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**Via email only**

July 14, 2020

Michael Evans
Bureau of Land Management
Pahrump Field Office
4701 North Torrey Pines Drive
Las Vegas, NV 89130
mevans@blm.gov

Re: Reward Mining Project Draft Environmental Assessment N-82840 (DOI-BLM-NV-S030-2020-0006-EA), Nye County, Nevada

Dear Mr. Evans,

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 the conservation of tortoises in the deserts of the southwestern United States and Mexico, the Council routinely provides information and other forms of assistance to individuals, organizations, and regulatory agencies on matters potentially affecting desert tortoises within their geographic ranges.

We appreciate this opportunity to provide comments on the above-referenced project. Given the location of the proposed action in habitats occupied by Agassiz's desert tortoise (*Gopherus agassizii*) (synonymous with "Mojave desert tortoise"), our comments pertain to enhancing protection of this species during activities authorized by the Bureau of Land Management (BLM).

**Proposed Action and Alternatives** – CR Reward LLC (CRR) currently operates a permitted open pit mining operation at the Reward Project (Project). CCR has submitted a request to modify this operation. BLM describes two alternatives in the EA:

- No Action Alternative – Under this alternative no expansion of the approved existing mining operation or facilities would occur. CRR would continue exploration, mining, and processing as authorized under the 2009 Plan and Plan Amendments from 2010 and 2012. Authorized operations and facilities include: Exploration drill roads and pads; three

open pits and associated open pit mining operations; three waste rock dumps; one heap leach pad (HLP) with a cyanide solution collection system, process solution tank, and vadose zone monitoring; one event pond; ore crushing and temporary stockpile facilities; process plant area and tanks; roads; growth media stockpiles; and ancillary support facilities including administration and maintenance infrastructure, and linear features including powerlines, a water well and water conveyance lines, and desert tortoise exclusion fencing. Full extraction of the defined mineral resource would not occur.

- Proposed Action Alternative – CRR is proposing the following changes: Expansion of the Authorized Plan Area (the Proposed Plan Expansion); modifications to the HLP configuration and disturbance area; modifications to process and event ponds; inclusion of a lean solution processing circuit; inclusion of non-contact stormwater diversions; modifications to/construction of new roads; expansion of desert tortoise exclusion fencing; and alterations to other authorized but not yet constructed facility locations and disturbance areas.

Common to both alternatives, the following hazardous materials would be used at the Plan Area by CRR:

- Diesel fuel, gasoline, oils, greases, anti-freeze, and solvents used for equipment operation and maintenance;
- Sodium cyanide, flocculants, lime, and antiscalants used in mineral extraction processes;
- Ammonium nitrate and high explosives used for blasting in the open pit; and,
- Various byproducts classified as hazardous waste.

For the No Action Alternative, tortoise exclusion fencing has been constructed around the Authorized Plan Area, except for the area of bare rock and steep topography on the east side of the proposed pits, which is not suitable desert tortoise habitat. For the Proposed Action, the location of the tortoise exclusion fencing where it intersects the east and north sides of the proposed pits would be moved to allow excavation of these pits.

The Proposed Plan Area would expand the existing Mining Plan of Operations Authorized Plan Area by 117 acres for a total of 716 acres, 669 of which are public lands administered by the BLM Pahrump Field Office and 47 acres are private lands controlled by CRR. The direct impacts from the Proposed Action would affect an additional 53 acres of disturbance. The Proposed Plan Area is located about 6 miles south southeast of Beatty on the southwest side of the Bare Mountains in Nye County, Nevada. It ranges in elevation from approximately 2,840 feet to 5,200 feet.

**Section 1.1 Purpose and Need** – BLM needs to "to respond to a Plan of Operations (Plan) amendment which would allow an operator [CRR] to prospect, explore, and assess locatable mineral resources on public lands, and not authorize the Project if it is found that the Proposed Action does not comply with the 43 CFR § 3809 regulations and the FLPMA [Federal Land Policy and Management Act] mandate to prevent unnecessary or undue degradation." We interpret this and BLM's description of the Proposed Action as substantial changes to the Authorized Plan of Operation/Authorized Action. If BLM does not approve the Proposed Action/Plan of Operations amendment, CRR would not be able to, or would have their abilities limited, to prospect, explore, and assess locatable mineral resources.

**Section 3.3 Air Quality, Environmental Effects of the Proposed Action** – BLM says, "The construction of haul roads, salvaging of growth media, and earth works related to other altered mine facilities [e.g., crushing rock, etc.] would create fugitive dust emissions in the form of PM10 and particulate matter less than 2.5 microns (PM2.5). These impacts would last for the short term, until the completion of reclamation and revegetation success has been established, estimated to be around 10 years."

We were unable to find information in the EA that provided the length of time that mining activities are expected to occur at the Proposed Plan Area. We presume that CRR does not plan to mine for only a few years when it has invested much time and effort in preparing and revising a mining plan of operation and amendments. Consequently, we presume that mining may continue for a few decades, which means that the generation of dust would continue for a few decades. We do not consider this time to be a "short term." We request that BLM provide this information as it has bearing on impacts to vegetation and wildlife habitat (including habitat needed for forage and cover by the Mojave desert tortoise) that was not analyzed in the EA. Please see our comments below under *Section 3.12.3 Vegetation, Environmental Effects of the Proposed Action*.

**Section 3.6.1 Invasive Species/Noxious Weeds, Affected Environment** – In the EA, BLM says "During vegetation surveys conducted in 2019 (EM Strategies, 2019) no noxious weeds, as defined by Nevada Revised Statutes (NRS) Chapter 555.010 were observed within the Proposed Plan Expansion." In reviewing the list of noxious weeds maintained by the Nevada Department of Agriculture, we note that no species of *Bromus* or *Schismus* are on this list. Please see our comment below under *Section 3.10.3 Threatened, Endangered, Candidate, or Other Sensitive Status Animal Species, Environmental Effects of the Proposed Action* regarding BLM's need to analyze the impacts of the Proposed Action on these invasive species.

**Section 3.10.1 Threatened, Endangered, Candidate, or Other Sensitive Status Animal Species, Affected Environment** – In the EA, BLM says, "For the wildlife surveys conducted in 2019 (EM Strategies, 2019)….No live desert tortoises or sign of desert tortoise were present in the Proposed Plan Expansion, including burrows, scat, or carcasses. The Proposed Plan Expansion contained very little sign of burrowing wildlife of any kind; the area contains no water, few plant resources and is located on very rocky and inhospitable terrain (EM Strategies, 2019)."

