FGC - 670.1 (3/94)

A PETITION TO THE STATE OF CALIFORNIA FISH AND GAME COMMISSION

For action pursuant to Section 670.1, Title 14, California Code of Regulations (CCR) and Sections 2072 and 2073 of the Fish and Game Code relating to listing and delisting endangered and threatened species of plants and animals.

I. SPECIES BEING PETITIONED:

Common Name: **Agassiz's desert tortoise or Mojave desert tortoise**

Scientific Name: **(*Gopherus agassizii*)**

II. RECOMMENDED ACTION:

(Check appropriate categories)

a. List ☐ b. Change Status ☒

As Endangered ☐ from **Threatened**

As Threatened ☐ **to Endangered**

Or Delist ☐

III. AUTHORS OF PETITION:

Names: Jeff Aardahl and Tom Egan for Defenders of Wildlife
Ed LaRue for Desert Tortoise Council
Ron Berger for Desert Tortoise Preserve Committee

Address: Jeff Aardahl, California Representative
Defenders of Wildlife
46600 Old State Highway, Unit 13
Gualala, CA 95445
(707) 884-1169

I hereby certify that, to the best of my knowledge, all statements made in this petition are true and complete.

Signature: [signature] Date: 3/11/2020

Address: Tom Egan, California Desert Representative
Defenders of Wildlife
P.O. Box 388
Helendale, CA 92342
(760) 221-7531

I hereby certify that, to the best of my knowledge, all statements made in this petition are true and complete.

Signature: Date: 3/11/2020

I hereby certify that, to the best of my knowledge, all statements made in this petition are true and complete.

Address: Ed LaRue, Chairperson Ecosystems Advisory Committee
Desert Tortoise Council
4654 East Avenue S. #257B
Palmdale, CA 93552

Signature: Date: 3/11/2020

Address: Ron Berger, President
Desert Tortoise Preserve Committee
4067 Mission Inn Avenue
Riverside, CA 92501

I hereby certify that, to the best of my knowledge, all statements made in this petition are true and complete.

Signature: Date: 3/11/2020

PETITION TO THE STATE OF CALIFORNIA FISH AND GAME COMMISSION SUPPORTING INFORMATION FOR

Agassiz's desert tortoise or Mojave desert tortoise (*Gopherus agassizii*)
Common Name **Scientific Name**

EXECUTIVE SUMMARY

Based upon a scientific review of its distribution and status, this petition requests that the Agassiz's desert tortoise (*Gopherus agassizii*; Mojave desert tortoise or desert tortoise) be moved from listed as Threatened to Endangered by the California Fish and Game Commission (Commission). Despite federal and state protections, the desert tortoise is closer to extinction than it was in 1989 and 1990 when it was listed by the Commission and U.S. Fish and Wildlife Service (USFWS), respectively. A change in listing from Threatened to Endangered will reflect the current dire situation facing California's state reptile and is necessary to generate substantially increased attention and efforts to reverse the very real likelihood that desert tortoise will become extinct in California.

The Commission listed the desert tortoise as Threatened under the California Endangered Species Act (CESA) in 1989. The Mojave population of the desert tortoise was listed as Endangered under a federal emergency listing rule under the Endangered Species Act (ESA) by the USFWS that same year. In 1990, the Mojave population of the species was listed by the USFWS under a final ESA rule as Threatened (USFWS 1990). A recovery plan prepared by the USFWS for this federally-listed species was adopted in 1994 (USFWS 1994a), with Critical Habitat concurrently designated (USFWS 1994b). A revised recovery plan for the species, noting problems in implementing certain previous recovery plan actions, was adopted in 2011 (USFWS 2011).

The initial California listing of the desert tortoise as threatened was based on a severe decline of tortoises throughout California, Nevada, Utah, and northwest Arizona – with California populations considered the most endangered.

Recent genetic analysis has concluded that the Mojave population of the desert tortoise is a distinct species, not a population, with a range that includes southeastern California, southern Nevada, northwest Arizona, and southwest Utah (Murphy et al. 2011). Those tortoises occurring in the rest of Arizona and northwest/west Sonora, Mexico, have recently been described as a separate species, Morafka's desert tortoise (*Gopherus morafkai*), and those in southwest Sonora and Sinaloa, Mexico, as Goode's thornscrub tortoise (*Gopherus evgoodei*) (Edwards et al. 2016). The species occurring in California is best described as Agassiz's desert tortoise (*Gopherus agassizii*).

Thirty-years after its listing as Threatened under provisions of the CESA and ESA, Agassiz's desert tortoise is in worse condition with the species on a path to extinction due to an increase in the number and severity of threats. Similarly, while Critical Habitat was designated for this species in 1994 and several federal resource management plans have been adopted by the Bureau of Land Management (BLM) and designed to improve habitat conditions, the sobering reality is that conditions on the ground have worsened for Agassiz's desert tortoise habitat over the long term, especially in California. More development and increased human uses have occurred in the California desert since listing, resulting in substantial loss of individuals, reduced recruitment, and substantial loss/degradation of habitat. Further, these threats are amplified by the effects of climate change on tortoise habitat. As a result, tortoise populations throughout **all** Recovery Units in California continue to decline.

Reversing the trend towards extinction and putting Agassiz's desert tortoise on a path towards recovery is difficult because the tortoise is a long-lived reptile, requiring up to 20 years to reach sexual maturity, and has a low reproductive rate over a long period of reproductive potential. The combination of a late breeding age and a low reproductive rate makes accomplishing desert tortoise recovery very challenging (USFWS 1994a). In addition, the continued, ongoing loss and degradation of the species' last remaining occupied habitat from a variety of authorized and unauthorized land uses, in an area of increasing human population growth, renewable energy development and generation, motorized vehicle recreation, and other human impacts, only makes the conservation and recovery of the desert tortoise even more challenging.

Threats to the species at the time of the 1990 federal listing as Threatened have not abated. Instead, they are more widespread and intense. The relatively recent expansion of military testing and training installations (United States Army National Training Center, Fort Irwin; United States Navy, Marine Corps Air Ground Combat Center, Twentynine Palms); development of large-scale renewable energy projects throughout the range of Agassiz's desert tortoise; and increased human population growth and activities in the California desert have resulted in concurrent tortoise mortality and habitat degradation/loss, both adjacent to human communities and at appreciable distances. Notably, tortoise populations located immediately adjacent to expanding human communities have disappeared.

Tortoises and their habitats are impacted by a myriad of authorized and illegal human activities that degrade or eliminate suitable creosote bush scrub and other vegetation communities needed as habitat. In particular, off-highway vehicle use, especially widespread, unregulated use on lands that are supposed to be protected, destroys and fragments habitat, injures and kills tortoise, and crushes tortoise burrows and eggs. Human activities also subsidize predators whose increased numbers prey on tortoises and facilitate invasion of non-native species of plants that degrade habitat quality and displace native forbs and grasses needed for adequate nutrition and reproduction/recruitment (Brooks and Berry 2006). Invasive, non-native plants also increase flammable fuel load to the point where wildfire, when it occurs, results in catastrophic megafires that kill tortoises outright. Recovery from fire in Mojave and Colorado desert vegetation communities is extremely slow because these communities are not adapted to wildfire and non-native plants outcompete native species during the post-fire period (Brooks and Esque 2002).

Climate modeling predicts that California's deserts will experience longer and more frequent drought and increased temperatures. These climate conditions will impact tortoise habitat and food supply, the species' ability to reproduce and recruit tortoises, and its sensitivity as a cold-blooded reptile to increasing temperature extremes. These impacts combined with the ongoing impacts from human activities are endangering Agassiz's desert tortoise throughout California.

The USFWS has repeatedly identified high adult tortoise survivorship as a key factor in meeting tortoise recovery objectives (USFWS 1994a, 2011). However, science-based surveys (line distance sampling) extending over a 10-year period throughout the species' range in California and data from permanent study plots indicate this key factor is not being achieved (USFWS 2015). These surveys demonstrate that desert tortoise numbers are declining significantly and resulting in all three Recovery Units experiencing reduced numbers and densities that reflect a species on a trajectory toward extinction.

Based on systematic USFWS-designed line distance sampling conducted by the USFWS's Desert Tortoise Recovery Office (DTRO), from 2004 through 2014, adult tortoises in the three California Recovery Units (Western Mojave, Colorado Desert, Eastern Mojave) declined 51.3 percent from 119,029 individuals to 65,726 (USFWS 2015). It is noteworthy and troubling for the future survival and recovery of desert tortoise that these losses occurred within federally designated Critical Habitat Units for tortoises, which, in theory, receive a higher level of protection under provisions of the federal ESA and land use plans prepared by federal agencies, primarily by the BLM for public lands in the California Desert Conservation Area.

Adult tortoise densities in Critical Habitat within the Western Mojave Recovery Unit averaged 5.7 per square kilometer in 2004, in contrast with an average density of 2.8 per square kilometer in 2014. This serious reduction is consistent with the substantial decreases in tortoise population densities documented within all three Recovery Units in California (Allison and McLuckie 2018). Unfortunately, this current decline is a continuation of the downward population trends documented in the Western Mojave by BLM wildlife biologists using a series of one square-mile study plots beginning in 1979 and extending to 2002. Initial surveys on these plots documented adult desert tortoise densities ranging from 29 to 147 per square kilometer in much of the western Mojave Desert (Tracy et al. 2004). Using the available scientific survey data, **adult tortoise densities in the Western Mojave Recovery Unit declined by 85 to 95 percent between 1980 and 2014** and continue to decline to the present time.

According to Allison and McLuckie (2018), adult tortoise densities in the three California Recovery Units of Agassiz's desert tortoise declined at the following annual rates during the period 2004 through 2014: Colorado Desert –4.5%; Eastern Mojave –11.2%; and Western Mojave –7.1%.

