

DESERT TORTOISE COUNCIL

3807 Sierra Highway #6-4514

Acton, CA 93510

www.deserttortoise.org

eac@deserttortoise.org

Via email and BLM National NEPA Portal

7 August 2024

Attn: Derek Eysenbach/Socorro Solar Project
Bureau of Land Management, Arizona State Office
1 North Central Avenue, Suite 800
Phoenix, AZ 85004
BLM_AZ_CRD_SOLAR@blm.gov

RE: Socorro Solar Project – Scoping Comments (DOI-BLM-AZ-C030-2024-0026-EA)

Dear Mr. Eysenbach,

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

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

We appreciate that the Bureau of Land Management (BLM) ensured that the Council was contacted directly to inform us of the public scoping period for this proposed project. Given the location of the proposed project in habitats potentially occupied/used by the Sonoran desert tortoise (*Gopherus morafkai*) (synonymous with Morafka’s desert tortoise), our comments include recommendations intended to enhance protection of this species and its habitat during activities authorized by the BLM, which we recommend be added to the project’s terms and conditions in the authorizing document (e.g., right of way grant, etc.). Please accept, carefully review, and include in the relevant project files the Council’s following comments and attachments for the proposed project.

Description of the Proposed Project

EDF Renewables (EDFR), doing business as Socorro Peak, LLC (Applicant), requested a right-of-way (ROW) grant from the BLM, Lake Havasu Field Office, to construct, operate and maintain, and decommission a 350 megawatt (MW) solar photovoltaic (PV) facility with battery storage, a 230-kilovolt (kV) to 500-kV generation tie (gen-tie) line, and a 30-foot wide access road on approximately 3,066 acres (project). The entire Project is located within a 5,850-acre application area on BLM-managed lands and within an area designated as a Renewable Energy Development Area (REDA) by the Arizona Restoration Design Energy Project Record of Decision issued by BLM in January 2013. The 1.3-mile long gen-tie would cross lands managed by the BLM and La Paz County. The requested ROW term is for 40 years.

The project's gen-tie line would cross the Central Arizona Project (CAP) and Interstate 10 to the south of the CAP to connect with the proposed Cielo Azul 500-kV Substation. The proposed access road would connect to Harquahala Road on the west side of the solar facility.

The project is located in La Paz County, approximately 35 miles east of Quartzsite and 85 miles west of central Phoenix. It is in the area managed under the Lake Havasu Resource Management Plan (RMP). There are several other solar facilities proposed within 10 miles of the proposed project.

BLM is conducting public scoping prior to preparation on an environmental assessment (EA) for the project. Currently BLM is considering two alternatives – the No Action (No Build) Alternative and the Applicant's Proposed Action as described in the preliminary Plan of Development (project).

No amendments to the Lake Havasu Resource Management Plan have been identified.

Scoping Comments on the Project

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).

In the National Environmental Policy Act (NEPA) document that BLM is preparing to analyze the impacts of the proposed project on the human environment, this document should:

1. Discuss how each proposed alternative fits within the management structure of the current resource management plan (RMP) for the area, including management of adjacent/nearby lands, and meets the regulatory requirements and most important, the statutory requirements under the Federal Land Policy and Management Act (FLPMA).
2. Provide maps of Areas of Critical Environmental Concern (ACECs), and other areas identified for special management by BLM (e.g., science-based Important Connectivity Zones for the tortoise in/near the project area, etc.) and how each alternative would impact the resources for which these lands are managed.

3. Provide maps of all areas identified by Arizona Game and Fish Department (AZGFD) and BLM as managed for the tortoise and other special status wildlife species and if those lands are mitigation lands for previous projects.
4. Identify the lands BLM is effectively managing for the tortoise and demonstrate how it is complying with the Candidate Conservation Agree for the Sonoran Desert Tortoise (USFWS et al. 2015).
5. Provide maps with the locations of existing and proposed solar development projects and transmission lines in the immediate region and an analysis of their direct, indirect, cumulative, interactive, and synergistic impacts for the tortoise and other special status wildlife species.
6. Provide maps that identify the ownership of the lands associated with the proposed alternatives and ownership of surrounding lands.
7. Provide maps with existing and proposed developments/surface disturbance activities on the project site and adjacent lands surrounding the project area.

Compliance with Directives, Policies, Agreements, and Other Relevant Documents

For the Sonoran desert tortoise, please be sure that the action alternatives adhere to and fully implement measures, regulations, and policies including but not limited to the following documents:

- Arizona Game and Fish Department's (2010) Desert Tortoise Survey Guidelines for Environmental Consultants
- Arizona Game and Fish Department's (2014) Guidelines for Handling Sonoran Desert Tortoises Encountered on Development Projects
- Arizona Interagency Desert Tortoise Team's (2008) Recommended Standard Mitigation Measures for Projects in Sonoran Desert Tortoise Habitat. June 2008
- BLM's (2008a) Special Status Species Management. Handbook 6840
- BLM's Sensitive Species List for Arizona. Arizona Instructional Memorandum AZ-IM 2017-009
- BLM's (2015) Advancing Science in the BLM: An Implementation Strategy (Information Bulletin 2015-040)
- BLM's (2021a) Instruction Memorandum IM 2021-046 on Mitigation
- BLM's (2021b) Mitigation Handbook (H-1794-1)
- BLM's (2021c) Mitigation Manual (MS-1794)
- BLM's (2022) Habitat Connectivity on Public Lands Instruction Memorandum 2023-005
- U. S. Fish and Wildlife Service and Cooperating Agencies comprising the Arizona Interagency Desert Tortoise Team's (2015) Candidate Conservation Agreement for the Sonoran Desert Tortoise (*Gopherus morafkai*) in Arizona
- Council on Environmental Quality's (CEQ) 2023 Policy for Implementing NEPA, "Guidance for Federal Departments and Agencies on Ecological Connectivity and Wildlife Corridors"
- Council on Environmental Quality's 2011 Rule for appropriate use of mitigation in Environmental Assessments (EAs) and Environmental Impact Statements (EISs) under the NEPA

Although the location of the proposed project is in an area designated as a REDA by the Arizona Restoration Design Energy Project Record of Decision issued by BLM in January 2013, this designation was made prior to the issuance of the Candidate Conservation Agreement for the Sonoran Desert Tortoise (USFWS et al. 2015) (CCA) to which BLM is signatory. Thus, it is imperative that BLM analyze in the NEPA document how the proposed project would impact the tortoise including direct, indirect, cumulative, interactive, and synergistic effects, how the mitigation that is part of the project description would fully offset these impacts, and how BLM's granting a ROW and required mitigation for the proposed project would comply with BLM's commitments in the CCA.