In the Literature Cited section of the EA, we did not find this reference for EM Strategies. We did not find the document provided as an appendix. After searching online for it, we were unable to locate it. Consequently, we are unable to determine whether U.S. Fish and Wildlife Service (USFWS 2019) protocol surveys for the Mojave desert tortoise were conducted to determine the presence of the tortoise and tortoise sign. Please add this information to the EA.

The EA provides a habitat map for mule deer and desert bighorn sheep, neither of which is listed under the Federal Endangered Species Act (FESA), but we found no comparable information for the federally threatened Mojave desert tortoise. We suggest that this information be provided along with information on the status and trend of the Mojave desert tortoise in the Eastern Mojave Recovery Unit, which is where the Proposed Action and No Action Alternatives are located.

BLM says, the "emphasis of the 1998 Las Vegas RMP [Resource Management Plan] is to protect unique habitats for threatened, endangered, and special status species while providing areas for community growth, recreation, mineral exploration and development, and other resource uses." These protections would include habitat for the federally threatened Mojave desert tortoise. We have appended a summary of the status and trend of the Mojave desert tortoise in the Eastern Recovery Unit (from USFWS 2015 and Allison and McLuckie 2018), much of which is in the Las Vegas Resource Management Plan area. We request that BLM use this information in its decision-making process, so BLM can determine the effectiveness of the Las Vegas RMP with respect to managing for habitat for the tortoise. Important points include the following:

(1) Tortoise Density: Resource Management Plan is being managed for the tortoise; the density of adult tortoises is 1.9 per square kilometer. Between 2004 and 2014, this Recovery Unit had a decline in density of 67.26 percent.
(2) Tortoise Viability: A density of 1.9 adult tortoises per square kilometer is substantially below the viable level of 3.9 breeding individuals/square km (USFWS 1994) needed to sustain a population.
(2) Tortoise Abundance – Adults and Juveniles: For change in abundance during this same period, adult tortoise numbers declined 67 percent. In addition, Allison and McLuckie (2018) reported that the proportion of juvenile desert tortoises has been decreasing in all five recovery units of the Mojave desert tortoise since 2007.

We request that this information on the status and trend of the Mojave desert tortoise be added to the Affected Environment section of the EA.

**3.10.3 Threatened, Endangered, Candidate, or Other Sensitive Status Animal Species, Environmental Effects of the Proposed Action** – In the EA BLM says, "The taking of desert tortoise is also not likely to occur due to the application of protection measures described in appendices A and B and the extension of the desert tortoise exclusion fence, used to prevent desert tortoise from entering operational areas accessible to tortoise. Other wildlife protection measures, including adherence to speed limits and construction of the power line and communication facilities according to Avian Power Line Interaction Committee (APLIC) standards, would minimize impacts to wildlife including special status species (APLIC 2006 and 2012)."

We were unable to find a discussion of what BLM would require CRR to do if a desert tortoise is found within the Proposed Plan Area. BLM and CRR should have completed formal Section 7 consultation and a relocation/translocation plan should have been prepared to address this issue, during the construction, operations and maintenance, and revegetation phases of the Proposed Action and the No Action Alternatives. Because desert tortoise exclusion fencing does not surround the Proposed Plan Area and breaches of the exclusion fencing will occur during the life of the Proposed Action, it is imperative that BLM and CRR have a Relocation/Translocation Plan in place for tortoises for when tortoises enter the Proposed Plan Area. In addition, it is imperative that exclusion fencing be monitored and maintained throughout all phases (exploration, operations, and reclamation/revegetation/revegetation) of the Proposed Action and No Action Alternatives. Please add this information to the EA and BLM Stipulations in Appendix A.

We were unable to find a discussion and analysis of many indirect impacts to the Mojave desert tortoise or its habitat. Take of the desert tortoise may occur through indirect means. The definition of take includes to harm or harass. In addition, desert bighorn sheep, which is not a federally listed species, is mentioned and a habitat map is provided (Figure 9), but no equitable consideration for the tortoise/tortoise habitat. The EA mentions "Human presence and noises" that "could result in wildlife displacement for the life of the Project" and for "special status species [it] would include the disturbance of approximately 53.0 acres of habitat." However, we were unable to find an analysis of other indirect impacts to the tortoise in this section, such as (1) human subsidies for common ravens (*Corvus corax*) that are known predators of the tortoise; (2) introduction of non-native plant species that change in the availability of nutritious annual forbs needed by tortoises to survive, reproduce, and grow; and (3) increased frequency, size, and intensity of fires in native vegetation associations that are not adapted to fire and its effect on tortoise/tortoise habitat. We request that BLM include an analysis of each of these indirect impacts to the tortoise in the EA.

Human subsidies for common ravens: Common ravens are known predators of the Mojave desert tortoise (Berry et al. 2013, 2014, Hazard et al. 2015, and Nagy et al. 2015) and their numbers have increased substantially because of human subsidies of food, water, and sites for nesting, roosting, and perching to hunt (Boarman 1993, 2003). Resources associated with human activities have allowed their populations to grow beyond their "natural" carrying capacity in the desert habitat (Boarman 1993). For example, powerline poles and towers provide artificial perches and nest sites for common ravens (Lovich and Bainbridge 1999). Ravens are able to fly at least 30 miles in search of food and water on a daily basis (Boarman et al. 2006). Mojave desert tortoises experience hyperpredation (Boarman 2003) when the raven population is maintained by some abundant, often introduced prey (e.g., human subsidies of food) but depredate rare native prey (e.g., Mojave desert tortoise) when they encounter them in the same habitat.

We did not find an analysis of impacts to the Mojave desert tortoise from the Proposed Action providing subsidies of food (trash, human food, animals killed by operation of vehicles and equipment), water (dust suppression, mining operations, pipeline leaks, stormwater diversion channels, etc.), and sites for nesting, roosting, and perching to hunt (e.g., buildings, transmission poles, etc.). Because ravens are able to fly at least 30 miles in search of food and water on a daily basis (Boarman et al. 2006), this analysis should extend out at least 30 miles from the Proposed Project Area. We request that BLM include an analysis of how the Proposed Action would provide subsidies to the common raven, and how these subsidies would impact the Mojave desert tortoise at the Proposed Plan Area and the population of tortoises within 30 miles of the Proposed Plan Area.