Allison and McLuckie (2018) also concluded that:

- *Overall this threatened species is* ***experiencing large, ongoing population declines****, and* ***adult tortoise numbers have decreased by over 50% in some recovery units*** *since 2004*;

- ***Declining adult densities through 2014 have left the Western Mojave adult numbers at 49% and in the Eastern Mojave at 33% of their 2004 levels****. 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 since 2007, and in these two recovery units* ***the proportion of juveniles in 2014 has declined to 91% and 77% of their representation in 2004,*** *respectively*;

- *Recent attention has focused especially on increased predation risk in the Western Mojave, Eastern Mojave, and Colorado Desert recovery units due to prey-switching during droughts by* Coyotes *(Canis latrans) and especially by increasing abundance of* Common Ravens *(Corvus corax), which typically prey on smaller tortoises rather than on adults*;

- *The negative population trends in most of the* [Tortoise Conservation Areas] *TCAs for Mojave Desert Tortoises indicate that* ***this species is on the path to extinction under current conditions.*** *This may reflect inadequate recovery action implementation, slow response by tortoises and their habitat to implemented actions, or new and ongoing human activities in the desert that have not been mitigated appropriately. It may also be a result of stochastic or directional climatic events that impact large expanses of tortoise habitat (e.g., drought, fire, climate change) and are largely beyond the realm of local land management activities.* ***Our 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.***

(Emphasis added).

The USFWS (1994a) has determined that the minimum viable density of adult tortoises is 3.9 tortoises per square kilometer (10 tortoises per square mile), and that populations with densities below this size are in danger of extinction. The USFWS (2015) has reported that the density of adult desert tortoises in the three

Desert Tortoise Recovery Units in California are less than the minimum viable density and are experiencing a declining trend.

In addition to the startling population declines, this species is also facing significant uncertainty regarding protections on federal land. The California Desert Conservation Area (CDCA) Plan is the primary document guiding management on BLM land and was amended by the Desert Renewable Energy Conservation Plan (DRECP) in 2016 and the West Mojave Plan Route Network and Livestock Grazing Project in 2019. The most recent West Mojave Plan provides for a continuation of excessive vehicle use and livestock grazing, which are two of the most important threats to the desert tortoise and its critical habitat. Further, there is a currently pending plan amendment to the DRECP that is anticipated to contain further reductions in protections to desert tortoise.

Based on the best available scientific information presented in this petition, naturally-occurring populations of Agassiz's desert tortoise are on the verge of extirpation in California from a variety of human-caused threats and warrant a change in their listing status from Threatened to Endangered. Defenders of Wildlife, Desert Tortoise Council and Desert Tortoise Preserve Committee (Petitioners) believe changing the status of the species from Threatened to Endangered under provisions of the California Endangered Species Act will result in improved conservation and management outcomes for this species because it will (1) accurately reflect its status under CESA, (2) better inform project proponents that the tortoise is in danger of extinction and they should move their projects out of tortoise habitat/linkage areas to avoid extinction in California, (3) result in fully mitigation/compensation for the direct, indirect, and cumulative impacts to the tortoise, (4) provide for the implementation of more recovery actions to prevent its extinction in California, and (5) result in a higher-level of analysis of impacts to this species by the California Department of Fish and Wildlife (CDFW) from proposed land use activities on both federal, state, local, and private lands. If California is going to have any hope of avoiding the extinction of its state reptile, Agassiz's desert tortoise, and reverse the current decline of the tortoise to move toward recovery, the Commission must act by changing the listing status of this species from Threatened to Endangered.

1. **POPULATION TRENDS**

Describe current population trends (with numbers and rate) and relate these to viable population numbers. Explain survey methodology used to arrive at numbers or estimates and what assumptions, if any, were involved.

Background:

Population Sampling Methodologies

Permanent Study Plots: In the late 1970s, the Bureau of Land Management implemented a sampling methodology to collect demographic data on desert tortoises at 47 study plots in the spring. The method was to survey the sites intensively, locating all living tortoises and shell remains (BLM 2002). From these 47 plots, BLM selected and established 15 permanent one square mile study plots at various locations in the three Recovery Units (Figure 1) for the desert tortoise in the California Desert Conservation Area – Western Mojave, Colorado Desert, and Eastern Mojave (BLM 2002, Berry 2003) (See Tables 1a and 1b below). One hundred percent of each plot was surveyed twice for live desert tortoises and tortoise sign (e.g., burrows, scat, tracks, etc.). Surveys occurred in spring for 60 days. Density estimates were determined using mark-recapture sampling methods. Abundance, sex ratio, mortality, size distribution, and other population attributes were determined from the data collected. Most study plots were surveyed from every year to every 10 years (Berry 2003). The results of the surveys were applied to adjacent areas.

From the data collected, BLM reported the abundance of all size classes of desert tortoises (e.g., hatchlings, juveniles, immatures, subadults, and adults), mortality, population density and trend, size-specific sex ratios, age structure, survivorship rates, and causes of mortality at the size class and population levels in the California desert when compared to prior surveys at each plot. BLM in Nevada and Utah implemented this methodology in 1981 and Arizona in 1987 (USFWS 2010). BLM surveyed these study plots until 1995 when the U.S. Geological Survey assumed the task in California (BLM 2002; BLM et al. 2005).

The permanent study plot method had its downsides and assumptions. These include:

- Because of the intensive search effort needed to survey 100 percent of each plot, most study plots were not surveyed annually.
- Placement of permanent study plots was not random.
- Generally, plots were located where densities of tortoises were found to be high. This placement was done to get an adequate sample size to determine density using mark-recapture calculations. Thus, density estimates from study plots when applied to adjacent areas could be greater or less than the actual densities.
- The assumption that tortoises do not enter or leave the study plot during the entire 60-day spring survey period is not likely being met for the mark-recapture method.
- Tracy et al. (2004) concluded that it was not appropriate to extrapolate data from these plots to serve as a range-wide population baseline from which to assess recovery.

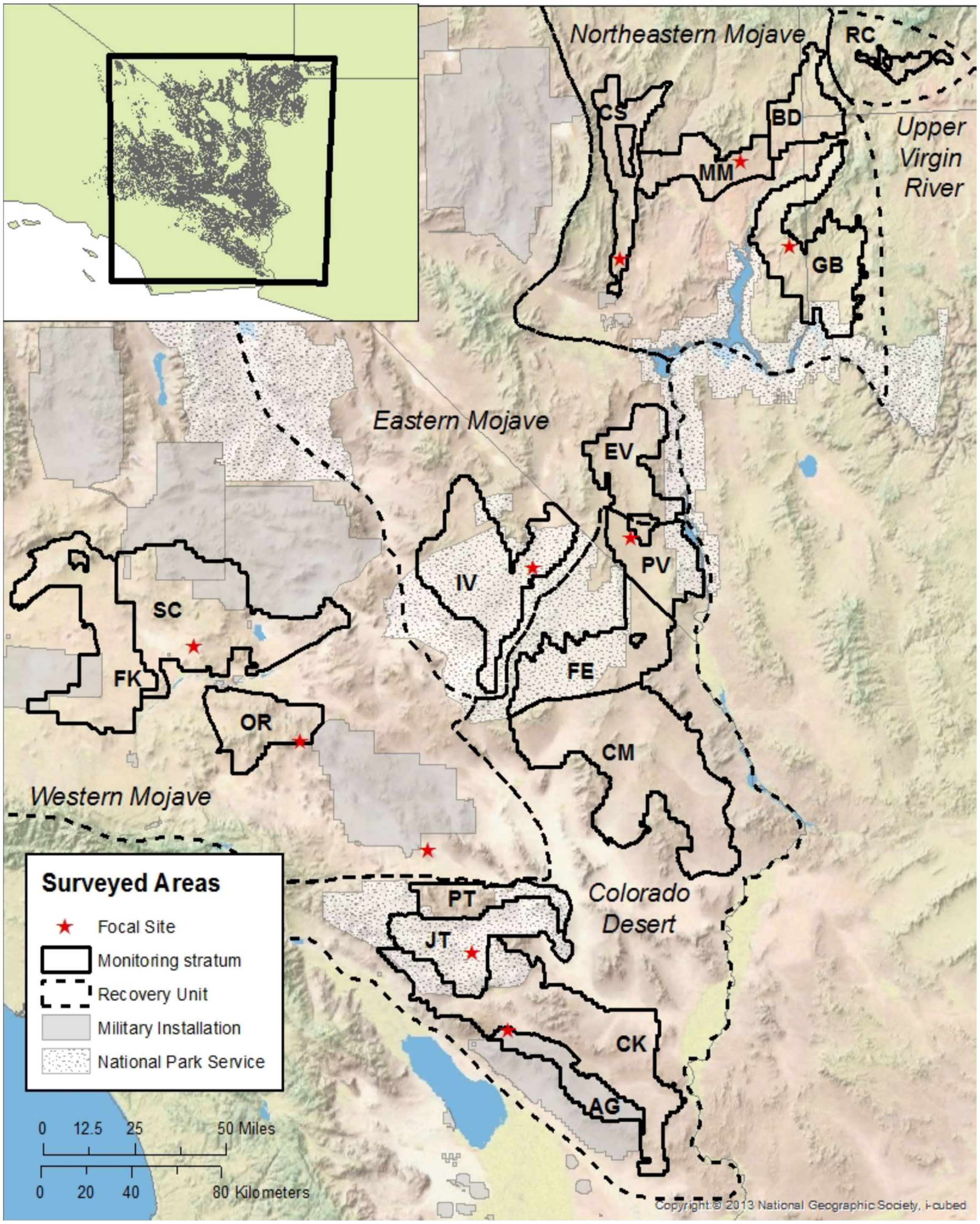

Figure 1. Map of the Recovery Units and Critical Habitat Units (CHUs) for Agassiz's desert tortoise. The CHUs in California are: FK = Fremont-Kramer, SC = Superior-Cronese, OR = Ord-Rodman, PT = Pinto Mountains, JT = Joshua Tree, CK = Chuckwalla, AG = Chocolate Mtns Aerial Gunnery Range, CM = Chemehuevi, FE = Fenner, IV = Ivanpah.

