durango, Mexico. *Journal of Mammalogy* 84(2):547–552.
- [USFWS] U.S. Fish and Wildlife Service. 1994a. Determination of critical habitat for the Mojave population of the desert tortoise. *59 Federal Register* 5820-5866.]
- [USFWS] U.S. Fish and Wildlife Service. 1994b. Desert Tortoise (Mojave Population) Recovery Plan. U.S. Fish and Wildlife Service, Portland, OR. Pp. 73, plus appendices.
- [USFWS] U.S. Fish and Wildlife Service. 2009. Desert Tortoise (Mojave Population) Field Manual: (*Gopherus agassizii*). Region 8, Sacramento, California.
- [USFWS] U.S. Fish and Wildlife Service. 2010. Common raven predation on the desert tortoise. USFWS, Ventura Fish and Wildlife Office, Ventura, CA.
- [USFWS] U.S. Fish and Wildlife Service. 2011. Revised recovery plan for the Mojave population of the desert tortoise (*Gopherus agassizii*). U.S. Fish and Wildlife Service, Pacific Southwest Region, Sacramento, California. 222 pp.
- [USFWS] U.S. Fish and Wildlife Service. 2014. Status of the desert tortoise and critical habitat. Unpublished report available on the Desert Tortoise Recovery Office’s website: “02/10/2014 Status of the Desert Tortoise and Critical Habitat (.704MB PDF).” Reno, NV.
- [USFWS] U.S. Fish and Wildlife Service. 2015. Range-wide Monitoring of the Mojave Desert Tortoise (*Gopherus agassizii*): 2013 and 2014 Annual Reports. Report by the Desert Tortoise Recovery Office, U.S. Fish and Wildlife Service, Reno, Nevada. 44 pages.
- [USFWS] U.S. Fish and Wildlife Service. 2019. Preparing for any action that may occur within the range of the Mojave desert tortoise (*Gopherus agassizii*). USFWS Desert Tortoise Recovery Office. Dated 21 August 2017. Reno, NV.]
- [USFWS] U.S. Fish and Wildlife Service. 2020. Translocation of Mojave Desert Tortoises from Project Sites: Plan Development Guidance. U.S. Fish and Wildlife Service, Las Vegas, Nevada.
https://www.fws.gov/nevada/desert_tortoise/documents/reports/2020/RevisedUSFWSDTTranslocationGuidance20200603.pdf.]
- [USFWS] U.S. Fish and Wildlife Service. 2021. Population Augmentation Strategy for the Mojave Desert Tortoise Recovery Program. U.S. Fish and Wildlife Service, Las Vegas, Nevada.

[USFWS] U.S. Fish and Wildlife Service. 2022a. Range-wide Monitoring of the Mojave Desert Tortoise (*Gopherus agassizii*): 2020 Annual Reporting DRAFT. Report by the Desert Tortoise Recovery Office, U.S. Fish and Wildlife Service, Reno, Nevada.

[USFWS] U.S. Fish and Wildlife Service. 2022b. Range-wide Monitoring of the Mojave Desert Tortoise (*Gopherus agassizii*): 2021 Annual Reporting DRAFT. Report by the Desert Tortoise Recovery Office, U.S. Fish and Wildlife Service, Reno, Nevada.

von Seckendorff Hoff, K., and Marlow, R.W. 2002. Impacts of vehicle road traffic on desert tortoise populations with consideration of conservation of tortoise habitat in southern Nevada. *Chelonian Conservation and Biology* 4:449–456.

Attachment. 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 Projects 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, and 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 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, between 2004 and 2014, the 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 km² (USFWS 2015). The Mormon Mesa population is near the proposed Projects and is one of the few populations that had an increase – 217% between 2004 and 2014, but it represents less than 3.5% of the area of the TCAs (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** and **Table 2**).

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/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 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.

Adult tortoise densities from 2004 through 2014 the Western Mojave, Colorado Desert, Eastern Mojave, and Upper Virgin River Recovery Units declined 26 to 67% (Allison and McLuckie 2018, USFWS 2015). Such steep declines in the density of adults are only sustainable if there are suitably large improvements in reproduction and juvenile growth and survival. However, the proportion of juveniles has not increased anywhere in the range of the Mojave desert tortoise since 2007 (Allison and McLuckie 2018).

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). Of the four TCAs in the Northeastern Recovery Unit, three now have tortoise densities below the population viability level.

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 2. Summary of trend data for Agassiz’s desert tortoise, *Gopherus agassizii* (=Mojave desert tortoise).from 2004 to present for 5 Recovery Units and 17 Critical Habitat Units (CHU)/Tortoise Conservation Areas (TCA). 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	2004 density/ km ²	2014 density/ km ² (SE)	% 10- year change (2004– 2014)	2015 density/ km ²	2016 density/ km ²	2017 density/ km ²	2018 density/ km ²	2019 density/ km ²	2020 density/ km ²	2021 density/ km ²
Western Mojave, CA	24.51		2.8 (1.0)	-50.7 decline							
Fremont- Kramer	9.14		2.6 (1.0)	-50.6 decline	4.5	No data	4.1	No data	2.7	1.7	No data
Ord-Rodman	3.32		3.6 (1.4)	-56.5 decline	No data	No data	3.9	2.5/3.4*	2.1/2.5*	No data	1.9/2.5*
Superior- Cronese	12.05		2.4 (0.9)	-61.5 decline	2.6	3.6	1.7	No data	1.9	No data	No data
Colorado Desert, CA	45.42		4.0 (1.4)	-36.25 decline							
Chocolate Mtn AGR, CA	2.78		7.2 (2.8)	-29.77 decline	10.3	8.5	9.4	7.6	7.0	7.1	3.9
Chuckwalla, CA	10.97		3.3 (1.3)	-37.43 decline	No data	No data	4.3	No data	1.8	4.6	2.6
Chemehuevi, CA	14.65		2.8 (1.1)	-64.70 decline	No data	1.7	No data	2.9	No data	4.0	No data
Fenner, CA	6.94		4.8 (1.9)	-52.86 decline	No data	5.5	No data	6.0	2.8	No data	5.3
Joshua Tree, CA	4.49		3.7 (1.5)	+178.62 increase	No data	2.6	3.6	No data	3.1	3.9	No data

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
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.