CRR should eliminate all sources of human subsidies for ravens in the Plan Area (e.g., human food, human trash, injury/mortality of wildlife from construction, operation and maintenance, and reclamation/revegetation activities, surface water from mining and mitigation activities including puddles from dust abatement activities, and human-created sites for nesting/hunting-perching/roosting such as powerline poles and buildings, etc.).

We request that BLM add a stipulation that requires CRR to develop and implement a raven management plan. This plan would include actions that would eliminate raven subsidies on the Proposed Plan Area (e.g., install/modify transmission poles that prevent raven nesting and perching), and monitoring to determine the effectiveness of these actions. USFWS (2010) provides a template for a project-specific management plan for common ravens. This template includes sections on construction, operation and maintenance, and reclamation (USFWS 2010). In addition, BLM should require CRR to participate in efforts to address regional and cumulative impacts from human subsidies of ravens, as each individual proposed action in a region (i.e., southwest Nevada) contributes to these impacts.

Introduction of non-native plants: There is much information in the scientific literature of the impacts of non-native plants in the Mojave Desert and on the habitat of the Mojave desert tortoise. Factors that facilitate their introduction and spread are surface disturbance, increased carbon dioxide from climate change, and increased nitrogen in the soil (Brooks 2003, Salo 2005) (e.g., from increased use of vehicles and machinery using internal combustion engines), while native annual plant biomass with increasing nitrogen decreases (Esque et al. 2010c).

We found little discussion on the direct and indirect impacts of the Proposed Action on the introduction, spread, and proliferation of nonnative plant species to the tortoise, its habitat, or other special status species. Invasive plants cause two problems for desert ecosystems. First, exotic annuals increase the fuel load and the frequency of fires in vegetation types that are poorly adapted to fire. Second, exotic plants may induce allelopathic effects, which hinder the growth or establishment of other plant species (BLM 2016). For example, agricultural areas may act as source populations for exotic species. Roads promote the spread and establishment of exotic plants, either via the passage of vehicles or during construction, and act as corridors of disturbed land along which exotic plants can spread into otherwise undisturbed native vegetation (Brooks and Lair 2005, BLM 2016).

For the Mojave desert tortoise, these impacts include competition for limited resources between native and nonnative plant species (Lovich and Bainbridge 1999); reduction in availability and quality of nutritious forage for tortoises that are essential for survival, reproduction, growth, and recruitment; and promotion of fine fuels that spread fire and damage/destroy woody shrubs.

We contend that the presence of vehicles driving to and from the Proposed Plan Area daily and the operation of heavy equipment will result in increased levels of nitrogen deposition in the Proposed Plan Area and adjacent areas above current levels. Mining activities will disturb new areas of desert vegetation and soils that promote the establishment of nonnative plant species.

“One of the few certainties of invasive plant management is that exclusion of potentially threatening species before they invade, or at least early detection and rapid response at the very early stages of invasion, is the most cost-effective and successful way to prevent their negative ecological and economic impacts (Naylor 2000, Rejmánek and Pitcairn 2002, Brooks et al. 2004).

We request that BLM analyze the direct and indirect impacts of the Proposed Action to the tortoise and its habitat for the duration of the Proposed Action and reclamation/revegetation requirement. After completing this analysis, BLM should develop and implement an invasive species management plan that is appropriate for the results of the analysis. This plan would ensure that no new species of nonnative plants would become established in the area impacts directly and indirectly by the Proposed Action, and the presence and abundance of existing nonnative species would, as a minimum, not increase, but preferably decrease in area and abundance. The plan would include success criteria and regular monitoring of the Proposed Plan Area and adjacent areas using statistically robust methods that would provide quantifiable definitive data to determine if success criteria are being met.

Increased frequency, size, and intensity of fires: Brooks and Matchett (2006) analyzed wildlife data from the Department of the Interior and U.S. Forest Service for the Mojave Desert. For human-caused fires, many ignition points were clustered along major highways. This suggests that vehicles and/or people in the vehicles caused the fires. Brooks and Matchett (2006) reported that car fires along roadsides are frequent causes of fires in the Mojave Desert.

Wildfires in the Mojave Desert initiate a positive feedback loop between exotic grass invasion and changes in fire frequency, which have the potential to maintain vegetation dominated by exotic plants (BLM 2016, D'Antonio and Vitousek 1992, and Mack and D'Antonio 1998). The resultant vegetation type, post-fire, may not support the same fauna typically found during pre-fire conditions (Saab and Powell 2005). (Brooks and Esque 2002, Brooks and Matchett 2006). Vamstad and Rotenberry (2010) found that invasion by exotic plant species, nitrogen deposition, and global climate change together may initiate a fire cycle. Allen et al. (2011) reviewed the fire literature from North American deserts, and reported that hot deserts such as the Mojave have experienced slow recovery of native shrubs and increased growth of invasive grasses following fire.

Because of the increase in the occurrence, size, and intensity of wildlife in the Mojave Desert in the past few decades, we believe BLM should include an analysis of wildfire impacts in the EA. BLM acknowledges it is a cumulative impact, but provides no analysis of its direct and indirect impacts on the tortoise, its habitat, or other special status species/habitats. As mentioned above under "Introduction of non-native plants," the presence of nonnative plants and duration of the mining activity/use of vehicles and equipment means it is likely that a wildfire may occur during the life of the Proposed Action. We request that these impacts be analyzed in the EA.

**Section 3.12.2 Vegetation, Environmental Effects of the No Action Alternative** – BLM says, "Under the No Action Alternative, the proposed disturbance activities would not be carried out, and impacts to vegetation would remain the same as those analyzed under the 2009 EA." The 2009 EA was not provided by BLM with the other documents on its NEPA eplannning webpage. Unfortunately, we were unable to locate a copy of the 2009 EA after searching the BLM National NEPA Register (search conducted on July 10, 2020) and an internet search revealed no results. Consequently, the public has no information on BLM's analysis of impacts to vegetation from the No Action Alternative.

**Section 3.12.3 Vegetation, Environmental Effects of the Proposed Action** – In this section BLM says, "Approximately 53.0 acres of disturbance would occur under the Proposed Action." We presume that the 53 acres of disturbance to vegetation would be direct impacts from the footprint of the Proposed Action. This is not clear in the EA.

We were unable to find a discussion and analysis of the indirect impacts of the Proposed Action to vegetation, including desert tortoise habitat. The only time we found "indirect impacts" in this section was in the following, "Direct and indirect impacts to vegetation would be detectable, measurable, and perceptible but small. Considering the size of the proposed disturbance, the vegetation types currently present, proposed reclamation, and the surrounding undisturbed areas, the overall effects to vegetation would be minor, localized, and long-term."