Line Distance Sampling: In June 1999, the interagency Desert Tortoise Management Oversight Group (DTMOG) adopted line distance sampling as the method for estimating adult desert tortoise abundance and density on a rangewide basis, and to detect long-term population trends (Anderson and Burnham 1996). This sampling method is intended to document rangewide population trends for adult desert tortoises over time and to determine whether the goals and objectives in the Recovery Plan regarding tortoise densities are being met. This monitoring strategy uses annual surveys on randomly placed line distance transects, with effort levels designed to detect long-term population trends (e.g., 10-year trends) in adult tortoises. This method was used beginning in 2001 by experienced survey crews under the direction of the USFWS DTRO, who publishes annual reports of line distance survey result reports (e.g., USFWS 2019a, 2020).

The downsides and assumptions of line distance sampling include:

- Line distance sampling collects data only to estimate the density of live adult tortoises. No systematic methodology is used to collect data on other population attributes (e.g., sex ratio, carcasses (mortality), cause of death, abundance or density of hatchling or juvenile tortoises, or short-term changes to population characteristics such as a catastrophic decline or remarkable increase) (USFWS 2006).
- Transects are not located randomly throughout the range of the desert tortoise. Rather, they are located randomly within CHUs, due to funding constraints and logistical issues. This methodology leaves occupied tortoise habitat outside these areas and areas needed for connectivity between CHUs/TCAs/Desert Wildlife Management Areas (DWMAs) unsurveyed.
- There are no trend data for tortoise populations outside CHUs.
- CHUs are more likely to be managed for the tortoise and its habitat than habitat outside CHUs and more likely to have greater densities of tortoises than areas outside CHUs. Therefore, the density estimates for adult tortoises in CHUs obtained from line distance sampling would likely be greater than for areas outside the CHUs in tortoise habitat and greater than rangewide density estimates. Thus, the line distance sampling does not provide a rangewide density estimate; it provides a density estimate for CHUs.
- Like permanent study plots, CHUs are not surveyed annually but about once every 3 years.
- Results from the range-wide line distance sampling survey program for population monitoring in CHUs/TCAs/DWMAs are intended to provide a baseline from which recovery criteria for stable populations within recovery units may be measured (USFWS 2006). However, collection of this baseline data was started in 2001. This is 12 years after listing Agassiz's desert tortoise as under CESA and ESA. Desert tortoise densities and abundance continued to decline from 1989/1990 (date of listings) to 2001. Using tortoise densities obtained from 2001 and later implies that although

listed as threatened, the densities of tortoises could decline further and still achieve recovery. A more appropriate approach would have been to use densities at the date of listing as the baseline.

CHUs for Agassiz's desert tortoises receive, in theory, greater protection under ESA provisions for federal actions because of the prohibition of adversely modifying or destroying Critical Habitat under ESA Section 7(a)(2). In spite of this prohibition, recent programmatic plans by the BLM in the California deserts have designated Extensive Recreation Management Areas (ERMAs) and Special Recreation Management Areas (SRMAs) in hundreds of thousands of acres of Critical Habitat for the tortoise (BLM 2016). BLM has also opened Cuddeback and Coyote dry lake beds within Critical Habitats in the Western Mojave Desert to unrestricted motorized vehicle use (BLM 2019).

With greater protection afforded to desert tortoise habitat within designated Critical Habitat, one would assume that tortoise populations occurring in Critical Habitat would have higher densities, a higher probability of recovery, and upward population trends over time with implementation of developed recovery plan actions. However, when analyzing the data from multiple years of line distance sampling, this assumption, has proven incorrect (Berry et al. 2014, USFWS 2015), and exactly the opposite. (See "Line Distance Sampling Results.")

Population Viability for Agassiz's Desert Tortoise

In the 1994 Recovery Plan for the Mojave Population of the Desert Tortoise, the USFWS determined that the minimum viable tortoise population density is 3.9 adults per square kilometer, or approximately 10 per square mile. In calculating this detailed population viability analysis, many assumptions were factored into this analysis, including a male-female ratio of 1:1 (i.e., the number of female tortoises should not be less than the number of male tortoises) (USFWS 1994a), and certain minimum areas of conserved habitat (reserves) would be established and managed, 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 not viable and in danger of extinction (USFWS 1994a).

At the time the 1994 Recovery Plan was written, there was less consideration of the potentially important role of drought and climate change in the desert ecosystem, and with regard to desert tortoises and tortoise habitats in particular. In the meantime, studies have documented vulnerability of juvenile (Wilson et al., 2001) and adult tortoises (Peterson 1994, 1996; Henen 1997; Longshore et al., 2003) to drought (USFWS 2006).

The analysis of population viability for the desert tortoise used (1) population densities as of the early 1990s and size of reserves (i.e., areas managed for the desert tortoise), and (2) the population numbers (abundance) as of the early

1990s and size of reserves. 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).

Reserve design (USFWS 1994a) and designation of Critical Habitat were based on the population viability analysis from numbers (abundance) and densities of populations of the Mojave desert tortoise in the early 1990s. Inherent in this analysis is that the lands be managed with reserve level protection (USFWS 1994a) or ecosystem protection as described in section 2(b) of the federal ESA, and that sources of mortality be reduced so recruitment exceeds mortality (that is, lambda >1)(USFWS 1994a).

Permanent Study Plot Results

Since the permanent study plots were first established in the late 1970s to 2002, tortoise populations have experienced declines both in numbers of tortoises registered during the surveys and in densities of live tortoises (Berry and Medica 1995, Brown et al. 1999, Berry et al. 2002). Declines of >50% and up to 96% have occurred regardless of initial densities (Berry 2003). Declines in numbers and densities of live tortoises were confirmed by corresponding increases in carcasses, including remains of marked tortoises (Berry 2003).

Beginning in the 1980s, high tortoise mortality associated disease was documented throughout the western Mojave Desert, and shortly thereafter, in populations within the eastern Mojave Desert in California and Nevada. Disease outbreak was first detected in surveys at the Desert Tortoise Research Natural Area (DTRNA) study plot (Brown et al. 1999) on the west edge of what is now the Fremont-Kramer CHU and subsequently in populations in adjacent Critical Habitat Units (i.e., Fremont-Kramer and Superior-Cronese).

Table 1a. Estimated annual densities of adult Agassiz's desert tortoises (midline carapace length (MCL) >180 mm) during 60-day spring surveys using mark-recapture methodology at one square-mile permanent study plots in two of the three Agassiz's Desert Tortoise Recovery Units and Critical Habitat Units (CHUs)/Tortoise Conservation Areas (TCAs)/Desert Wildlife Management Areas (DWMAs) in California. Density is in adult tortoises/square-kilometer. DTRNA = Desert Tortoise Research Natural Area.

	Western Mojave Recovery Unit								**Eastern Mojave Recovery Unit**	
CHU/TCA/ DWMA	**Fremont-Kramer**				**Superior-Cronese**	**Ord-Rodman**			**Ivanpah**	
Permanent Study Plot	DTRNA Interpretive Plot	DTRNA Interior Plot	Fremont Valley Plot	Kramer Hills Plot	Plots established by National Training Center	Lucerne Valley	Johnson Valley	Stoddard Valley	Ivanpah	Shadow Valley
Year Surveyed										
1977									37- 46 (1)	
1979	56 (2)	34 (2,8)						20 (2)	40 (2)	XXX
1980				29 (3)		30-35 (3, 9)	23-26 (3, 9)			
1981									38-50 (4)	
1982				30 (5)						
1985	61 (6)									
1986						29 (9)	19 (9)		XXX	
1988										XXX
1989	XXX	61(8)								
1990						25 (9)	6 (9)		XXX	
1992										XXX
1993	XXX									
1994						25 (9)	6(9)		XXX	
1997	8 (7)									

(1) Berry 1978
(2) Berry 1980, BLM et al. 2005
(3) Berry 1981, BLM et al. 2005
(4) Turner, F., et al. 1982. DTC Symposium
(5) Berry, Nicholson; Juarez, and Woodman 1986
(6) Berry Shields, Woodman, Campbell, Roberson, Bohuski, and Karl 1986
(7) Berry, Stockton, and Shields 1998
(8) Berry, Woodman, and Knowles 1989
(9) BLM and CDFG 2002
(10) BLM 2002

XXX– Sampled but data unavailable

Table 1b. Estimated annual densities of adult Agassiz's desert tortoises (MCL >180 mm) during 60-day spring surveys using mark-recapture methodology at one-mile^2 permanent study plots in the third Agassiz's Desert Tortoise Recovery Unit and Critical Habitat Units (CHUs)/Tortoise Conservation Areas (TCAs)/Desert Wildlife Management Areas (DWMAs) in California. Density is in adult tortoises/kilometers^2.