Proposed Action and Alternatives

BLM was specific in describing the criteria that any suggested alternative must be considered reasonable. A reasonable alternative must meet all three criteria below:

- Meet the BLM's purpose and need;
- Be technically feasible; and
- Be economically feasible.

The purpose of the action is to respond to the Applicant's request for a ROW grant to develop a utility scale solar energy generating facility. The need for the action is to comply with BLM's regulations regarding requests for ROWs, Executive Order 14008, Tackling the Climate Crisis at Home and Abroad, and the Energy Act of 2020.

BLM should identify the locations of bladed or highly degraded tracts of land (e.g., abandoned agricultural fields, etc.) where a utility-scale solar project could be partially or completely located. Such an alternative would not result in the destruction of desert habitats and the mitigation needed to fully offset the functions and values lost from the existing development of these highly degraded habitats would be less. The loss of intact wildlife habitats including the degradation/loss of their ecological functions and values and the mitigation needed to offset these impacts are costly from an economic, environmental, and social perspective.

BLM should consider that wherever the solar project is located, it should be designed and managed to allow wildlife to use the area of the solar arrays and gen-tie line for the life of the project. Construction, operations and maintenance, and management of the area of the solar arrays and gen-tie line would include specific actions for wildlife. Examples of some of these actions include allowing native vegetation to remain; cutting the vegetation and installing the solar panels at elevated heights to allow for the persistence of the native vegetation under the panels; elevating the security fence so that wildlife can pass underneath it, especially at washes, avoiding blading/grading in washes so as not to alter the surface hydrology down-gradient from construction/maintenance activities to avoid indirect impacts to down-gradient vegetation and soils; closing and preventing public access to get-tie lines [this should be done for security purposes (e.g., vandalism, wildfires, etc.) as well as ecological impacts (e.g., spread and proliferation of non-native invasive plants, wildlife collection, increased surface disturbance from proliferation of routes, etc.)]; actively removing non-native invasive plants; and successfully establishing native biotic components of soils impacted by surface disturbance and native perennial and annual plant cover, density, and diversity.

These alternative approaches are 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 Arizona. 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 project could 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 the proposed project not result in the loss of vegetation.

These recommendations should be designed/implemented as a scientific experiment to add to the limited data on this approach to determine the extent of effects on Sonoran desert tortoise populations and movements/connectivity between populations, which is an important issue for this species, particularly over the long-term (see "Desert Tortoise Habitat Linkages/Connectivity among Populations" below). Long-term monitoring for the life of the project would need to be included to accurately evaluate the effectiveness of this strategy (e.g., wildlife cameras, etc.). We remind BLM that under FLPMA Congress directed BLM to "take any action necessary to prevent unnecessary or undue degradation of the lands." Mowing rather than blading, allowing for wildlife access, preventing public access to reduce ongoing and long-term surface disturbance and spread and proliferation of invasive non-native plants, and successful restoration of disturbed areas would help reduce the degradation of public lands used for solar energy projects.

Environmental Assessment (EA) versus Environmental Impact Statement (EIS)

BLM may have already determined that the proposed project would not have a significant effect on the human environment because it has decided to prepare an EA rather than an EIS. The Council on Environmental Quality's (CEQ's) regulations for implementing NEPA (40 CFR 1508.27) direct federal agencies to consider both context and intensity when determining whether a proposed action may have a significant effect on the human environment.

(a) Context. This means that the significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of the proposed action. For instance, in the case of a site-specific action, significance would usually depend upon the effects in the locale rather than in the world as a whole. Both short and long term effects are relevant.

(b) Intensity. This refers to the severity of impact. CEQ lists ten factors that federal agencies must analyze under "intensity" to determine whether any one may result in a significant impact and therefore require the preparation of an EIS.

In the NEPA document, BLM should show the results of the analysis it conducted for these ten factors listed in 40 CFR 1508.27 when analyzing intensity, and BLM should describe the context for each resource topic analyzed including the tortoise. The presentation of this information in the NEPA document allows the public to determine if BLM's analysis of whether the proposed project would have a significant effect on the human environment is complete and accurate. Please provide this requested information the NEPA document.

Connected Actions

Pursuant to Section 1508.25 of the CEQ regulations (40 CFR 1508.25), any draft EIS must cover the entire scope of a proposed action, considering all connected, cumulative, and similar actions in one document. 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. 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). Although BLM proposes to prepare an EA and not an EIS, the Council requests that BLM include this information on connected actions in the NEPA document. Please explain whether any current or proposed actions within the region are connected to the proposed project (e.g., would the proposed project result in /contribute to growth/development of other projects and therefore require analysis of growth-inducing impacts?). If other actions are connected, please analyze them in the EA; if they are not connected, please explain why they are not.

Standardized Surveys – Desert Tortoise and Other Species

For the NEPA document to fully analyze the effects and identify or eliminate potentially significant impacts, the following surveys should be performed to determine the extent of rare plant and animal populations occurring within/using areas to be directly and indirectly impacted.

The project proponent should fund focused surveys for all rare plant and animal species reported from the vicinity of the proposed project. Results of the surveys will determine appropriate permits from AZGFD, Arizona Department of Agriculture (AZDA), BLM, and U.S. Fish and Wildlife Service (USFWS) and appropriate mitigation measures. Focused plant and animal surveys should be conducted by knowledgeable biologists for respective taxa (e.g., rare plant surveys should be performed by botanists), and to assess the likelihood of occurrence for each rare species or resource (e.g., plant community) that has been reported from the immediate region. Focused plant surveys should occur only if there has been sufficient rainfall to promote germination of annual plants in the spring and late summer. Alternatively, the environmental documents may assess the likelihood of occurrence with a commitment by the proponents to perform subsequent focused plant surveys prior to ground disturbance, when conditions are favorable for germination.

Migratory Birds/Eagles: BLM should ensure that all actions it authorizes are implemented in compliance with the Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act, and associated regulations, executive orders, and policies (e.g., Driscoll 2010, Pagel et al. 2010) to avoid mortality or injury to migratory birds and harassment of eagles.