Indirect impacts from the mining activities of the Proposed Action that were not presented include fugitive dust, introduction and spread of non-native plant propagules, increased frequency and size of fire, destruction/degradation of soil crusts, etc.

As an example, for the first indirect impact, fugitive dust, the mining operation is likely to produce large amounts of fugitive dust for a prolonged time (see *Section 3.3 Air Quality, Environmental Effects of the Proposed Action*). Because fugitive dust has adverse impacts to desert vegetation (e.g., plant physiology, reproduction, etc.), the impacts of fugitive dust to native vegetation should be discussed in the EA. BLM has discussed this impact in other EAs but fails to do so in this one. For vegetation in the Proposed Plan Area and downwind, mining activities that generate dust would result in increased wind erosion of soil and dust deposition on plants, disruption of pollination systems, and the spread of invasive nonnative plant species. These impacts contribute to changes in vegetation type; increases in fire frequency, size, and intensity; fragmentation and reduction/loss of connectivity; reduced gene exchange; and reduced population persistence for plants (Sharifi et al. 1997, USFWS 2014).

Specifically, adverse impacts to desert vegetation from dust deposition include increases in leaf temperatures and subsequent photosynthetic rates during early spring that may require an increased amount of water for growth and successful reproduction. If this increased amount of water is not available, these plant species may respond by reducing plant vigor and by reducing flower and seed production or abandoning reproduction for the year (USFWS 2014). Subsequent years of dust may result in no recruitment of plants or plant mortality. In summary, the quality and quantity of the desert vegetation would be adversely impacted. These impacts in turn adversely affect the habitat of the Mojave desert tortoise for breeding, feeding, sheltering, and connectivity requirements as well as other wildlife populations in the surrounding area.

We request that BLM analyze the indirect impacts of dust deposition, disruption of pollination systems, and the spread of invasive nonnative plant species from mining operation in the EA on native vegetation and habitat of the desert tortoise.

Regarding BLM's statement that "the overall effects to vegetation would be minor, localized, and long-term," we perceive this as a conclusion using only information provided in the EA on direct impacts to vegetation. We presume that the "overall effects to vegetation" should include direct and indirect impacts from the Proposed Action. The appearance is that BLM reached this conclusion using only information provided on direct impacts to vegetation. Please correct/clarify this information.

We request that BLM use information from the scientific literature to determine the types of indirect impacts and analyze the extent of the loss and degradation of these plant communities from these impacts. Once completed, BLM may then draw a conclusion regarding significance. BLM should provide this information and references to support their conclusion.

**3.13.3 Wastes (Solid and Hazardous) - Environmental Effects of the Proposed Action** – In this section BLM says, "The chance of [a release of hazardous materials] occurring would be limited due to CRR's *Emergency Response Plan* and the environmental protection measures outlined in appendices A and B. The *Emergency Response Plan* was developed to establish responsibilities and guidelines for actions to be taken by mine personnel in the event of a spill at the mine. Spills would be cleaned up and contaminated materials would be removed from the site and disposed of at an approved disposal facility."

We were unable to find a copy of the Emergency Response Plan in the EA. In reading appendices A and B, we found the following information on CRR's responsibilities if a spill occurs. BLM's stipulation says, "As required by law, Holder shall have responsibility for and shall take all action(s) necessary to respond to and fully remediate releases (leaks, spills, etc.) within the authorized area." In the Applicant Committed Environmental Protection Measures, CRR says, "Any wastes generated which are classified as hazardous would be managed in accordance with Nevada state and federal Environmental Protection Agency regulations and guidelines. In the event hazardous or regulated material, such as diesel fuel and/or lubricants, is spilled, CRR would take measures to control the spill as described in the Emergency Response Plan, and the NDEP and BLM would be notified as per NDEP regulations." "PCS [phase change slurry] from accidental releases from equipment or storage would be excavated and transported for management at the permitted commercial US Ecology waste facility."

The Proposed Action is located at the upper point of an alluvial fan that slopes for several miles to the west southwest. This alluvial fan is desert tortoise habitat, and is located downslope from the heap leach pad, process and event ponds, tanks, and lean solution processing circuit. If a hazardous materials spill occurs, this tortoise habitat would likely be impacted because it is downslope from the hazardous materials.

The EA does not provide information on a plan to properly manage the storage and use of hazardous materials/waste in the Plan Area or the Emergency Response Plan for a spill event. The absence of this information means the public and decisionmaker are unable to determine whether the plans are adequate in preventing spills and minimizing all impacts to the resources analyzed in the EA including the Mojave desert tortoise and its habitat when a spill occurs. We request that BLM include the Emergency Response Plan in the EA.

In addition, we are concerned that CRR would not be responsible for damages to the tortoise and tortoise habitat and other public trust resources from a spill, as BLM is only requiring remediation. We strongly request that BLM add a stipulation that requires replacement/restoration of lost public trust resources (e.g., desert tortoise and tortoise habitat) and compensation for temporal losses from a spill both on and off the Plan Area.

**Cumulative Effects Analysis**

In **Section 1.3.2, Relationship to Laws, Regulations, and Other Plans** – BLM says, "The BLM has prepared this EA in conformance with the Council on Environmental Quality regulations for implementing the NEPA [National Environmental Policy Act] (40 CFR § 1500 to 1508), the BLM NEPA Handbook H-1790-1 (BLM, 2008), Department of Interior requirements, and Secretarial Order 3355 (BLM, 2017)."

With respect to the analysis of cumulative effects on the Mojave desert tortoise, the Council disagrees with this statement. We find no quantitative analysis or data/scientific references supporting BLM's conclusion regarding the cumulative effects of the Proposed Action to wildlife species, including special status species such as the Mojave desert tortoise. For BLM to analyze cumulative impacts to desert tortoises and other special status species, it must have baseline data on what their status and trend is. We did not find this in the Affected Environment section of the EA. Once the status and trend is presented as a baseline, cumulative impacts analysis in the EA should follow the Council on Environmental Quality's (CEQ) (1997) guidance to federal agencies on how to analyze cumulative environmental consequences. The BLM National Environmental Policy Act Handbook – H-1790-1 (BLM 2008a) has adopted this guidance. This guidance contains eight principles listed below to help federal agencies conduct an appropriate cumulative impacts analysis of their alternatives:

**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. DTC/Comment Letters/Mesa Wind Repower Project 10

**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.

We request that BLM apply these eight principles when conducting its cumulative effects analysis for the Proposed Action on resources issues, and especially for the Mojave desert tortoise. In addition, we request that BLM use current data in conducting its analysis. The courts have ruled that using "stale data" to conduct such analysis is inappropriate (Ninth Circuit Court 2004).