	Colorado Desert Recovery Unit								
CHU/TCA/ DWMA	**Chuckwalla**		**Chemehuevi**		**Fenner**		**Joshua Tree**	**Pinto Mountains**	**Chocolate Mtns AGR**
Permanent Study Plot / **Year Surveyed**	Chuckwalla Valley II Plot	Chuckwalla Bench Plot	Chemehuevi Wash Plot	Ward Valley Plot	Fenner	Goffs	Joshua Tree	No study plots	No study plots
1978							17-18 (1)		
1979		59 (5)	12-16 (2,5)						
1980	17(5,6)			29 (4,6)		61 (4)			
1982		61 (5)	15 (5)						
1983						XXX			
1984						XXX			
1985						XXX			
1986						XXX			
1987	XXX			XXX					
1988		43 (6)	XXX						
1990		XXX				XXX			
1991	XXX			XXX			45* (3)		
1992		XXX	XXX				51* (3)		
1993							47* (3)		
1994						XXX			
1995				XXX					
1996			XXX						
1997		XXX							
2000						XXX			

(1) Barrow 1979
(2) Berry 1980
(3) Freilich, J. and B. Moon 1993* Densities reported for all tortoises rather than adults.
(4) Berry 1981
(5) Berry, Nicholson; Juarez, and Woodman 1986
(6) Berry 1981
(7) Berry, Woodman, and Knowles 1989

XXX – Sampled this year but data unavailable

In the Western Mojave Recovery Unit, between 1982 and 1992, the overall tortoise population at the DTRNA declined by 86% with the adult population declining by about 94%, primarily due to *Mycoplasmosis* disease mortality (Brown et al. 1999). Juvenile tortoise mortality occurred primarily from Common raven (*Corvus corax*) predation. Tracy et al. (2004) concluded that the apparent downward trend in desert tortoise populations in the western portion of the range (Western Mojave Recovery Unit) that was identified at the time of listing from permanent study plot data was valid and ongoing from several threats including disease.

In the Colorado Desert Recovery Unit, BLM and CDFG (2002) reported that populations of desert tortoises "have declined precipitously in some parts of the range, such as the Chuckwalla Bench….Population estimates of permanent study plots at Chemehuevi Valley and Chuckwalla Bench have shown declines as high as 90 percent over the past decade" (i.e., early 1990s to 2000s).

Surveys in the eastern Mojave Desert (i.e., Goffs, California) (Colorado Desert Recovery Unit) have found high levels of Agassiz's desert tortoise mortality attributable to tortoise shell (*dyskeratosis*) and respiratory tract (*mycoplasmosis*) diseases (Berry 2000). Surveys performed in 2000, eleven years after state listing of the desert tortoise as Threatened, revealed that all tortoise size classes in sampled eastern Mojave Desert Critical Habitats had declined by as much as 76-80% from previous tortoise population estimates. The decline rate in larger tortoise size classes, which have a greater reproductive contribution to the population [i.e., larger females produced larger clutch sizes (Wallis et al. 1999)], was estimated to have declined by as much as 90% from previous estimates (Berry 2000, BLM 2002).

Lovich (2016) reported on the trend of desert tortoise densities in Joshua Tree National Park (Colorado Desert Recovery Unit). He noted tortoise populations "decreased in size during droughts." And, "What was once a robust and large population of tortoises in the early 1990s declined precipitously by 2012."

In the Eastern Mojave Recovery Unit in California, surveys performed in 2000, eleven years after state listing of the desert tortoise as Threatened, revealed that all tortoise age classes sampled in the CHUs of the Eastern Mojave Recovery Unit had declined by as much as 76-80% from previous tortoise population estimates. The decline rate in larger tortoise size/age classes, which have a greater reproductive contribution to the population, was estimated to have declined by as much as 90% from previous estimates (Berry 2000).

Line Distance Sampling Results

The USFWS Desert Tortoise Recovery Office has published reports of annual line distance sampling results since 2001 (e.g., USFWS 2019a, 2020). The first multi-year report was issued in 2006 for years 2001-2005.

Below are the results of line distance surveys by year (2001-2019) and change in estimated abundance of adult tortoises by Recovery Unit and Critical Habitat Unit in

California (Table 2) (USFWS 2006, 2009, 2010, 2011, 2012b, 1012c, 2013, 2014, 2015, 2016a, 2018, 2019, 2020).

Table 2. Density of adult Agassiz's desert tortoises (>180 mm MCL) per km^2 by year (2001-2018) in Critical Habitat Units designated for the species within California.

Year	Western Mojave Critical Habitat Unit			Eastern Mojave Critical Habitat Unit	Colorado Desert Critical Habitat Unit					
	Fremont-Kramer	Superior-Cronese	Ord-Rodman	Ivanpah	Chuckwalla	Chemehuevi	Fenner	Chocolate Mountains AGGR	Pinto Mountains	Joshua Tree
2001	5.5	4.3	10.1	2.8	10.1	7.2	15.7	No data	6.5	5.8
2002	4.7	8.1	13.1	5.4	7.7	No data	3.7	No data	4.0	3.3
2003	3.4	7.8	4.1	No data	4.0	6.3	2.8	No data	3.8	2.7
2004	6.1	4.5	5.2	4.7	6.4	6.9	8.7	No data	2.2	1.7
2005	5.7	6.7	8.1	4.6	7.9	10.8	14.0	No data	10.3	2.8
2006	No data	No data	No data	No data	No data	No data	No data	No data	No data	No data
2007	2.7	6.3	8.2	6.5	4.5	4.6	6.6	7.1	2.4	2.8
2008	0.4	1.4	3.8	3.8	3.2	3.6	5.0	3.4	2.5	1.8
2009	3.3	4.9	7.1	4.0	0.0	9.2	8.1	7.3	5.0	2.3
2010	2.5	2.6	7.5	1.0	3.7	4.2	6.9	13.8	3.4	2.8
2011	3.5	3.4	3.2	4.5	3.9	4.0	6.8	No data	3.3	3.5
2012	2.2	4.4	4.6	2.8	3.9	0.8	0.9	6.1	3.7	3.4
2013	No data	No data	No data	No data	No data	No data	No data	7.3	No data	No data
2014	4.7	2.5	3.5	2.3	3.3	2.8	4.8	8.4	2.4	3.7
2015	4.5	2.6	No data	1.9	No data	No data	No data	10.3	No data	No data
2016	No data	3.6	No data	No data	No data	1.7	5.5	8.5	2.1	2.6
2017	4.1	1.7	3.9	No data	4.3	No data	No data	9.4	2.3	3.6
2018	No data	No data	2.5/3.4*	3.7	No data	2.9	6.0	7.6	No data	No data
2019	2.7	1.9	2.1	2.6	1.8	No data	2.8	7.0	1.7	3.1

*Density of 2.5 adult tortoises per km^2 in the Ord-Rodman CHU is for resident tortoises only. The 3.4 adult tortoises per km^2 includes the tortoises translocated from the expansion area of the Marine Corps Air Ground Combat Center to Ord-Rodman CHU that were found during transect sampling.

USFWS (2006) reported low tortoise densities across recovery units from 2001-2005 and are indicative of a continuing long-term decline of tortoise abundance and population densities throughout the Mojave and Colorado deserts in California. This decline was first reported in the 1980s and resulted in the Commission listing the desert tortoise as Threatened in 1989 and USFWS following in 1990.

In their 2015 report, the USFWS provides an aggregate analysis of the data from 2004 through 2014 to determine the trend of adult desert tortoise (>180 mm midline carapace length) densities and abundance from rangewide sampling in CHUs/TCAs/DWMAs (Table 3).

Table 3. Summary of 10-year trend data (from 2004 to 2014) for Recovery Units and Critical Habitat Units (CHU)/Tortoise Conservation Areas (TCA)/Desert Wildlife Management Areas (DWMAs) for Agassiz's desert tortoise, *Gopherus agassizii* (=Mojave desert tortoise) in California The table includes the area of each Recovery Unit and CHU/TCA/DWMA, percent of total habitat for each Recovery Unit and CHU/TCA/DWMA, density (number of breeding adults/km^2 and standard errors = SE), and the percent change in population density between 2004-2014. Populations below the viable level of 3.9 breeding individuals/km^2 (10 breeding individuals per mi^2) (assumes a 1:1 sex ratio (i.e., number of adult females equal to or greater than adult males) and showing a decline from 2004 to 2014 are in red (USFWS 2015).

Recovery Unit Designated Critical Habitat Unit/Tortoise Conservation Area/Desert Wildlife Management 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**
Eastern Mojave, CA	**3,446**	**13.42**	**1.9 (0.7)**	**–67.26 decline**
Ivanpah, CA	2,447	9.53	2.3 (0.9)	**–56.05 decline**

Using line distance sampling data, Defenders of Wildlife prepared a series of graphs showing the population trend of adult desert tortoises from 2001 within CHUs in California, including a line showing the minimum viable density threshold of 3.9 adults per square kilometer, and a projected date of extirpation or extinction (Attachment 1).

An analysis of these data indicate:

- The aggregate adult tortoise densities in the Western Mojave Recovery Unit, Colorado Desert Recovery Unit, and Eastern Mojave Recovery Unit in

California were below the population viability density of 3.9 adult tortoises per km^2.

- At the CHU/TCA/DWMA population level, 9 of the 10 populations in these Recovery Units in California were below this viability density.
- For percent change in population abundance between 2004 and 2014, all populations in the three CHUs/TCAs/DWMAs except one (Joshua Tree National Park) experienced a decline.
- For percent change in population abundance in 2014 using 2004 data as a baseline, the aggregate change in all Recovery Units in California experienced declines ranging from 36 to 67 percent.
- In the Western Mojave Recovery Unit at the population level, the three populations experienced 50 to 61 percent declines.
- In the Colorado Desert Recovery Unit in California, five of six populations experienced 29 to 64 percent declines.
- In the Eastern Mojave Recovery Unit in California, the Ivanpah population experienced a 56 percent decline.
- Only the Joshua Tree population in the Colorado Desert Recovery Unit had an increase in population abundance. Despite this 178 percent increase, its population density was below the 3.9 tortoises per km^2 population viability level.

The population viability analysis in the 1994 Recovery Plan assumed a 1:1 male - female sex ratio and used the estimated densities of tortoises in the early 1990s in the analysis to calculate the population viability density. Unfortunately, we were unable to find information in the USFWS reports on the sex ratios of these populations. Therefore, we are unable to determine if this assumption is being met. A male - female sex ratio that favors males would require a greater population density than 3.9 adult tortoises per square kilometer for a population to be viable.