Burrowing Owl: Surveys for western burrowing owl (*Athene cunicularia*) should be coordinated with the USFWS as the species is protected under the Migratory Bird Treaty Act. BLM should require the implementation of the Burrowing Owl Project Clearance Guidance for Landowners (AZGFD 2009). Surveys for burrowing owls should be conducted by persons with both knowledge and field experience in the biology, ecology, and behavior of burrowing owls and identifying burrowing owl sign. BLM should also require implementing surveys at 30-, 60-, 90-, 120-, and 150-meter intervals in all suitable habitats adjacent to the subject property to collect data to help assess the potential indirect impacts of the project on this species (CDFG 2012). If burrowing owl sign is found, AZGFD (2007) and CDFG (2012) describe appropriate mitigation measures to offset these impacts.

In addition, BLM should demonstrate in the NEPA document how it will comply with “E.O. 13186 – Responsibilities of Federal Agencies To Protect Migratory Birds.” If burrowing owl sign is found in/near the project site, BLM and the project proponent should develop science-based relocation, mitigation, monitoring, and adaptive management plans with the USFWS and AZGFD and ensure that these plans are implemented. We recommend that researchers with expertise on the western burrowing owl from the U.S. Geological Survey, the scientific research branch of the Department of the Interior, be included in the development of the relocation, mitigation, monitoring, and adaptive management plans.

Sonoran Desert Tortoise Surveys: Although there is not a formal protocol survey method for the Sonoran desert tortoise, we believe that the survey methods for Mojave desert tortoise (USFWS 2019) would be appropriate. If the density or cover of perennial vegetation in the project areas is greater than for typical Sonoran desert scrub, the transect width would need to be less than 10 meters to ensure that cryptic tortoises are seen during the tortoise surveys. Because USFWS (2009) and AZGFD require only experienced biologists to perform protocol surveys, USFWS and AZGFD biologists should review the surveyors’ credentials prior to initiating the surveys. Per this protocol, if the impact areas are larger than 500 acres, the surveys must be performed in the time periods of April-May or September-October so that a statistical estimate of tortoise densities can be determined for the “action area” (please see below). If summer rains occur at a project site, surveying following monsoon rains may facilitate seeing tortoises that emerge to forage on new plant growth (Sullivan et al. 2016) or to drink. If any tortoise sign is found, the project proponent should coordinate with USFWS and AZGFD to determine if significant environmental impacts are likely to occur from implementation of the proposed project. If tortoises are present, the project proponent must obtain appropriate agency authorizations prior to conducting any ground disturbance.

We request that protocol-level surveys be performed in the action area of the proposed project *and the alternatives that are being considered* in the NEPA document. The results of these surveys should be published in the NEPA document and should include density estimates for each alternative assessed for the proposed project.

To determine the full extent of impacts to tortoises and to facilitate compliance with pertinent guidelines and agreements, authorized biologist(s) should consult with the USFWS to determine the action area for the proposed project. The USFWS defines “action area” in the Code of Federal Regulations and their Desert Tortoise Field Manual (USFWS 2009) as “all areas to be affected directly or indirectly by proposed development and not merely the immediate area involved in the action (50 CFR §402.02).” Although the “action area” is a term applied to consultation for species listed under the Federal Endangered Species Act, this methodology is relevant to all species regardless of their regulatory status.

The Council’s persisting concern is that proponents of solar projects continue to identify a single site for development without any apparent attempt to identify alternative sites. As such, when focused studies reveal data indicating substantial or important use of the proponent’s selected site, because there is only one site identified for the project, there is no opportunity to select an alternative site or modify the configuration of the site so that impacts could be minimized.

For example, we request that the “action area” of the proposed project be several times larger than the project footprint so that those portions of the site with fewer tortoises/tortoise sign could be selected for development. 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.

We request that the alternative with the fewest direct, indirect, and cumulative impacts to tortoises be selected for development.

The USFWS’s Desert Tortoise Recovery Office recommends desert tortoise protocol surveys (USFWS 2019) for the Sonoran desert tortoise be conducted on a given site, but all too often translocation sites are ignored. We feel strongly that protocol surveys should occur on multiple or enlarged project sites as given above *and* on all proposed translocation sites, assuming tortoises will be translocated.

Sonoran Desert Tortoise Impacts Analysis:

Analysis of Direct and Indirect Impacts: The alternatives analysis should include an economic analysis that provides the total cost of implementing each alternative so the public can see how much the total cost of each alternative is. This would include an analysis of the costs of replacing all natural 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, not just acquisition, management, monitoring, and adaptive management costs.

The NEPA document should include a thorough analysis of the status and trend of the tortoise in the action area, nearby tortoise populations, and rangewide. 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, operations and maintenance, decommissioning, and restoration of the public lands. The NEPA document should use the data from focused plant and wildlife surveys in the analysis of the direct, indirect, synergistic, interactive, and cumulative impacts of the proposed project on the Sonoran desert tortoise and its habitat, other listed species, and species of special concern designated by USFWS, AZGFD, and BLM.

We expect that the NEPA document will describe how many acres would be impacted directly by solar arrays, access roads to the site, administration/maintenance buildings, parking areas, transmission towers, switchyards, laydown areas, internal access roads, access roads along gen-tie lines, perimeter roads, perimeter fencing, substations, battery storage, etc. i.e., the project footprint). We also request that separate calculations document how many acres of desert tortoise habitat would be temporarily versus permanently impacted both directly and indirectly (e.g., “road effect zone,” etc.) by the proposed project. As described below, these acreages should be based on field surveys for tortoises and available models.

Road Effect Zone: We request that the NEPA document include information on the locations, sizes, and arrangements of roads to the proposed project and within them, who will have access to them, whether the access roads will be secured to prevent human access or vandalism to project facilities, and if so, what methods would be used. The presence/public use of roads even with low vehicle use has numerous adverse effects on the desert tortoise and its habitats that have been reported in the scientific literature¹ (see footnote for a bibliography compiled by the Council in 2019). 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 including the tortoise through numerous mechanisms that 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 NEPA document an analysis of 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 local population, regional, 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, vandalism and/or collection, and wildfires. The analysis of the impacts from road establishment and use should include cumulative effects to the tortoise with respect to nearby occupied habitats, areas identified as important linkage habitat for connectivity between nearby occupied habitats as these linkage areas serve as corridors for maintaining genetic and demographic connectivity between populations, regionally, and rangewide (see *Desert Tortoise Habitat Linkages/Connectivity among Populations* below). These and other indirect impacts to the Sonoran desert tortoise should be analyzed in the NEPA document from project construction, operations and maintenance, decommissioning, and habitat restoration.