**Appendix A: Stipulations**
BLM requires the following:

**"2. Threatened, Endangered or Candidate Animal Species**

2.1. The Holder will comply with the terms and conditions of the Biological Opinion File No. 84320-2010-F-0365.R039 for this project. The Biological Opinion is on file at the Bureau of Land Management, Southern Nevada District Office. The terms and conditions are attached.

2.2. The Holder, upon completion of the Proposed Action, must submit Appendix G found in the terms and conditions of the Biological Opinion (attached). "

We were unable to find the attached terms and conditions or Appendix G. We request that BLM include these in the EA.

We contend the Biological Opinion File No. 84320-2010-F-0365.R039 may not be current. In 2020, the USFWS issued a Programmatic Biological Opinion to the BLM Southern Nevada District Office for Effects to Threatened and Endangered Species and their Critical Habitat that May Occur as a Result of Actions Proposed by the Southern Nevada District Office (08ENVS00-2019-F-0153). This Biological Opinion covers mining activities and may supersede the 84320-2010-F-0365.R039 Biological Opinion, as formal consultation for it was initiated in 2010 and its reasonable and prudent measures and terms and conditions may be outdated.

We request that the required actions from BLM's implementing regulations for mining (e.g., "Reclamation of the Mine Site" and management/clean-up of "Leaching Operations and Impoundments" discussed in USFWS 2020 under Mining Program – Locatable Minerals), reasonable and prudent measures, and terms and conditions from the USFWS 2020 Programmatic Biological Opinion for the Mojave desert tortoise be included as stipulations in Appendix A. We request that BLM add these requirements (e.g., RMPs 1, 2, 3, 6, and 7 and all associated terms and conditions) to the EA so the public and decisionmaker can see how they will avoid and minimize impacts to the Mojave desert tortoise.

**6. Vegetation**

6.1. A reclamation plan must be developed and approved in coordination with the BLM botanist.

We found no other information on the reclamation plan. However, in the analysis of impacts in *Section 3.12.3 Vegetation, Environmental Effects of the Proposed Action*, BLM says, "Direct impacts to vegetation would be localized and long-term on approximately 53.0 acres, lasting until reclamation efforts are complete, and revegetation is successfully established. Direct impacts to vegetation would continue on 4.0 acres of the post-closure stormwater channel." Upon successful reclamation of these areas, the vegetation communities would be modified to one based on the chosen reclamation seed mix." Thus, BLM is presuming that this reclamation plan will be effective in revegetating all areas disturbed by the mining activity except the stormwater channel.

Revegetation efforts in the Mojave Desert are unreliable (Grantz et al. 1998, Abella et al. 2012, DeFalco et al. 2012, Reynolds et al. 2012, and Abella et al. 2015). We found no scientific evidence in the EA that the reclamation efforts will be successful on the 49 acres of land. BLM's assumption/claim is not supported by a scientific study or paper in the EA.

We request that BLM provide a revegetation plan in the EA that is not "vague and speculative" but "detailed and justified" by scientific studies and reports. This plan should be developed using current scientific information and proven methods and include success criteria and monitoring requirements. BLM should make the reclamation/revegetation plan available to the public to comment on.

**Appendix B**

**Applicant Committed Environmental Protection Measures, 6. Water** – CRR has committed to implementing the following: "Stormwater diversion channels would be sized to transport surface waters either to natural drainageways or sedimentation structures (berms, ponds, etc.). Sediment collection ponds/basins, if required, would be constructed to control the volume of eroded soil, which could be transported off-site into natural drainageways within the area."

We have three concerns. First, will the diversion channels and collection ponds/basins be located inside or outside of the desert tortoise exclusion fencing? These facilities should be located inside the exclusion fencing to prevent tortoises from becoming trapped in them or drowning. Second, how does CRR propose to exclude tortoises from travelling along natural drainage ways and accessing the terminus of the diversion channels? A barrier needs to be added where the exclusion fencing intersects the natural drainages and at the terminus of the diversion channels to prevent tortoises from entering the channels/ponds/basins and becoming trapped or drowning. Third, we found no mention of CRR's commitment to implement rigorous monitoring and prompt, effective maintenance of the tortoise exclusion fencing for the life of the mining operations and reclamation/revegetation activities. Monitoring and maintenance is needed to ensure that the fencing is effective in excluding tortoises from the Proposed Plan Area. Failure to identify a breach and repair it quickly would initiate a requirement that CRR/mining operator conduct USFWS protocol-desert tortoise clearance surveys (USFWS 2009) for the entire Plan Area. We request that BLM address these concerns in the EA and require implementation of effective mitigation and monitoring to avoid take of tortoises from these circumstances.

**Applicant Committed Environmental Protection Measures, 8. Wildlife** – BLM says, "Impacts to desert tortoise will be minimized by adhering to the terms and conditions of Biological Opinion File No. 84320-2008-F-0293." Unfortunately, we were unable to find a copy of this document in the EA, on the USFWS ECOS website, or a list of the conservation/ minimization measures and terms and conditions in this biological opinion. As stated in our comment on Appendix A, we did find a programmatic biological opinion issued to BLM in 2020 for the area of the Southern Nevada District. We suggest that BLM coordinate with USFWS to determine the appropriate biological opinion that it must follow if it decides to authorize the Proposed Action.

In this appendix, BLM says, "Incidental trash not contained in fenced or covered trash containers could potentially increase the raven population in the area, and consequently predation on tortoises." This appendix is entitled "Applicant Committed Environmental Protection Measures." Although the presence of trash is identified in this appendix as an indirect threat to tortoises, there is no mention of implementing a protection measure for prevention and containment of trash. Consequently, we are unsure why it is in this appendix. Alternatively, the Applicant should identify specific measures to address this indirect impact.

**Mitigation of Indirect and Cumulative Impacts** – In the EA BLM says, "Minerals Management Program as defined in the Las Vegas RMP Record of Decision are:

> MN-1. Where lands remain open to entry provide for orderly exploration and development of valuable minerals on Federally owned mineral estate whether or not the surface estate is in Federal ownership; and
>
> MN-2. Use appropriate environmental safeguards to allow for the preservation and enhancement of fragile and unique resources."