In addition, the density and abundance of desert tortoises has declined substantially in the Western Mojave Recovery Unit, Colorado Desert Recovery Unit, and Eastern Mojave Recovery Unit since the population viability analysis was published in the 1994 Recovery Plan. Consequently, the minimum viable density for tortoise populations may now be greater than the 3.9 adult tortoises per km^2 (10 adult tortoises per m^{i2}) because population density estimates in the 1990s were used to calculate the population viability density along with other parameters.

In their analysis of the USFWS's 2015 Line Distance Survey Report, Allison and McLuckie (2018) reported:

"*Populations of the Mojave Desert Tortoise (Gopherus agassizii) experienced severe declines in abundance in the decades leading up to 1990, when the species was listed as threatened under the U.S. Endangered Species Act. Prevailing declines in the abundance of adults overall and in four of the five recovery units indicate the need for more aggressive implementation of recovery actions and more critical evaluation of the suite of future activities and projects in tortoise habitat that may exacerbate ongoing population declines. Adult densities in the* [California recovery units] *declined at different annual rates: Colorado Desert (-4.5%, Eastern Mojave*

(-11.2%), and Western Mojave (-7.1%). Of the four recovery units in which we used two-pass surveys, the probability of encountering a juvenile was consistently lowest in the Western Mojave Recovery Unit.

Overall this threatened species is experiencing large, ongoing population declines, and adult tortoise numbers have decreased by over 50% in some recovery units since 2004. Declining adult densities through 2014 have left the Western Mojave adult numbers at 49% and in the Eastern Mojave at 33% of their 2004 levels. 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 since 2007, and in these two recovery units the proportion of juveniles in 2014 has declined to 91% and 77% of their representation in 2004, respectively.

Throughout our assessment, we describe tortoise status based on adult densities, which is useful for comparison of areas of different sizes. However, if the area available to tortoises is decreasing, then trends in tortoise density no longer capture the magnitude of decreases in abundance. Some of the area of potential habitat (68,501 km^2) has certainly been modified in a way that decreases the number of tortoises present.

We used area estimates that removed impervious surfaces created by development as cities in the desert expanded. However, we did not address degradation and loss of habitat from recent expansion of military operations (753.4 km^2 so far on Fort Irwin and the MCAGCC [in addition to training/bombing lands expanded at China Lake Naval Weapons Center]*… the current range-wide distance sampling program provides fairly coarse but clear summaries of patterns in tortoise density and abundance, definitive because they sample regionally and range-wide.*

The negative population trends in most of the TCAs for Mojave Desert Tortoises indicate that this species is on the path to extinction under current conditions. This may reflect inadequate recovery action implementation, slow response by tortoises and their habitat to implemented actions, or new and ongoing human activities in the desert that have not been mitigated appropriately.

It may also be a result of stochastic or directional climatic events that impact large expanses of tortoise habitat (e.g., drought, fire, climate change) and are largely beyond the realm of local land management activities. Our 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."

Combining Permanent Study Plots and Line Distance Sampling Results

By the time formal line distance sampling of adult tortoise populations in California began in 2001, high levels of tortoise mortality had been documented and already reduced these populations by up to approximately 90%, such as in the Fremont-Kramer CHU in the Western Mojave Recovery Unit (USFWS 1994a).

As mentioned above, beginning in the 1980s, high tortoise mortality was reported in the three Recovery Units in California. Combining the adult density data from permanent study plots and line distance sampling for these three Recovery Units indicates a substantial long-term downward trend in the density of these desert tortoise populations (Attachment 2).

Agassiz's desert tortoise is a "K-strategist" (MacArthur and Wilson 1967, USFWS 1994a), with delayed maturity and long life under normal conditions. Its survival strategy is to live a long time and recruit a small number of individuals into the population to replenish the loss of adults or slowly increase the population size. However, given the numerous, increasing, and compounding threats to the desert tortoise (see Section 6 "Factors Affecting Ability to Survive and Reproduce") and the long-term downward trend in the density of reproducing adults, these data indicate that adults are not living a long time and recruitment is much lower than mortality. With most population densities in California below the minimum viable density, this long-term downward trend indicates the survival strategy of the desert tortoise has not been working for several decades. Agassiz's desert tortoise is on a path to extirpation in California.

Analyzing the line distance sampling data that spans 19 years, population declines of desert tortoises have been documented since 2001, currently resulting in a breeding adult tortoise density generally below the minimum population viability level of 3.9 tortoises per square kilometer in all but one of the tortoise Critical Habitat Units in California (USFWS 2020). Twenty-five years after the publication of the 1994 Recovery Plan, the USFWS has confirmed that the densities of the 10 tortoise populations in CHUs/TCAs/DWMAs in California are below this minimum viable density, except for the Chocolate Mountains. If the density estimates from line distance sampling in CHUs is below the minimum viable density, it is likely that the occupied habitats outside the CHUs have lower population densities, as Critical Habitat receives an additional regulatory level of management. This would mean that rangewide the density and abundance of the tortoise may not be as great as reported from line distance sampling.

In summary, the permanent study plots data and long-term monitoring data from the USFWS's line distance sampling show a multi-decadal decline in the density of adult desert tortoises in California. The line distance sampling shows the density of 9 of 10 populations of Agassiz's desert tortoise in the CHUs of the California desert are below the population viability density of 3.9 adult tortoises per km^2. All populations have experienced steep declines in abundance since 2004 except the Joshua Tree population. Between 2004 and 2014, nine populations continue to decline at substantial rates. If these rates of decline continue, the trajectory for extirpation of the tortoise in California will likely occur within the foreseeable future. This assumes that factors such as drought and climate change do not become worse and that human uses of desert lands do not increase substantially in the future. Based on past history and regional climate models, we know this is unlikely.

2. **RANGE AND DISTRIBUTION**

In the text, indicate the percentage of historic distribution that is in existence and the rate of loss. If appropriate, indicate the number of extant occurrences, populations or portions of populations in California. Indicate whether the rate of loss is accelerating, and estimate when extinction would occur if current trends continue. Discuss the relationship between historic and current acreage and degree of habitat fragmentation. Describe the quality of the existing habitats in terms of ability to maintain viable populations with or without enhancement.

The following information is from the report published by the USFWS DTRO, entitled "Status and Trend of the desert tortoise and its Critical Habitat in 2019" (USFWS 2019b):

Beginning in the 1970s *"the range and distribution of the Desert tortoise in California was initially mapped using observations of live individuals and their sign collected by the Bureau of Land Management during development of the California Desert Conservation Area Plan. Over 1,000 triangular transects were surveyed between 1978 and 1983 and were used to build a Desert tortoise occurrence map based on five classes of estimated abundance (0-20, 21-50, 51-100, 101-250, > 250 tortoises/mile. Further refinement of the occurrence and relative abundance of Desert tortoises in the Western Mojave Desert was completed by the Bureau of Land Management from 1998-1999 in support of the West Mojave Plan. Approximately 1,800 transects were performed*. *Within its range in California, habitat degradation and loss due to land-use practices include development (urban and rural), military training activities, habitat fragmentation from roads and utility corridors, recreational activities, and livestock grazing."*

In 2009, the US Geological Survey looked at the distribution of the desert tortoise by focusing on available habitat for the species (USFWS 2019b): *"Typical habitat of the desert tortoise in the Mojave Desert is characterized as Creosote Bush Scrub ranging in elevation from approximately 1,000 to 5,500 feet. A key habitat component within this habitat is a reliable food source in the form of annual forbs and grasses, which rely on annual precipitation ranging from approximately 2-8 inches. Based on an evaluation of environmental variables associated with occupied Desert tortoise habitat, U.S. Geological Survey researchers developed a habitat suitability model in 2009* (Nussear et al. 2009), *which provided the first accurate map of predicted occupied habitat for the species.*

The most apparent threats to the desert tortoise are those that result in mortality and permanent habitat loss across large areas, such as urbanization and large-scale renewable energy projects and those that fragment and degrade habitats, such as proliferation of roads and highways, off-highway vehicle (OHV) activity [including military training], wildfire, and habitat invasion by non-native invasive plant species.

Prior to 1994, desert tortoises were extirpated from large areas within their distributional limits by urban and agricultural development (e.g., the cities of Barstow and Lancaster, California; Las Vegas, Nevada; and St. George, Utah; etc.; agricultural areas south of Edwards Air Force Base and east of Barstow), military training (e.g., Fort Irwin, Leach Lake Gunnery Range), and off-highway vehicle use (e.g., portions of off-road management areas managed by the BLM and *unauthorized use in areas such as east of California City, California). Since 2010, the U.S. Fish and Wildlife concluded that the distribution of the Desert tortoise had not changed substantially in terms of the overall extent of its range, although desert tortoises have been removed from several thousand acres because of solar development, military activities, and other project development (USFWS 2010). In 2014, the U.S. Fish and Wildlife Service accounted for acres of non-habitat for the species (i.e., impervious surfaces that included paved and developed areas and other disturbed areas that have zero probability of supporting desert tortoises. Within California, impervious surfaces totaled 3,325,979 acres, or 19.2% of the total acres of modeled habitat for the species.*

Other anthropogenic factors affect the physical and biological features of critical habitat in more subtle ways. Surface disturbance from OHV vehicle activity can cause erosion and large amounts of dust to be discharged into the air. Recent studies on surface dust impacts on gas exchanges in Mojave Desert shrubs showed that plants encrusted by dust have reduced photosynthesis and decreased water-use efficiency, which may decrease primary production during seasons when photosynthesis occurs.

Sharifi et al. (1997) also showed reduction in maximum leaf conductance, transpiration, and water-use efficiency due to dust. Leaf and stem temperatures were also shown to be higher in plants with leaf-surface dust. These effects may also impact [native] desert annuals, an important food source for desert tortoises.

Invasion of non-native plants can affect the quality and quantity of plant foods available to desert tortoises. Increased presence of invasive plants can also contribute to increased fire frequency. Proliferation of invasive plants is increasing in the Mojave and Sonoran deserts and is recognized as a substantial threat to desert tortoise habitat."