¹ <https://www.dropbox.com/scl/fi/bl221ei0ved0tmridfts5/Road-Impacts-Bibliography.pdf?rlkey=91w1zlkjzc7w6ifi4tn7h8yrv&dl=0>

Desert Tortoise Habitat Linkages/Connectivity among Populations: The NEPA document should analyze how the alternatives would impact the movement of tortoises relative to linkage habitats/corridors. The NEPA document should include an analysis of the minimum linkage design necessary for conservation of the desert tortoise (e.g., USFWS 2011, Hromada et al. 2020, Averill-Murray et al. 2021), and how the project, along with other existing projects, would impact the linkages between tortoise populations. We strongly request that the environmental consequences section of the NEPA document include a thorough analysis of this indirect effect (40 CFR of Federal Regulations 1502.16) and appropriate mitigation to maintain the function of population connectivity for the Sonoran desert tortoise and other wildlife species. Similarly, please document how this project may impact proximate conservation areas, such as BLM-designated ACECs. Please refer to the CEQ's "Guidance for Federal Departments and Agencies on Ecological Connectivity and Wildlife Corridors" issued in 2023 for more information on how to analyze these impacts and show compliance with this CEQ document in the NEPA document.

Mitigation and Mitigation Plans

The NEPA document should include effective mitigation for all direct, indirect, cumulative, synergistic, and interactive effects to the tortoise and its habitats that are described in mitigation plans. The mitigation plans should demonstrate the use of the best available science with a commitment to implement the mitigation commensurate to impacts to the tortoise and its habitats. Mitigation should include a fully-developed desert tortoise translocation plan, including protection of tortoise translocation area(s) from future development and human disturbance in perpetuity; predator management plan; non-native plant species management plan; fire prevention/management plan; soils and vegetation restoration plan for temporarily disturbed areas; 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 ROW is terminated and the proposed project is decommissioned.

All plans should be provided in the NEPA document so the public and the decision maker can determine their adequacy (i.e., whether they are scientifically rigorous and would be effective in mitigating for the displacement and loss of tortoises and degradation and loss of tortoise habitat from project implementation). Too often, such plans are alluded to in the NEPA document and promised later, which does not allow the reviewers including the public to assess their adequacy. This is unacceptable. If not available as appendices in the draft NEPA document, all indicated plans must be published in the final environmental documents. Their inclusion is necessary to determine their adequacy for mitigating direct, indirect, synergistic, interactive, and cumulative impacts, and monitoring for effectiveness and adaptive management regarding the desert tortoise. If these plans are not provided, it is not possible for BLM, other decision makers, and the interested public to determine the environmental consequences of the project to the tortoise.

These mitigation plans should include an implementation schedule that is tied to key actions of the construction, operation, maintenance, decommissioning, and restoration phases of the projects 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.

Desert Tortoise Management Oversight Group's (MOG) "Compensation for the Desert Tortoise": The NEPA document should demonstrate how it will comply with the commitment BLM made in this document to compensate for tortoise habitat degraded or destroyed from implementation of the proposed projects.

BLM Manual 6840: Special Status Species Management includes the following BLM directives (BLM 2008a) that are applicable to the Sonoran 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 Federal Endangered Species Act (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 State Director(s).

6840.02 Objectives. The objectives of the BLM special status species policy are (1) 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, and, (2) to initiate proactive conservation measures that reduce or eliminate threats to BLM-sensitive species to minimize the likelihood of and need for listing of these species under the FESA, which includes the Sonoran desert tortoise. With respect to the Sonoran desert tortoise, we request that the proposed action or other alternatives contribute to meeting objectives in BLM Manual 6840 – Special Status Species Management (BLM 2008a).

BLM should describe and analyze how each alternative would implement the objectives of this BLM policy for the tortoise.

Translocation Plan – Translocated Tortoises & Translocation Sites: BLM should have a translocation plan for the tortoise because there is always the likelihood that one or more tortoises, if not found during the preconstruction surveys, would move onto the project area during the construction and decommissioning phases of the proposed project. The translocation plan should address several questions including: 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 rainfall conditions that may exacerbate translocation success? Were tortoises translocated to a site where they would be protected from threats (e.g., off-highway vehicles, other sources of surface disturbance, etc.)? These questions should be answered in the Environmental Consequences section of the NEPA document and the Translocation Plan.

The project proponent should implement the USFWS's Translocation Guidance (USFWS 2020) and any revisions or amendments to this guidance by the USFWS's Desert Tortoise Recovery Office (DTRO), and coordinate translocation with BLM and AZGFD. In addition, the translocation plan should be developed in coordination with the DTRO using lessons learned from earlier and ongoing translocation efforts (e.g., increased predation, drought, time of year, distance moved, hydrating tortoises, etc.). Please see "Appendix A – Recent Research, Results, and Guidance on Translocation of the Desert Tortoise" (attachment).

The Translocation Plan should include implementation of a science-based monitoring plan approved by the USFWS and AZGFD 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 and AZGFD 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 to another site, the focus of the Translocation Guidance, does not guarantee their survival and persistence at the translocation sites, especially if they 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 sites to enhance them for the benefit of the tortoise in perpetuity.

Tortoise Predators and a Predator Management Plan: Common ravens are known predators of the 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 et al. 2006). 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.

The NEPA document should analyze if these new uses 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 BLM should require science-based management of common raven, coyote, and badger predation on tortoises in the action area. This would include the translocation site(s).

For local impacts, the Predator Management 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 projects). This includes buildings, fences, and other vertical structures associated with the project sites. In addition, the Predator Management Plan should include provisions that eliminate the pooling of water on the ground or on roofs.

The Predator Management 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.

We request that for any of the gen-tie line options, the project use infrastructure (particularly towers) that prevent raven nesting and perching for hunting. For example, for gen-tie/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 includes 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. We request that the NEPA document 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 and access road.

Habitat Compensation Plan: The NEPA document should include an analysis of all proposed mitigation and how its implementation (including monitoring for effectiveness and adaptive management) would implement its commitment in the CCA for Sonoran desert tortoises (USFWS et al. 2015) and ensure that the proposed project results in "no net loss in quantity and quality of Sonoran desert tortoise habitat....and using offsite mitigation (compensation) for unavoidable residual habitat loss."