Focusing on MN-2, we were unable to locate a description of actions that would fully offset the indirect and cumulative effects of the Proposed Action to the Mojave desert tortoise. We strongly request that BLM require such mitigation actions for the tortoise in its Decision Document. The mitigation actions should be described in mitigation plans where their preparation, implementation, and effectiveness monitoring uses the best available science. CRR and BLM should include a commitment to implement the mitigation commensurate with impacts to the tortoise and its habitats. Mitigation plan for the tortoise should include a relocation/translocation plan, predator management plan, weed management plan, fire management plan, compensation plan for the temporal degradation and loss of tortoise habitat from mining that includes protection of the acquired, improved, and restored habitat in perpetuity, a plan to protect tortoise relocation/translocation area(s) in perpetuity from future development/human activity that degrades/destroys habitat, and habitat restoration plan when the mining operation is terminated/abandoned.

These mitigation plans should include an implementation schedule that is tied to key actions of the construction, operations and maintenance, and cleanup/restoration phases of the Proposed Action so that mitigation occurs concurrently with or in advance of the impacts. The plans should specify success criteria, include a monitoring plan to collect data to determine whether success criteria have been met, and identify actions that would be required if the mitigation measures do not meet the success criteria.

**Requirement for a Bond** – Because many hard rock mines on BLM land have a history of abandoning their operations and leaving the public to cleanup and restore the area, we request that BLM require a bond from CRR that is sufficient to pay for the cost of cleanup and restoration and that considers that costs will likely increase in the future.

**Draft Finding of No Significant Impact** – BLM provided a copy of the Draft FONSI for the public to review. Under Cumulative Impacts, BLM says, "The EA considered various types of past, present, and reasonably foreseeable projects on both public and private land within the cumulative effects study area."

We contend that the cumulative effects study area (CESA) is not defined in the EA. According to CEQ (1997) and the BLM NEPA Handbook, the CESA for "[e]ach 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." We contend that BLM did not do this for the Mojave desert tortoise or its habitat.

Under Threatened and Endangered Species, BLM says, "the Proposed Action may result in potential impacts to federally listed, threatened, or endangered and BLM sensitive species habitats. However, potential impacts will be below the level of significant by the measures described in Chapter 3 of the EA."

We assert that BLM did not use recent data on the status and trend of the Mojave desert tortoise in its analysis of the direct, indirect, and cumulative impacts on this species. Until BLM uses recent data (please see Appendix A below to assist BLM) and conducts these analyses, the decisionmaker has no information to support this statement.

Under Federal, State, Local, or Tribal Law, Regulation, or Policy, BLM says, "The Proposed Action does not violate any known federal, state, local, or tribal law or requirement imposed for the protection of the environment."

We contend that BLM has not made it clear in the EA why it is complying with an old biological opinion on the Authorized Project from 2012, when this document does not include the actions and additional area of the Proposed Project. In addition, BLM has not made it clear in the EA if it will comply with the reasonable and prudent measures and terms and conditions of the 2020 programmatic biological opinion regarding surface disturbance and mining for the tortoise.

For these reasons, we assert that the decisionmaker is unable to sign the FONSI until the EA supports these statements.

**FLPMA and BLM's Decision to Be Made** – In the EA, BLM says, "The decision the BLM would make, based on analysis conducted pursuant to the NEPA, includes the following: 1) approve the Proposed Action with no modifications; 2) approve the Proposed Action with additional mitigation measures that are needed to prevent unnecessary or undue degradation of public lands; or 3) deny the approval of the Proposed Action as currently written and not authorize the Project if it is found that the Proposed Action does not comply with the 43 CFR § 3809 regulations and the FLPMA mandate to prevent unnecessary or undue degradation."

We contend that BLM's NEPA analysis with respect to the Mojave desert tortoise is inadequate/incomplete. It does not provide an accurate description of the status and trend of the tortoise in the Eastern Mojave Recovery Unit. "The negative population trends…indicate that this species is on the path to extinction" (Allison and McLuckie 2018). It does not comply with FLPMA's requirements in which Congress declared that "public lands be managed in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values;" and that public lands "will provide food and habitat for fish and wildlife." Congress furthers stated in FLPMA that "management be on the basis of multiple use and sustained yield." It 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." We request that BLM include these requirements of FLPMA in the EA and demonstrate in its analysis of how its implementation of the Proposed Action will comply with FLPMA with regard to the Mojave desert tortoise.

We request that BLM incorporate information that we have provided herein on the Mojave desert tortoise and its habitat and impacts from the Proposed Action into the EA, Finding of No Significant Impact (FONSI), and Decision Document. The EA and BLM decisionmaker need to take a "hard look" at this information and consider it, especially with respect to cumulative impacts analysis (Ninth Circuit 1998) on the Mojave desert tortoise, before making a decision on whether to approve the Proposed Action or approve it with additional stipulations.

To summarize our comments, we are disappointed that BLM provided little or no current baseline information on the status and trend of special status species, including the Mojave desert tortoise. We are disappointed that BLM provided little or no discussion and analysis on the

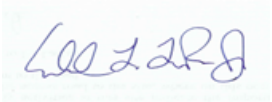
indirect and cumulative impacts of the Proposed Action on the Mojave desert tortoise and its habitat. We are disappointed that BLM provided no data/recent scientific data/scientific references to support their conclusions regarding direct, indirect, and cumulative impacts to the Mojave desert tortoise and its habitat, and other special status species. With respect to the Mojave desert tortoise, we are disappointed that BLM has drafted a FONSI that makes findings regarding cumulative impacts, threatened and endangered species, and compliance with federal environmental law that is not supported by the EA. We request that BLM revise the EA and add this information to comply with CEQ's regulations on implementing NEPA, applicable court decisions, and the BLM NEPA Handbook.

Because of the current serious status and ongoing downward trend of the tortoise in the Eastern Mojave Recovery Unit, after BLM has revised the EA, if the decisionmaker decides to approve the Proposed Action, BLM should require as stipulations all those given in the USFWS 2020 biological opinion and all those requested by the Council in this comment letter.

Finally, it is important that the Proponent also adheres to state requirements that are in addition to those required by the BLM. Among others, if a desert tortoise needs to be moved out of harm's way, in addition to all applicable federal permits, CRR would need to obtain a Special Purpose Permit from the Nevada Department of Wildlife, in compliance with NRS 503.597 and NAC 503.0935.