Substantial alteration of Agassiz's desert tortoise Critical Habitat occurred with the expansion of the U.S. Army's National Training Center at Fort Irwin in 2002, 13 years after listing of the species as Threatened by the California Fish and Game Commission. This federal action resulted in the transfer of approximately 99,000 acres of public land managed by the BLM in the Superior-Cronese Critical Habitat Unit of the Western Mojave Recovery Unit in California to the U.S. Army. (Charis 2005). The Army is now conducting mechanized warfare training, which directly impacts tortoise habitat, on approximately 18,000 of these acres in the Southern Expansion Area, and indirectly impacts additional habitat by creating large amounts of dust that are deposited in adjacent and downwind areas. The dust covers plants and reduces their ability to photosynthesize. It also reduces maximum leaf conductance, transpiration, and water-use efficiency (Sharifi et al. 1997). Thus, plant survival, growth, and reproduction are reduced. This reduces the availability of important forage plants (USFWS 2010) and cover for the tortoise from predators and temperature extremes. Military training activities spread the seeds and plant propagules of nonnative plant species in the tracks and tires of their vehicles and in their equipment. The remaining 62,000 acres of Critical Habitat in the Western Expansion Area have not been used for mechanized training to date, but the Army intends to utilize them at some future date (USFWS 2012a).

Prior to use of the 18,000 acres in the Southern Expansion Area, the Army in 2002 captured a total of 650 adult and sub-adult desert tortoises and translocated them to specific non-training lands within and adjacent to the installation. Roughly half of tortoises translocated died during or immediately after translocation. To date, tortoises have only been removed from the Southern Expansion Area where mechanized warfare training takes place (USFWS 2012a). Surveys in the 62,000 acre Western Expansion Area revealed that approximately 1,100 individuals would have to be captured and translocated before mechanized training could commence.

A second significant impact to Agassiz's desert tortoise habitat occurred in 2013, when the U.S. Navy expanded the U.S. Marine Corps Air Ground Combat Center (MCAGCC) into the eastern Johnson Valley by acquiring 154,000 acres of public land managed by the BLM and 13,971 acres of non-federal land (U.S. Marine Corps et al. 2016). Approximately 1,000 desert tortoises were captured and translocated from the area planned for active mechanized warfare training exercises into the adjacent Ord-Rodman CHU. The same direct and indirect impacts to tortoises and tortoise habitat from the National Training Center's expansion also occurred on the expansion lands of MCAGCC.

Between 2009 and 2019, ten solar energy generation projects were also approved on public lands supporting Agassiz's desert tortoise habitat in California, 20 years following state listing of the species as Threatened. As a result, a total of 31,578 acres of Agassiz's desert tortoise habitat on public land has been removed during this time, although none of these projects are located in Critical Habitat. Additional private land with significant tortoise habitat have also been developed for renewable energy projects. The estimated incidental take of Agassiz's desert tortoises for these projects total over 2,298 individuals to date, based on USFWS biological opinions and CESA Section 2081 incidental take permits. Authorization for additional incidental take in the future is anticipated due to continued development of solar energy facilities, primarily on federal land managed by the BLM.

Roads have been described as the single most destructive element in the process of habitat fragmentation (Noss 1993) and their ecological effects are considered "the sleeping giant of biological conservation" (Forman 2002:viii, as cited in van der Ree et al. 2011). Though roads comprise only 1% of surface area, an estimated 19% of the total land within the United States is ecologically affected by roads due to indirect effects that extend beyond the physical footprint of the road (Forman, 2000, as cited in Nafus et al. 2013).

There are approximately 15,000 miles of paved and maintained roads within the range of the Agassiz's desert tortoise in California (BLM 1999); and 5,997 miles of authorized off-highway vehicle routes within the western Mojave Desert (BLM 2005, 2019). These roads and routes and their use by vehicles have numerous adverse impacts on the desert tortoise and its habitat. They include (1) wildlife mortality from collisions with vehicles, collecting, and vandalism (McLellan and Shackleton 1988, Kilgo et al. 1998) (2) hindrance/barrier to animal movements thereby reducing access to resources and mates [fragmentation], (3) degradation of habitat quality [spread of non-native invasive plant species] (Parendes and Jones 2000), (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 (at higher risk of localized extirpation from stochastic events or from inbreeding depression) (Jaeger et al. 2005a, 2005b, Roedembeck et al. 2007) (USFWS 1994a, Boarman 2002). A summary of the miles of routes and disturbed areas associated with motorized vehicle use within CHUs in the Western Mojave Recovery Unit is provided in Attachment 3.

For a herbivorous species such as the desert tortoise, roadside vegetation is often more robust and diverse because water that becomes concentrated along roadside berms promotes germination. This attracts tortoises and puts them at higher risk of mortality as road-kill (Boarman et al. 1997).

LaRue (1993) and Boarman et al. (1997) reported observing depauperate desert tortoise populations along highways. Subsequent research shows that populations may be depressed in a zone at least as far as 0.4 kilometers (0.25 miles) from the roadway on each side (Boarman and Sazaki 1996). The greater the distance from the road, the more desert tortoise sign is observed (LaRue 1993; Boarman et al. 1997; von Seckendorff Hoff and Marlow 2002; Boarman and Sazaki 1996). Similarly, the cover and richness of non-native plant species decreases as distance from the road increases (Boarman and Sazaki 1996).

In summary, the distribution of Agassiz's desert tortoise has been shrinking since its listing as threatened because of the myriad of land use projects throughout much of the tortoise's range in California. The larger individual projects (e.g., the expansion of the National Training Center at Fort Irwin and MCAGCC, and numerous large-scale renewable energy projects) and collectively, smaller development projects in/near the growing cities/communities of Palmdale-Lancaster, Victorville-Hesperia-Adelanto-Apple Valley, and Barstow-Lenwood continue to reduce the distribution of the tortoise near these communities. Thousands of miles of roads and routes of travel crisscross desert tortoise habitat effectively eliminating tortoises from thousands of acres of habitats adjacent to their corridors and fragment tortoise populations.

3. **ABUNDANCE**

Provide available historic and current population estimates/trends, densities, vigor, sex and age structures, and explain population changes relative to human-caused impacts or natural events. Compare current and historic abundance in terms of overall population size or size of occurrences, populations or portions of populations, as appropriate. Describe current population trends (with numbers and rate) and relate these to viable population numbers. Explain survey methodology used to arrive at numbers or estimates and what assumptions, if any, were involved.

As stated above in the Executive Summary and Section 1 (Population Trends), adult tortoise populations in Recovery Units in California have declined by 51.3% from 2004 through 2014 (i.e., from 119,029 tortoises in 2004 to 65,726 tortoises in 2014) (USFWS 2015). These declines were within tortoise Critical Habitat Units where there is a higher level of habitat protection expected to occur compared to lands outside these areas.

Densities of adult tortoises in CHUs within the Western Mojave Recovery Unit were estimated in 2004 to average 5.7 tortoises per square kilometer, in contrast to an average density of 2.8 tortoises per square kilometer estimated in 2014 – a decline similar to those occurring in all three Recovery Units in California (USFWS 2015). Historical survey data from permanent study plots in the Western Mojave Recovery Unit in the late 1970s and early 1980s were used to estimate adult tortoise densities in the 1994 Recovery Plan, which ranged from 2 to 96 per square kilometer at that time (USFWS 1994a) – indicating that adult tortoises in the Western Mojave Recovery Unit may have declined by as much as 85-95% from roughly 1980 to 2014. During this time Agassiz's desert tortoise had been state-listed as Threatened for 15 years.

These trend data indicate that under current management, Agassiz's desert tortoise populations within Critical Habitat Units in California continue to decline rapidly, which is inconsistent with the goals in the Recovery Plans of stabilizing and recovering depleted tortoise populations and halting habitat degradation – a situation that endangers the continued viability of wild tortoise populations in California. Still higher tortoise population declines, and greater degrees of habitat degradation, are known to occur outside of these Critical Habitat Units, possibly due to less restrictions placed on various public land use activities and private land development through regional and county land use plans [e.g., California Desert Conservation Area (CDCA) Plan (BLM 1980), as amended by the Desert Renewable Energy Conservation Plan (DRECP)].

Darst et al. (2013) developed a tortoise threats assessment that ranked the relative importance of threats to Agassiz's desert tortoise and its populations. These researchers determined that urbanization, human access, military operations, disease, and illegal use of off-highway vehicles were, and continue to be, the most significant threats on a range-wide basis.

In the 1994 rule designating Critical Habitat for the Mojave population of the desert tortoise, the USFWS (1994b) stated:

"*OHV use in the desert has increased and proliferated since the 1960s. As of 1980, OHV activities affected approximately 25 percent of all desert tortoise habitat in California*."

Various researchers have studied threats to tortoises and their populations. Tuma et al. (2016) conducted a detailed analysis of threats present in the Superior-Cronese Critical Habitat Unit in the Western Mojave Recovery Unit in California. These researchers concluded human presence was associated with significantly greater declines in tortoise populations because it was associated with habitat degradation and higher animal mortality on a continuous basis. This conclusion was reached even though human presence had a patchy distribution in the study area. Land use activities, such as vehicle use on/off authorized roads/trails, camping, mining, and livestock grazing; as well as habitat loss associated with housing subdivisions, freeways, transmission lines and railroads were identified in this study as a current suite of threats to Agassiz's desert tortoise. The second highest-ranked threat was subsidized predators, which contribute to tortoise mortality on a continuous, widespread basis but without causing habitat loss or degradation.

The USFWS (2011) concluded in its revised recovery plan for the Mojave Population of the Desert Tortoise that:

"*The vast majority of threats to the desert tortoise or its habitat are associated with human land uses. The threats identified in the 1994 Recovery Plan formed the basis for listing the tortoise as a threatened species and continue to affect the species today*."