Restoration Plan: BLM should require the Applicant to develop and implement a restoration plan that reestablishes the ecological functions and values that were present at the project site prior to construction of the solar project.

Climate Change and Non-native Plants

Climate Change: We request that the NEPA document address the effects of the proposed action on climate change 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. We strongly urge that the BLM require the project proponent to develop and implement management and monitoring plans using this analysis and other relevant data that would reduce the transport to and spread of nonnative seeds and other plant propagules within the project area, actively establish native annual and perennial vegetation, and eliminate/reduce the likelihood of human-caused fires. The plan should integrate vegetation management with fire prevention and fire response.

Impacts from Proliferation of Nonnative Plant Species and Management Plan: The NEPA document should include an analysis of how the proposed project would contribute to the spread and proliferation of non-native 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 projects may affect the frequency, intensity, and size of human-caused and naturally occurring fires. For reasons given in the previous paragraph, we strongly urge that the BLM require the project proponent to develop and implement management and monitoring plans for nonnative plant species. The plans should integrate management/enhancement of native vegetation with fire prevention and fire response to wildfires.

Hydrology and Water Quality

Regarding quality and quantity of surface and ground water, the NEPA document should include an analysis of the impacts of water acquisition, use, and discharge for construction, panel washing, potable uses, decommissioning, and any other uses associated with the proposed project, and cumulative impacts from water use and discharge on native perennial shrubs and annual vegetation used for forage by the Sonoran desert tortoise, including downstream impacts. The NEPA document should analyze how any grading or washes an grading, placement, and/or use of any project facilities including roads and detention basins will impact downstream/downslope surface flows that are reduced, altered, eliminated, or enhanced. This analysis should include impacts to soil moisture and soil biota; cover, density and diversity of native and non-native vegetation (Devitt et al. 2022); and habitats for wildlife species including the Sonoran desert tortoise, for which washes are of particular importance for feeding, shelter, and movements (Zylstra and Steidl 2009). Appropriate mitigation should be required to ensure that the project does not alter surface flow from pre-project conditions.

Therefore, we request that the NEPA document include an analysis of how water use during construction, operations and maintenance, decommissioning, and habitat restoration will impact the levels of ground water in the region. These levels may then impact surface and near-surface flows at springs, seeps, wetlands, pools, and groundwater-dependent vegetation in the basins. The analyses of water quality and quantity of surface and ground water should include appropriate measures to ensure that these impacts are fully mitigated, preferably beginning with avoidance and continuing through CEQ's other forms of mitigation (40 CFR 1508.20).

Federal Land Policy and Management Act

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 Sonoran 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, BLM must consider the quality or condition of the environment of the Sonoran desert tortoise with respect to the species’ requirements for persistence and must maintain this habitat quality under FLPMA.

Cumulative Effects and Its Analysis

In the cumulative effects analysis of the NEPA document, please ensure that the CEQ’s “Considering Cumulative Effects under the National Environmental Policy Act” (1997) is followed, including the eight principles, when analyzing cumulative effects of the proposed action to the affected resource issues. This CEQ document is referred to in BLM’s National Environmental Policy Act Handbook (BLM 2008b).

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.”

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 needs 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.

Note that CEQ recognizes that synergistic and interactive impacts as well as cumulative impacts should be analyzed in the NEPA document for the resource issues.

We request that the NEPA document (1) include these eight principles in its analysis of cumulative impacts to the Sonoran desert tortoise for each alternative; (2) address the sustainability of the tortoise in the region; and (3) include mitigation along with monitoring and adaptive management plans that protect desert tortoises and their habitats during construction, operations and maintenance, and decommissioning of approved facilities.

To help BLM understand the complexity of the cumulative and interactive nature of multiple anthropogenic threats to desert tortoise populations and to help develop BLM's analysis of cumulative impacts in the NEPA document for this proposed project, we have included a map of some of these multiple threats and their relationships to other threats (Tracy et al. 2004) (please see Figure 1).

In addition, we request that BLM add this project and its impacts to a database and geospatial tracking system for special status species, including Sonoran desert tortoises, which track cumulative impacts (e.g., surface disturbance, paved and unpaved routes, linear projects, invasive species occurrence, herbicide/pesticide use, wildfires, etc.), management decisions, and effectiveness of mitigation for each project. Without such a tracking system, BLM is unable to determine whether its management for the tortoise complies with its commitment in the CCA for the Sonoran desert tortoise (USFWS et al. 2015) to implement landscape level conservation measures (Section 9.1.1), local conservation measures (Section 9.1.2), and Agency-Specific Species and Habitat Conservation Actions (Section 9.2.1 for BLM). Please add these proposed projects to this data base and geospatial tracking system and explain in the NEPA document how the proposed projects with required mitigation will adhere to these commitments in the CCA including in section 9.2.1 “[r]enewable energy projects have been sited to avoid all occupied SDT [Sonoran desert tortoise] habitat. Roads, pipelines and transmission lines have been designed to minimize impacts to SDT habitat or mitigated to achieve no net loss.”

We appreciate this opportunity to provide the above comments and trust they will help protect tortoises during any resulting authorized activities. Herein, we reiterate that the Council wants to be identified as an Affected Interest for this and all other projects funded, authorized, or carried out by the BLM that may affect desert tortoises, and that any subsequent environmental documentation for this project is provided to us at the contact information listed above. Additionally, we ask that you notify the Desert Tortoise Council at eac@deserttortoise.org of any proposed projects that BLM may authorize, fund, or carry out in the range of any species of desert tortoise in the southwestern United States (i.e., *Gopherus agassizii*, *G. morafkai*, *G. berlandieri*, *G. flavomarginatus*) so we may comment on them to ensure BLM fully considers and implements actions to conserve these tortoises as part of its directive to conserve biodiversity on lands managed by BLM.