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 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 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.

Literature Cited in “Attachment – Status of the Mojave Desert Tortoise (*Gopherus agassizii*)”

- Allison, L.J. and A.M. McLuckie. 2018. Population trends in Mojave desert tortoises (*Gopherus agassizii*). *Herpetological Conservation and Biology* 13(2):433–452.
- Congdon, J.D., A.E. Dunham, and R.C. van Loeben Sels. 1993. Delayed sexual maturity and demographics of Blanding’s Turtles (*Emydoidea blandingii*): implications for conservation and management of long-lived organisms. *Conservation Biology* 7:826–833.
- Doak, D., P. Karieva, and B. Klepetka. 1994. Modeling population viability for the Desert Tortoise in the Western Mojave. *Ecological Applications* 4:446–460.
- Dutcher, K.E., A.G. Vandergast, T.C. Esque, A. Mitelberg, M.D. Matocq, J.S. Heaton, and K.E. Nussear. 2020. Genes in space: what Mojave desert tortoise genetics can tell us about landscape connectivity. *Conservation Genetics* 21:289–303(2020).
- Fahrig, L. 2007. Non-optimal animal movement in human-altered landscapes. *Functional Ecology* 21:1003–1015.
- Murphy, R.W., K.H. Berry, T. Edwards, and A.M. McLuckie. 2007. A genetic assessment of the recovery units for the Mojave population of the Desert Tortoise, *Gopherus agassizii*. *Chelonian Conservation and Biology* 6:229–251.
- Murphy, R.W., K.H. Berry, T. Edwards, A.E. Leviton, A. Lathrop, and J. D. Riedle. 2011. The dazed and confused identity of Agassiz’s land tortoise, *Gopherus agassizii* (Testudines, Testudinidae) with the description of a new species, and its consequences for conservation. *ZooKeys* 113: 39–71. doi: 10.3897/zookeys.113.1353.

- Spencer, R.-J., J.U. Van Dyke, and M.B. Thompson. 2017. Critically evaluating best management practices for preventing freshwater turtle extinctions. *Conservation Biology* 31:1340–1349.
- Turtle Conservation Coalition. 2018. *Turtles in Trouble: The World's 25+ Most Endangered Tortoises and Freshwater Turtles*. www.iucn-tftsg.org/trouble.
- [USFWS] U.S. Fish and Wildlife Service. 1994a. Desert tortoise (Mojave population) Recovery Plan. U.S. Fish and Wildlife Service, Region 1, Portland, Oregon. 73 pages plus appendices.
- [USFWS] U.S. Fish and Wildlife Service. 1994b. Endangered and threatened wildlife and plants; determination of critical habitat for the Mojave population of the desert tortoise. *Federal Register* 55(26):5820-5866. Washington, D.C.
- [USFWS] U.S. Fish and Wildlife Service. 2011. Revised Recovery Plan for the Mojave Population of the Desert Tortoise (*Gopherus agassizii*). U.S. Fish and Wildlife Service, California and Nevada Region, Sacramento, California.
- [USFWS] U.S. Fish and Wildlife Service. 2015. Range-wide Monitoring of the Mojave Desert Tortoise (*Gopherus agassizii*): 2013 and 2014 Annual Reports. Report by the Desert Tortoise Recovery Office, U.S. Fish and Wildlife Service, Reno, Nevada.
- [USFWS] U.S. Fish and Wildlife Service. 2016. Range-wide Monitoring of the Mojave Desert Tortoise (*Gopherus agassizii*): 2015 and 2016 Annual Reporting. Report by the Desert Tortoise Recovery Office, U.S. Fish and Wildlife Service, Reno, Nevada.
- [USFWS] U.S. Fish and Wildlife Service. 2018. Range-wide Monitoring of the Mojave Desert Tortoise (*Gopherus agassizii*): 2017 Annual Reporting. Report by the Desert Tortoise Recovery Office, U.S. Fish and Wildlife Service, Reno, Nevada.
- [USFWS] U.S. Fish and Wildlife Service. 2019. Range-wide Monitoring of the Mojave Desert Tortoise (*Gopherus agassizii*): 2018 Annual Reporting DRAFT. Report by the Desert Tortoise Recovery Office, U.S. Fish and Wildlife Service, Reno, Nevada.
- [USFWS] U.S. Fish and Wildlife Service. 2020. Range-wide Monitoring of the Mojave Desert Tortoise (*Gopherus agassizii*): 2019 Annual Reporting DRAFT. Report by the Desert Tortoise Recovery Office, U.S. Fish and Wildlife Service, Reno, Nevada. 42 pages.
- [USFWS] U.S. Fish and Wildlife Service. 2022a. Range-wide Monitoring of the Mojave Desert Tortoise (*Gopherus agassizii*): 2020 Annual Reporting DRAFT. Report by the Desert Tortoise Recovery Office, U.S. Fish and Wildlife Service, Reno, Nevada.
- [USFWS] U.S. Fish and Wildlife Service. 2022b. Range-wide Monitoring of the Mojave Desert Tortoise (*Gopherus agassizii*): 2021 Annual Reporting DRAFT. Report by the Desert Tortoise Recovery Office, U.S. Fish and Wildlife Service, Reno, Nevada.