As stated in Section 1 ("Population Trends"), the USFWS (1994) has determined the minimum viable density of adult tortoises is 3.9 tortoises per square kilometer, and that populations with densities below this number are in danger of extirpation. Based on extensive (2001-2014) line distance sampling, the USFWS (2015) determined that the estimated density of adult tortoises within Critical Habitat within the Western Mojave Recovery Unit in California in 2014 had declined to 2.8 tortoises per square kilometer, which is below the minimum density to ensure population viability or persistence. For the Colorado Desert Recovery Unit, the estimated density of adult tortoises was 4.0 tortoises per square kilometer. Although just above the minimum viable density of 3.9 calculated for desert tortoises in 1994, this CHU had a declining trend of 36.25 % from 2004 to 2012. This declining trend likely means that the density of adult tortoise will be below the minimum viable density in the foreseeable future. The Eastern Mojave Recovery Unit in California had an estimated adult tortoise density of 2.3 tortoises per square kilometer and the estimated density for the entire Recovery Unit in California and Nevada was 1.9 tortoises per square kilometer. Like the Colorado Desert Recovery Unit, the Western Mojave and Eastern Mojave Recovery Units had declining trends of 50.7% and 63.7%, respectively (see Table 3 in Section 1 – "Population Trends"). Tortoise densities in 8 of 10 Critical Habitat Units in California are also below minimum viability (see Table 3 in Section 1 – "Population Trends").

In addition to these threats, there is the overarching threat of climate change. Regional climate change models for the southwest United States show that the area is already experiencing the effects of climate change. The average daily temperatures for the 2001–2010 decade were the highest in the southwestern United States from 1901 through 2010 (Overpeck et al. 2012) with temperatures almost 2.0 degrees Fahrenheit (1.1 degrees Celsius) higher than historic averages, with fewer cold snaps and more heat waves (Overpeck et al. 2012). Climate change models for the southwestern United States for the 21st century predict seasonal air and surface temperatures in all seasons will increase (Overpeck et al. 2012), with greater warming in summer and fall than winter and spring. Droughts in parts of the southwestern United States are projected to become greater in intensity (Overpeck et al. 2012) (i.e., more frequent and/or longer in duration) with a precipitation decrease westward through the Sonoran and Mojave Deserts. With precipitation decreasing as one moves farther west in the southwest U.S., this would mean that the western portion of the range of Agassiz's desert tortoise (i.e., the tortoises in California) would be most affected by this decrease in precipitation from climate change.

Perennial vegetation is being impacted by prolonged drought conditions in the Mojave Desert. The negative effects of long-term drought on Sonoran, Great Basin, and Mojave Desert perennial plants are well documented (Goldberg and Turner 1986; Turner 1990; Bowers 2005; Hereford et al. 2006; Miriti 2006; Hamerlynck and McAuliffe 2008; Hamerlynck and Huxman 2009; Ralphs and Banks 2009, as cited in Huggins et al. 2010), and include high shrub mortality, shrub canopy deterioration, and low plant recruitment.

In a portion of the Superior-Cronese CHU, die-offs of desert shrubs have been documented. Data from plant transects reveal that total shrub cover and volume have decreased significantly by roughly 10% between 2000 and 2009 (Huggins et al. 2010). Mortality of these long-lived shrubs has been high (48%), and the recruitment of new shrubs (5%) has been too low to maintain their populations at previous levels (Huggins et al. 2010).

If the climate models for the Southwest and Mojave and Colorado deserts are correct, as the westernmost deserts in the southwest, their drought periods will become longer and more frequent. These climatic conditions will result in reduced reproduction and recruitment and elevated mortality of native woody perennial vegetation needed by the desert tortoise for shelter from extreme weather conditions and cover from predators. It also means that the frequency and quantity of native annual and herbaceous perennial plants needed by the tortoise for adequate nutrition (see Section 5 “Kind of Habitat Necessary for Survival”) would be reduced further. Reductions in precipitation and availability of forage plants for tortoises would result in reduced tortoise survival, reproduction, and recruitment (Henen 1997; Henen 2002a; Henen 2002b; and Wallis et al. 1999) and reduced tortoise densities and abundance). Because 9 of the 10 tortoise populations in the three Recovery Units in California are below the population viability threshold, the tortoise cannot persist if its survival, reproduction, or recruitment will be reduced. The tortoise’s downward trend toward extirpation will continue.

Based on the best available scientific information (presented above), Agassiz’s desert tortoise is in danger of extirpation in Critical Habitat Units in California from a variety of human-related threats. Because line distance sampling represents estimates of desert tortoise densities and abundance rangewide, the data and analysis from line distance sampling shows that Agassiz’s desert tortoise is in danger of extirpation in the three Recovery Units in California - the Western Mojave Recovery Unit, the Colorado Desert Recovery Unit, and the Eastern Mojave Recovery Unit.

Defenders of Wildlife, the Desert Tortoise Council and the Desert Tortoise Preserve Committee believe changing the regulatory status of Agassiz’s desert tortoise from Threatened to Endangered under CESA provisions will result in a higher level of impact analyses for proposed land use activities and greater long-term protection of occupied habitats. Mitigation requirements to avoid, minimize, and compensate for adverse impacts under Endangered vs. Threatened status would likely be greater and more effective in halting population declines and habitat loss/degradation, and in contributing to recovery of the species. Funding available for conservation projects for recovery of Endangered vs. Threatened species would also likely be greater.

4. LIFE HISTORY (SPECIES DESCRIPTION, BIOLOGY, AND ECOLOGY)

Include pertinent information that is available on species identification, taxonomy and systematics, seasonal activity or phenology, reproductive biology, mortality/natality, longevity, growth rate, growth form, food habits, habitat relationships and ecological niche or ecological attributes, interactions with other species or special habitat requirements that may increase vulnerability of the species to certain natural or human-caused adverse impacts (e.g., obligate wetland or riparian habitat species, low birthrate, colonial species).

This information is available in the supporting documents for the 1989 listing of the desert tortoise as Threatened by the Commission, as well as in the supporting documents for federal listing as Threatened by the USFWS. Additional information is available in the 1994 Recovery Plan (USFWS 1994a) and the 2011 Revised Recovery Plan (USFWS 2011). A summary is provided below from the Status of the Desert Tortoise (USFWS 2019b) and Andersen et al. (2000), and the two desert tortoise recovery plans.

The desert tortoise is a large, herbivorous reptile that reaches 20 to 38 centimeters (8 to 15 inches) in carapace (upper shell) length and 10 to 15 centimeters (4 to 6 inches) in shell height. Hatchlings emerge from eggs at about 5 centimeters (2 inches) in length. During the first 5 to 7 years of life, the tortoise shell is incompletely ossified; it is soft and easy to puncture and rip open (Boarman 2002). This makes small tortoises highly vulnerable to predation by a variety of mammals and birds. Adult desert tortoises weigh 3.6 to 6.8 kilograms (8 to 15 pounds). The forelimbs have heavy, claw-like scales and are flattened for digging. Hind limbs are more elephantine (Ernst et al. 1994).

Desert tortoise behavior is well adapted to living in a highly variable and often harsh desert environment. They spend much of their lives in burrows that they excavate, even during their seasons of activity. Burrows are made under rocks or in soil and may be as much as 5 m in length but are usually 1 m deep (Burge 1978, Bulova 1994). Patterns of burrow use are sex specific (Bailey et al. 1995) and may reflect complex social interactions among individual tortoises (Bulova 1994). Burrow living can make tortoises difficult to find, particularly in drought years when the animals seal themselves behind a wall of dirt and stay underground to conserve water.

In late winter or early spring, they emerge from overwintering burrows and typically remain active through fall. Activity decreases in summer, but tortoises often emerge after summer rain storms to drink (Henen et al. 1998). During activity periods, desert tortoises eat a wide variety of herbaceous vegetation, particularly perennial grasses and the flowers of annual plants (Berry 1974; Luckenbach 1982; Esque 1994). Tortoises are selective in the plant species and plant parts that they eat. Oftedal et al. (2002) reported that plant species and plant parts of species eaten by desert tortoises were higher in water, protein, and potassium excretion potential (PEP), and lower in potassium than uneaten species and parts. During periods of inactivity, they reduce their metabolism and water loss and consume very little food by remaining in their burrows. Adult desert tortoises lose water at such a slow rate that they can survive for more than a year without access to free water (obtaining it from their food, if available) and can apparently tolerate large imbalances in their water and energy budgets (Nagy and Medica 1986; Peterson 1996; Henen et al. 1998) at least for a limited time.

Desert tortoises are essentially “K-strategists” (MacArthur and Wilson 1967), with delayed maturity and long life. Eggs and hatchlings are quite vulnerable, and pre-reproductive adult mortality averages 98% (Wilbur and Morin 1988, Turner et al. 1987). Adults, however, are well protected against most predators (other than humans) and other environmental hazards and consequently can be long-lived (Germano 1992, Turner et al. 1987). Their longevity helps compensate for their variable annual reproductive success, which is correlated with environmental conditions.

Mating occurs both during spring and fall (Black 1976; Rostal et al. 1994). In drought years, the availability of surface water following rains may be crucial for desert tortoise survival (Nagy and Medica 1986). During these unfavorable periods, desert tortoises decrease surface activity and remain mostly inactive or dormant underground (Duda et al. 1999), which reduces water loss and minimizes energy expenditures (Nagy and Medica 1986). Duda et al. (1999) showed that home range size, number of different burrows used, average distances traveled per day, and levels of surface activity were significantly reduced during drought years.

The size of desert tortoise home ranges varies with respect to location and year (Berry 1986) and also serves as an indicator of resource availability and opportunity for reproduction and social interactions (O’Connor et al. 1994). Females have long-term home ranges that may be as little or less than half that of the average male, which can range to 80 or more hectares (200 acres) (Burge 1977; Berry 1986a; Duda et al. 1999; Harless et al. 2009). Core areas used within tortoises’ larger home ranges depend on the number of burrows used within those areas (Harless et al. 2009). Over its lifetime, each desert tortoise may use more than 3.9 square kilometers (1.5 square miles) of habitat and may make periodic forays of more than 11 kilometers (7 miles) at a time (Berry 1986).