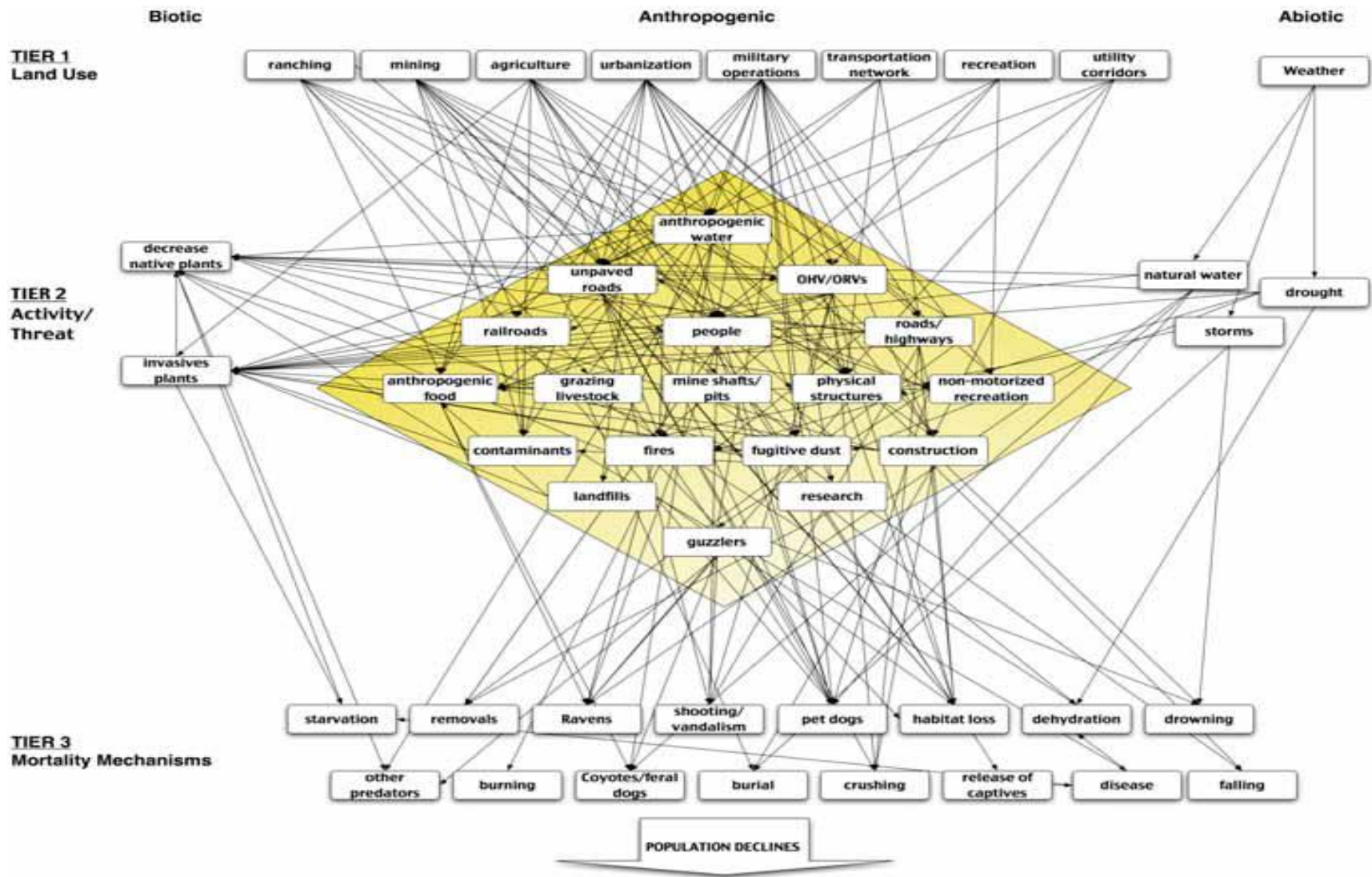
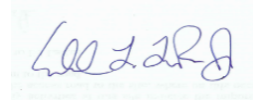


Figure 1. Network of threats demonstrating the interconnectedness between multiple human activities that interact to impact tortoise populations through a suite of mortality factors.

Please respond in an email that you have received this comment letter so we can be sure our concerns have been registered with the appropriate personnel and office for this Project.

Respectfully,



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

Attachment: Appendix A – Recent Research, Results, and Guidance on Translocation of the Desert Tortoise

Cc: Ann McPherson, Environmental Review, U.S. Environmental Protection Agency, mcperson.ann@epa.gov
Raymond Suazo, Arizona State Director, Bureau of Land Management, blm_az_asoweb@blm.gov
Heather Whitlaw, Field Supervisor, Arizona Ecological Services Field Office (Phoenix), U.S. Fish and Wildlife Service, heather_whitlaw@fws.gov

Literature Cited

Averill-Murray, R.C., T.C. Esque, L.J. Allison, S. Bassett, S.K. Carter, K.E. Dutcher, S.J. Hromada, K.E. Nussear, and K. Shoemaker. 2021. Connectivity of Mojave Desert tortoise populations—Management implications for maintaining a viable recovery network. U.S. Geological Survey Open-File Report 2021–1033, 23 p., <https://doi.org/10.3133/ofr20211033>.

<https://pubs.usgs.gov/of/2021/1033/ofr20211033.pdf>

[AZGFD] Arizona Game and Fish Department. 2007. Burrowing Owl Management Guidelines for Municipalities in Arizona.

https://s3.amazonaws.com/azgfd-portal-wordpress/PortalImages/files/wildlife/nongame/eagles/BUOWMunicipalitiesWhitePaper_Final_20070618.pdf

[AZGFD] Arizona Game and Fish Department. 2009. Burrowing Owl Project Clearance Guidance for Landowners.

https://s3.amazonaws.com/azgfd-portal-wordpress/PortalImages/files/wildlife/nongame/eagles/BurrowingOwlClearanceProtocol_2009.pdf

[AZGFD] Arizona Game and Fish Department. 2010. Desert Tortoise Survey Guidelines for Environmental Consultants, June 2010.

<https://s3.amazonaws.com/azgfd-portal-wordpress/PortalImages/files/wildlife/2010SurveyguidelinesForConsultants.pdf>.