We appreciate this opportunity to provide input and trust that our comments will further protect tortoises if the Proposed Action is authorized. Herein, we ask that the Desert Tortoise Council be identified as an Affected Interest for this and all other BLM projects that may affect species of desert tortoises, and that any subsequent environmental documentation for this Proposed Action is provided to us at the contact information listed above.

Regards,



Edward L. LaRue, Jr., M.S.
Chair, Ecosystems Advisory Committee

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## Appendix A

### Status of the Mojave Desert Tortoise (*Gopherus agassizii)*

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

The Desert Tortoise Council (Council) has serious concerns about direct, indirect, and cumulative sources of human mortality for the Mojave desert tortoise given the status and trend of the species range-wide, within each of the five recovery units, within the Tortoise Conservation Areas (TCAs) that comprise each recovery unit.

Densities of Adult Mojave Desert Tortoises: A few years after listing the Mojave desert tortoise under the Federal Endangered Species Act (FESA), the U.S. Fish and Wildlife Service (USFWS) published a Recovery Plan for the Mojave desert tortoise (USFWS 1994a). It contained a detailed population viability analysis. In this analysis, the minimum viable density of a Mojave desert tortoise population is 10 adult tortoises per 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 amount 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 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 tortoise declined, on average, in every recovery unit except the Northeastern Mojave (Table 1). Adult densities in the Northeastern Mojave Recovery Unit increased 3.1% per year (SE = 4.3%), while the other four recovery units declined at different annual rates: Colorado Desert (4.5%, SE = 2.8%), Upper Virgin River (3.2%, SE = 2.0%), Eastern Mojave (11.2%, SE = 5.0%), and Western Mojave (7.1%, SE = 3.3%)(Allison and McLuckie 2018). However, the small area and low starting density of the tortoises in the Northeastern Mojave Recovery Unit (lowest density of all Recovery Units) resulted in a small overall increase in the number of adult tortoises by 2014 (Allison and McLuckie 2018). In contrast, the much larger areas of the Eastern Mojave, Western Mojave, and Colorado Desert recovery units, plus the higher estimated initial densities in these areas, explained much of the estimated total loss of adult tortoises since 2004 (Allison and McLuckie 2018).

At the population level, represented by tortoises in the TCAs, densities of 10 of 17 monitored populations of the Mojave desert tortoise declined from 26% to 64% and 11 have a density that is less than 3.9 adult tortoises per km2 (USFWS 2015). The Chuckwalla population is near the proposed Project and has a population below the minimum viable density, and an 11-year declining trend (-37.4%)(USFWS 2015). We are concerned that the proposed Project would bring additional indirect and cumulative impacts to this population and its density and trend would further decline.

Population Data on Mojave Desert Tortoise: The Mojave desert tortoise was listed as threatened under the FESA in 1990. The listing was warranted because of ongoing population declines throughout the range of the tortoise from multiple human-caused activities. Since the listing, the status of the species has changed. Population numbers (abundance) and densities continue to decline substantially (please see Table 1).

Table 1. Summary of 10-year trend data for 5 Recovery Units and 17 Critical Habitat Units (CHU)/Tortoise Conservation Areas (TCA) for Agassiz's desert tortoise, Gopherus agassizii (=Mojave 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 breeding individuals/km2 (10 breeding individuals per mi2) (assumes a 1:1 sex ratio) and showing a decline from 2004 to 2014 are in red (USFWS 2015).

| **Recovery Unit**<br>Designated Critical Habitat Unit/Tortoise Conservation Area | Surveyed area ($km^2$) | % of total habitat area in Recovery Unit & CHU/TCA | 2014 density/$km^2$ (SE) | % 10-year change (2004–2014) |
|---|---|---|---|---|
| **Western Mojave, CA** | **6,294** | **24.51** | **2.8 (1.0)** | **–50.7 decline** |
| Fremont-Kramer | 2,347 | 9.14 | 2.6 (1.0) | –50.6 decline |
| Ord-Rodman | 852 | 3.32 | 3.6 (1.4) | –56.5 decline |
| Superior-Cronese | 3,094 | 12.05 | 2.4 (0.9) | –61.5 decline |
| **Colorado Desert, CA** | **11,663** | **45.42** | **4.0 (1.4)** | **–36.25 decline** |
| Chocolate Mtn AGR, CA | 713 | 2.78 | 7.2 (2.8) | –29.77 decline |
| Chuckwalla, CA | 2,818 | 10.97 | 3.3 (1.3) | –37.43 decline |
| Chemehuevi, CA | 3,763 | 14.65 | 2.8 (1.1) | –64.70 decline |
| Fenner, CA | 1,782 | 6.94 | 4.8 (1.9) | –52.86 decline |
| Joshua Tree, CA | 1,152 | 4.49 | 3.7 (1.5) | +178.62 increase |
| Pinto Mtn, CA | 508 | 1.98 | 2.4 (1.0) | –60.30 decline |
| Piute Valley, NV | 927 | 3.61 | 5.3 (2.1) | +162.36 increase |
| **Northeastern Mojave** | **4,160** | **16.2** | **4.5 (1.9)** | **+325.62 increase** |
| Beaver Dam Slope, NV, UT, AZ | 750 | 2.92 | 6.2 (2.4) | +370.33 increase |
| Coyote Spring, NV | 960 | 3.74 | 4.0 (1.6) | + 265.06 increase |
| Gold Butte, NV & AZ | 1,607 | 6.26 | 2.7 (1.0) | + 384.37 increase |
| Mormon Mesa, NV | 844 | 3.29 | 6.4 (2.5) | + 217.80 increase |
| **Eastern Mojave, NV & CA** | **3,446** | **13.42** | **1.9 (0.7)** | **–67.26 decline** |
| El Dorado Valley, NV | 999 | 3.89 | 1.5 (0.6) | –61.14 decline |
| Ivanpah, CA | 2,447 | 9.53 | 2.3 (0.9) | –56.05 decline |
| **Upper Virgin River** | **115** | **0.45** | **15.3 (6.0)** | **–26.57 decline** |
| Red Cliffs Desert | 115 | 0.45 | 15.3 (6.0) | –26.57 decline |
| **Total** amount of land | **25,678** | **100.00** | | **–32.18 decline** |

Density of Juvenile Mojave Desert Tortoises: Survey results indicate that the proportion of juvenile desert tortoises has been decreasing in all five recovery units since 2007 (Allison and McLuckie 2018). The probability of encountering a juvenile tortoise was consistently lowest in the Western Mojave Recovery Unit. Allison and McLuckie (2018) provided reasons for the decline in juvenile desert tortoises in all recovery units. These included decreased food availability for adult female tortoises resulting in reduced clutch size, decreased food availability resulting in increased mortality of juvenile tortoises, prey switching by coyotes from mammals to tortoises, and increased abundance of common ravens that typically prey on smaller desert tortoises.