- [AZGFD] Arizona Game and Fish Department. 2014. Guidelines for handling Sonoran desert tortoises encountered on development projects. Arizona Game and Fish Department, Revised September 22, 2014.
<https://s3.amazonaws.com/azgfd-portal-wordpress/PortalImages/files/wildlife/2014%20Tortoise%20handling%20guidelines.pdf>.
- Arizona Interagency Desert Tortoise Team. 2008. Recommended standard mitigation measures for projects in Sonoran desert tortoise habitat. June 2008.
<https://s3.amazonaws.com/azgfd-portal-wordpress/PortalImages/files/wildlife/MitigationMeasures.pdf>
- [BLM] U.S. Bureau of Land Management. 2008a. Special Status Species Management. Handbook 6840. December 12, 2008.
https://www.blm.gov/sites/blm.gov/files/uploads/mediacenter_blmpolicymanual6840.pdf
- [BLM] U.S. Bureau of Land Management. 2008b. H-1790-1 - National Environmental Policy Act Handbook. National Environmental Policy Act Program, Office of the Assistant Director, Renewable Resources and Planning, Washington, D.C. January 2008.
https://www.blm.gov/sites/blm.gov/files/uploads/Media_Library_BLM_Policy_Handbook_h1790-1.pdf
- [BLM] U.S. Bureau of Land Management. 2015. Advancing Science in the BLM: An Implementation Strategy IB 2015-040. March 18, 2015.
<https://www.blm.gov/policy/ib-2015-040>
- [BLM] U.S. Bureau of Land Management. 2017. Updated Bureau of Land Management Sensitive Species List for Arizona. Arizona Instructional Memorandum AZ-IM-2017-009. March 1, 2017.
- [BLM] U.S. Bureau of Land Management. 2021a. Reinstating the Bureau of Land Management (BLM) Manual Section (MS-1794) and Handbook (H-1794-1) on Mitigation. Instruction Memorandum IM 2021-046. September 22, 2021.
- [BLM] U.S. Bureau of Land Management. 2021b. Mitigation Handbook (H-1794-1).
https://www.blm.gov/sites/default/files/docs/2021-10/IM2021-046_att2.pdf.
- [BLM] U.S. Bureau of Land Management. 2021c. Mitigation Manual (MS-1794). Bureau of Land Management, September 22, 2021.
https://www.blm.gov/sites/default/files/docs/2021-10/IM2021-046_att1_0.pdf.
- [BLM] U.S. Bureau of Land Management. 2022. Habitat Connectivity on Public Lands Instruction Memorandum 2023-005.
<https://www.blm.gov/policy/im-2023-005-change-1>

- 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.
<https://www.sciencedirect.com/science/article/abs/pii/S0140196306003016>
- [CDFW] California Department of Fish and Wildlife. 2012. Staff report on burrowing owl mitigation. The 7 March 2012 memo replacing 1995 staff report, State of California Natural resources Agency, Department of Fish and Wildlife. 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.
https://ceq.doe.gov/publications/cumulative_effects.html
- [CEQ] Council on Environmental Quality. 2011. Final Guidance for Federal Departments and Agencies on the Appropriate Use of Mitigation and Monitoring and Clarifying the Appropriate Use of Mitigated Findings of No Significant Impact.
<https://www.federalregister.gov/documents/2011/01/21/2011-1188/final-guidance-for-federal-departments-and-agencies-on-the-appropriate-use-of-mitigation-and>
- [CEQ] Council on Environmental Quality. 2023. Guidance for Federal Departments and Agencies on Ecological Connectivity and Wildlife Corridors. March 21, 2023.
<https://www.whitehouse.gov/wp-content/uploads/2023/03/230318-Corridors-connectivity-guidance-memo-final-draft-formatted.pdf>
- Devitt, D.A., L. Apodac, B. Bird, J.P. Dawyot, Jr., L. Fenstermaker, and M.D. Petrie. 2022. Assessing the impact of a utility scale solar photovoltaic facility on a down gradient Mojave Desert ecosystem. *Land* 2022, 11, 1315.
<https://doi.org/10.3390/land11081315>
- 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.
<https://www.int-res.com/articles/esr2010/12/n012p167.pdf>
- 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* 2020 8/38 doi: 10.1186/s40462-020-00224-8
<https://pubmed.ncbi.nlm.nih.gov/33042548/>

- 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.mdlt.org/climate-change/>
- [MOG] Desert Tortoise Management Oversight Group. 1991. Compensation for the desert tortoise.
<https://www.tortoise.org/conservation/hastey1991.pdf>
<http://www.redcliffsdesertreserve.com/wp-content/uploads/2006/02/MOG-Compensation-for-the-desert-tortoise.pdf>
- 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.
<https://www.sciencedirect.com/science/article/abs/pii/S0006320713001043>
- Novack, E. 2015. Segmentation of Environmental Review: Why Defenders of Wildlife v. U.S. Navy Threatens the Effectiveness of NEPA and the ESA. *Boston College Environmental Affairs Law Review* Volume 42 Issue 1 page 243.
<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. Houlihan, 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.
<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.
<https://academic.oup.com/jmammal/article/84/2/547/2373458>

- Sullivan, B.K, A.K. Owens, K.O. Sullivan, and E.A. Sullivan, 2016. Spatial Ecology of Sonoran Desert Tortoises (*Gopherus morafkai*): I. Fidelity in Home Range, Refuge Use and Foraging Behavior. *Journal of Herpetology* (2016) 50 (4): 509–519.
<https://doi.org/10.1670/15-148>
- [USFWS] U.S. Fish and Wildlife Service. 2009. Desert Tortoise (Mojave Population) Field Manual: (*Gopherus agassizii*). December 2009. Region 8, Sacramento, California.
<https://www.fws.gov/sites/default/files/documents/Desert-Tortoise-Field-Manual.pdf>
- [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.
<https://www.fws.gov/sites/default/files/documents/USFWS.2011.RRP%20for%20the%20Mojave%20Desert%20Tortoise.pdf>
- [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. Reno, NV. October 8, 2019.
https://www.fws.gov/sites/default/files/documents/Mojave%20Desert%20Tortoise_Pre-project%20Survey%20Protocol_2019.pdf
- [USFWS] U.S. Fish and Wildlife Service. 2020. Revised Translocation of Mojave Desert Tortoises from Project Sites: Plan Development Guidance and Attachments 1 and 2. 52 pp.
<https://www.fws.gov/media/revised-usfws-dt-translocation-guidance>
<https://www.fws.gov/media/translocation-guidance-attachment-1-clearance-survey-protocol-0>
<https://www.fws.gov/media/translocation-guidance-attachment-2-temporary-captive-care-wild-mojave-desert-tortoises>
- [USFWS et al.] U.S. Fish and Wildlife Service, Bureau of Land Management, Bureau of Reclamation, National Park Service, Department of Defense, Customs and Border Protection, U.S. Forest Service, Natural Resources Conservation Service, Arizona Game and Fish Department, and Arizona Department of Transportation. 2015. Candidate Conservation Agreement for the Sonoran Desert Tortoise (*Gopherus morafkai*) in Arizona. May 27, 2015.
<https://www.blm.gov/sites/blm.gov/files/policies/IMAZ-2016-004-a1.pdf>
- von Seckendorff Hoff, K. and R. Marlow. 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.
- Zylstra, E.R. and R.J. Steidl. 2009. Habitat Use by Sonoran Desert Tortoises. *Journal of Wildlife Management* 73(5):747-754.
<https://wildlife.onlinelibrary.wiley.com/doi/abs/10.2193/2008-446>

Appendix A – Recent Research, Results, and Guidance on Translocation of the Desert Tortoise

- Brand, L.A., M. Farnsworth, J. Meyers, B.G. Dickson, C.P. Grouios, A.F. Scheib, and R.D. Scherer. 2016. Mitigation-driven translocation effects on temperature, condition, growth, and mortality of Mojave desert tortoise (*Gopherus agassizii*) in the face of solar energy development. *Biological Conservation* 200:104-111.
<https://www.sciencedirect.com/science/article/abs/pii/S0006320716302130>
- Castillo, S. 2021. Desert Tortoise Deaths Near New Nevada Solar Farm Draw Study. Associated Press and Las Vegas Review-Journal. July 30, 2021.
<https://www.reviewjournal.com/news/science-and-technology/desert-tortoise-deaths-raise-concerns-as-solar-farms-solve-energy-need-2408456/>
- Dickson, B.G., R.D. Scherer, A.M. Kissel, B.P. Wallace, K.M. Langin, M.E. Gray, A.F. Scheib, and B. Weise. 2019. Multiyear monitoring of survival following mitigation-driven translocation of a long-lived threatened reptile.
<https://doi.org/10.1111/cobi.13301>
<https://conbio.onlinelibrary.wiley.com/doi/abs/10.1111/cobi.13301>
- Drake, K., K. Field, K. Holcomb, and C. Mitchell. 2024. Understanding how Wile E. Coyote & friends outsmarted us all and the impacts predators have on Mojave desert tortoise recovery. Abstract. Annual Desert Tortoise Council Symposium.
https://deserttortoise.org/wp-content/uploads/Berry_19Jan2024-Final-Abstracts-for-web-printing.pdf
- Harju, S.M., S.M. Cambrin, R.C. Averill-Murray, M. Nafus, K.J. Field, and L.J. Allison. 2020. Using incidental mark-encounter data to improve survival estimation. *Ecology and Evolution*. 2020;10:360–370.
https://www.fws.gov/sites/default/files/documents/Harju%20et%20al%202020_Using%20Incidental%20data%20to%20improve%20survival%20estimation.pdf
- Henen, B. T. 2024. Desert tortoise translocation of the Marine Corps Air Ground Combat Center (Combat Center) in 2023. Abstract. 49th Annual Desert Tortoise Council Symposium.
https://deserttortoise.org/wp-content/uploads/Berry_19Jan2024-Final-Abstracts-for-web-printing.pdf
- Mack, J.S., and K.H. Berry. 2023. Drivers of survival of translocated tortoises. *Journal of Wildlife Management* 87(2):(27 pages) (February 2023) 87:e22352.
<https://doi.org/10.1002/jwmg.22352>
- Mulder, K.P., A.D. Walde, W.I. Boarman, A.P. Woodman, E.K. Latch, and R.C. Fleischer. 2017. No paternal genetic integration in desert tortoises (*Gopherus agassizii*) following translocation into an existing population. *Biological Conservation* 210:318-324.
<https://www.sciencedirect.com/science/article/abs/pii/S0006320717307127>

- Nafus, M.G., T.C. Esque, R.C. Averill-Murray, K.E. Nussear, and R.R. Swaisgood. 2017. Habitat drives dispersal and survival of translocated juvenile desert tortoises. *Journal of Applied Ecology* 54:430-438. doi:10.1111/1365-2664.12774.
<https://besjournals.onlinelibrary.wiley.com/doi/epdf/10.1111/1365-2664.12774>
- Nussear, K. E., C. R. Tracy, P. A. Medica, D. S. Wilson, R. W. Marlow, and P. S. Corn. 2012. Translocation as a conservation tool for Agassiz's Desert Tortoises: survivorship, reproduction, and movements. *Journal of Wildlife Management* 76:1341–1353.
<https://wildlife.onlinelibrary.wiley.com/doi/epdf/10.1002/jwmg.390>
- Scott, P.A., L.J. Allison, K.J. Field, R.C. Averill-Murray, and H.B. Shaffer. 2020. Individual heterozygosity predicts translocation success in threatened desert tortoises. *Science* 370:1086-1098.
<https://www.fws.gov/sites/default/files/documents/Scott%20et%20al%202020%20Indivi%20heterozygosity%20predicts%20translocation%20success.pdf>
- Sullivan, B.K., E.M. Nowak, and M.A. Kwiatkowski. 2014. Problems with mitigation translocation of herpetofauna. *Conservation Biology* 29(1): 12–18.
<https://doi.org/10.1111/cobi.12336>
- 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. [also see Attachments 1 and 2]
<https://www.fws.gov/sites/default/files/documents/Revised%20USFWS%20DT%20Translocation%20Guidance%20and%20attachments.pdf>
- [Attachment 1] U.S. Fish and Wildlife Service. 2019. Translocation Guidance Attachment 1: Clearance survey protocol.
https://www.fws.gov/sites/default/files/documents/Attachment%201.Clearance%20survey%20protocol_final.pdf
- [Attachment 2] San Diego Zoo Global. 2010. Temporary Captive Care of Wild Mojave Desert Tortoises: Examples of Protocols Used at the Desert Tortoise Conservation Center
<https://www.fws.gov/sites/default/files/documents/Attachment%202.Temporary%20Captive%20Care%20of%20Wild%20Mojave%20Desert%20Tortoises.pdf>
- 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.
https://www.fws.gov/sites/default/files/documents/Mojave%20Desert%20Tortoise%20population%20augmentation%20strategy_2021FEB.pdf
- U.S. Fish and Wildlife Service. 2022. Translocation Plan for the Stump Springs Regional Augmentation Site, Clark County, Nevada.
https://www.fws.gov/sites/default/files/documents/2022-02-08_FINAL%20Revised%20Stump%20Springs%20Translocation%20Plan.pdf