Declining adult densities through 2014 have left the Western Mojave adult numbers at 49% (a 51% decline) and in the Eastern Mojave at 33% (a 67% decline) of their 2004 levels (Allison and McLuckie 2018, USFWS 2015). Such steep declines in the density of adults are only sustainable if there were suitably large improvements in reproduction and juvenile growth and survival. However, the proportion of juveniles has not increased anywhere in the range of the Mojave desert tortoise since 2007, and in the Western and Eastern Mojave recovery units the proportion of juveniles in 2014 declined to 91% (a 9 % decline) and 77% (a 23% decline) of their representation in 2004, respectively (Allison and McLuckie 2018).

Abundance of Mojave Desert Tortoises: Allison and McLuckie (2018) noted that because the area available to tortoises (i.e., tortoise habitat and linkage areas between habitats) is decreasing, trends in tortoise density no longer capture the magnitude of decreases in abundance. Hence, they reported on the change in abundance or numbers of the Mojave desert tortoises 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 (so far 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 2.

Habitat Availability: Data on population density or abundance does not indicate population viability. The area of protected habitat or reserves for the subject species is a crucial part of the viability analysis along with data on density, abundance, and other population parameters. In the Desert Tortoise (Mojave Population) Recovery Plan (USFWS 1994a), the analysis of population viability included population density and size of reserves (i.e., areas managed for the desert tortoise) and population numbers (abundance) and size of reserves. The USFWS Recovery Plan reported that as population densities for the Mojave desert tortoise decline, reserve sizes must increase, and as population numbers (abundance) for the Mojave desert tortoise decline, reserve sizes must increase (USFWS 1994a). In 1994, reserve design (USFWS 1994a) and designation of critical habitat (USFWS 1994b) were based on the population viability analysis from numbers

Table 2. Estimated change in abundance of adult Mojave desert tortoises in each recovery unit between 2004 and 2014 (Allison and McLuckie 2018). Decreases in abundance are in red.

| **Recovery Unit** | Modeled Habitat ($km^2$) | 2004 Abundance | 2014 Abundance | Change in Abundance | Percent Change in Abundance |
|---|---|---|---|---|---|
| Western Mojave | 23,139 | 131,540 | 64,871 | -66,668 | -51% |
| Colorado Desert | 18,024 | 103,675 | 66,097 | -37,578 | -36% |
| Northeastern Mojave | 10,664 | 12,610 | 46,701 | 34,091 | 270% |
| Eastern Mojave | 16,061 | 75,342 | 24,664 | -50,679 | -67% |
| Upper Virgin River | 613 | 13,226 | 10,010 | -3,216 | -24% |
| **Total** | **68,501** | **336,393** | **212,343** | **-124,050** | **-37%** |

(abundance) and densities of populations of the Mojave desert tortoise in the early 1990s. Inherent in this analysis is that the lands be managed with reserve level protection (USFWS 1994a, page 36) or ecosystem protection as described in section 2(b) of the FESA, and that sources of mortality be reduced so recruitment exceeds mortality (that is, lambda > 1)(USFWS 1994a, page C46).

Habitat loss would also disrupt the prevailing population structure of this widely distributed species with geographically limited dispersal (isolation by distance; Murphy et al. 2007; Hagerty and Tracy 2010). Allison and McLuckie (2018) anticipate an additional impact of this habitat loss/degradation is decreasing resilience of local tortoise populations by reducing demographic connections to neighboring populations (Fahrig 2007). Military and commercial operations and infrastructure projects that reduce tortoise habitat in the desert are anticipated to continue (Allison and McLuckie 2018) as are other sources of habitat loss/degradation.

Allison and McLuckie (2018) reported that the life history of the Mojave desert tortoise puts it at greater risk from even slightly elevated adult mortality (Congdon et al. 1993; Doak et al. 1994), and recovery from population declines will require more than enhancing adult survivorship (Spencer et al. 2017). The negative population trends in most of the TCAs for the Mojave desert tortoise indicate that this species is on the path to extinction under current conditions (Allison and McLuckie 2018). They state that their results are a call to action to remove ongoing threats to tortoises from TCAs, and possibly to contemplate the role of human activities outside TCAs and their impact on tortoise populations inside them.

Densities, numbers, and habitat for the Mojave desert tortoise declined between 2004 and 2014. As reported in the population viability analysis, to improve the status of the Mojave desert tortoise, reserves (area of protected habitat) must be established and managed. When densities of tortoises decline, the area of protected habitat must increase. When the abundance of tortoises declines, the area of protected habitat must increase. We note that the Desert Tortoise (Mojave Population) Recovery Plan was released in 1994 and its report on population viability and reserve design was reiterated in the 2011 Revised Recovery Plan as needing to be updated with current population data (USFWS 2011, p. 83). With lower population densities and abundance, a revised population viability analysis would show the need for greater areas of habitat to receive reserve level of management for the Mojave desert tortoise. In addition, we note that none of the recovery actions that are fundamental tenets of conservation biology has been implemented throughout most or all of the range of the Mojave desert tortoise.

Definition of an Endangered Species: In 2011, Murphy et al. stated that the "recognition of G. morafkai reduces the range of G. agassizii to occupying about 30% of its former range." Given this reduction in species distribution and numbers and the "…drastic population declines in G. agassizii during the past few decades, it might be endangered."

In 2018, Agassiz's desert tortoise was added to 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 Agassiz's desert tortoise to be Critically Endangered (Turtle Conservation Coalition 2018).

The IUCN places a taxon in the Critically Endangered category when the best available evidence indicates that it meets one or more of the criteria for Critically Endangered. These criteria are 1) population decline - a substantial (>80 percent) reduction in population size in the last 10 years; 2) geographic decline - a substantial reduction in extent of occurrence, area of occupancy, area/extent, or quality of habitat, and severe fragmentation of occurrences; 3) small population size with continued declines; 4) very small population size; and 5) analysis showing the probability of extinction in the wild is at least 50 percent within 10 years or three generations.

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…" Given the information on the status of the Mojave desert tortoise and the federal definition of an endangered species, the Council believes the status of the Mojave desert tortoise is that of an endangered species.

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