Tortoises are long-lived and grow slowly, requiring 13 to 20 years to reach sexual maturity, and have low reproductive rates during a long period of reproductive potential (Turner et al. 1984; Bury 1987; Germano 1994). Growth rates are greater in wet years with higher annual plant production (e.g., desert tortoises grew an average of 12.3 millimeters [0.5 inch] in an El Niño year compared to 1.8 millimeters [0.07 inches] in a drought year in Rock Valley, Nevada (Medica et al. 1975). The number of eggs as well as the number of clutches that a female desert tortoise can produce in a season is dependent on a variety of factors including environment, habitat, availability of forage and drinking water, and physiological condition (Turner et al. 1986, 1987; Henen 1997; McLuckie and Fridell 2002). The success rate of clutches has proven difficult to measure, but predation, while highly variable (Bjurlin and Bissonette 2004), appears to play an important role in clutch failure (Germano 1994).

Although Agassiz's desert tortoise occurs from the western Mojave Desert in California east to southwestern Utah, it consists of populations that show differences in genetics, morphology, ecology, and behavior (USFWS 2011). The USFWS used differences in genetic, ecological, and physiological characteristics to help delineate boundaries or other differences between Recovery Units. The designation of Recovery Units ensures that local adaptation as well as critical genetic diversity are maintained for Agassiz's desert tortoise (USFWS 2011). Hence, there are three Recovery Units for the desert tortoise in California.

5. **KIND OF HABITAT NECESSARY FOR SURVIVAL**

Describe habitat features that are thought to be important to the species' ability to maintain viable population levels. Any or all of the following features may be included, as appropriate:

Plant community; edaphic conditions; climate; light; topography/microtopography; natural disturbance; interactions with other plants or animals; associated species; elevation; migration or movement corridors; wintering habitat; breeding habitat; foraging habitat; other habitat features.

Suitable habitat for the species has been previously described in a U.S. Geological Survey (USGS) tortoise habitat model, as cited above in this Petition. However, we are providing a description of habitat characteristics below (from Nussear 2009, USFWS 1994a, USFWS 1994b, and USFWS 2011).

The habitat requirements of Agassiz's desert include sufficient suitable quantity and quality of plants for forage and cover, suitable substrates for burrow and nest sites, and low occurrence of predators. Throughout most of the Mojave region, desert tortoises occur primarily on flats and bajadas with soils ranging from sand to sandy-gravel, characterized vegetationally by scattered shrubs and abundant inter-shrub space for growth of herbaceous plants. Desert tortoises are also found on rocky terrain and slopes in parts of the Mojave region, and there is significant geographic variation in the way desert tortoises use available resources.

In the Mojave Desert, annual precipitation within known habitat ranges from 100 to 210 mm (Germano et al. 1994), mostly occurring during the winter months (> 50-75%) and infrequently as snow below 1,200 m. The temperature range within known habitat is extreme, with average daily low temperatures in January typically at or slightly below 0 ºC and average daily high temperatures in July ranging from 37 to 43 ºC (Germano et al. 1994).

In California, the desert tortoise uses the following vegetation communities:

- In the Colorado Desert Recovery Unit, vegetation communities include Succulent Scrub *(Fouquieria, Opuntia, Yucca),* Blue Palo Verde-Smoke Tree Woodland, Creosote Bush Scrub (lava flows), Blue Palo Verde-Ironwood-Smoke Tree Woodland, and Creosote Bush Scrub (rocky slopes).
- In the Eastern Mojave Recovery Unit, vegetation communities include Big Galleta-Scrub Steppe, Succulent Scrub *(Yucca, Opuntia* species), Creosote

Bush Scrub, Cheesebush Scrub (east Mojave type), and Indian Rice Grass Scrub-Steppe.

- In the Western Mojave Desert, vegetation communities include Mojave Saltbush- Allscale Scrub (endemic), Indian Rice Grass Scrub-Steppe, Hopsage Scrub, Big Galleta Scrub Steppe, Cheesebush Scrub (west Mojave type), Desert Psammophytes, and Blackbush Scrub.

The USFWS has determined that the physical and biological features (referred to as the primary constituent elements) of critical habitat that support nesting, foraging, sheltering, dispersal, and gene flow are essential to the conservation of the desert tortoise. The specific physical and biological features of Mojave desert tortoise critical habitat are:

- sufficient space to support viable populations within each of the recovery units and to provide for movement, dispersal, and gene flow;
- sufficient quality and quantity of forage species and the proper soil conditions to provide for the growth of these species;
- suitable substrates for burrowing, nesting, and overwintering; burrows, caliche caves, and other shelter sites; sufficient vegetation for shelter from temperature extremes and predators; and
- habitat protected from disturbance and human-caused mortality.

Forage quantity and quality is limited in the range of the Mojave desert tortoise. In the Mojave and Colorado deserts, many food plants are high in potassium (Minnich 1979), which is difficult for desert tortoises to excrete due to the lack of salt glands that are found in other reptilian herbivores such as chuckwallas (*Sauromalus obesus*) and desert iguanas (*Dipsosaurus dorsalis*) (Minnich 1970; Nagy 1972). Reptiles are also unable to produce concentrated urine, which further complicates the ability for desert tortoises to expel excess potassium (Oftedal and Allen 1996). Oftedal (2002) suggested that desert tortoises may be vulnerable to disease as a result of physiological stress associated with foraging on food plants with insufficient water and nitrogen to counteract the negative effects of dietary potassium. Only high quality food plants (as expressed by the Potassium Excretion Potential, or PEP, index) allow substantial storage of protein (nitrogen) that is used for growth and reproduction, or to sustain the animals during drought. Non-native, annual grasses have lower PEP indices than most native forbs (Oftedal 2002; Oftedal et al. 2002). Oftedal et al. (2002) found that foraging juvenile tortoises favored water-rich, high-PEP, native forbs. Much of the nutritional difference between available and selected forage was attributable to avoidance of abundant, non-native split grass (*Schismus* spp.) with mature fruit, which is very low in water, protein, and PEP. Of the species eaten, *Camissonia claviformis*, a native Mojave desert primrose, accounted for nearly 50 percent of all bites, even though it accounted for less than 5 percent of the biomass encountered, and was largely responsible for the high PEP of the overall diet. Impacts to vegetation (such as livestock grazing, invasion of non-native plants [from use of roadways], and soil disturbance) that reduce the abundance and distribution of high PEP plants may result in additional challenges for foraging desert tortoises (Oftedal et al. 2002).

Non-native grasses are not as nutritious as native forbs. Recent studies have shown that calcium and phosphorus availability are higher in forbs than in grasses and that desert tortoises lose phosphorus when feeding on grasses but gain phosphorus when eating forbs (Hazard et al. 2010).

As previously stated in Section 1 “Population Density,” for the desert tortoise to survive and recover, its habitat should be managed with reserve level protection (USFWS 1994a). A reserve has a primary goal of protecting biodiversity from harmful activities and processes, both natural and anthropogenic. Thus, reserve level protection for Agassiz’s desert tortoise requires substantially reducing the direct and indirect impacts to the tortoise and its habitats that cause/contribute to its mortality and its recruitment if lambda is less than 1. Section 6 “Factors Affecting the Ability to Survive and Reproduce” includes a figure of the human-caused impacts to the habitat of the desert tortoise that results in mortality.

6. **FACTORS AFFECTING ABILITY TO SURVIVE AND REPRODUCE**

Discuss the basis for the threats to the species or subspecies, or to each population, occurrence or portion of range (as appropriate) due to one or more of the following factors:

(1) present or threatened modification or destruction of its habitat;
(2) overexploitation;
(3) predation;
(4) competition;
(5) disease; or
(6) other natural events or human-related activities.

Identify the direct, indirect, and cumulative adverse impacts and discuss how these are contributing to the decline of the species. Indicate whether the species is vulnerable to random catastrophic events.

Information on these factors (e.g., habitat modification/destruction, predation, disease, etc.) has been provided in the above responses. A summary of these anthropomorphic threats and their interactions is provided in Figure 2 (below).

In addition, the desert tortoise is vulnerable to catastrophic events such as wildfire and flooding. Wildfire threat has increased dramatically over the past 100 years due to colonization of tortoise habitat by invasive, non-native species such as cheatgrass (*Bromus tectorum*), red brome (*Bromus madritensis* ssp. *rubens*) and Mediterranean splitgrass (*Schismus barbatus*). These annual grasses germinate early, compete with and displace native species of forbs and grasses for moisture and nutrients (Brooks 1999a, Brooks 1999b).

These non-native plants also form a dense and expansive layer of dry plant material in shrub communities at the end of the growing season that is highly flammable – substantially contributing to an area’s wildfire fuel load. Affected native plant communities can sometimes recover from wildfire over an extensive time period; but many become type-converted to a flammable grass community following intense fire, resulting in a modified tortoise habitat of generally low quality which generally lacks constituent elements of this species' native habitat (Brooks and Esque 2002, Brooks and Matchett 2003).

While flooding due to intense monsoon thunderstorms is relatively common in the eastern half of the species range in California, and rare in the western half, recent climate models predict that more frequent and intense thunderstorms are anticipated over time as a result of climate change. Overall rainfall is expected to decrease, but intense storms will likely become more common. Three climate model projections for the California Desert region show increased precipitation during winter months over the entire area, but one model predicts the greatest rainfall increase in winter and also a large increase in summer precipitation. One climate change model projects increasing precipitation throughout the 21st century with a much wetter future overall despite a decline in spring and, to a lesser extent, fall rains (Bachelet et al. 2016).

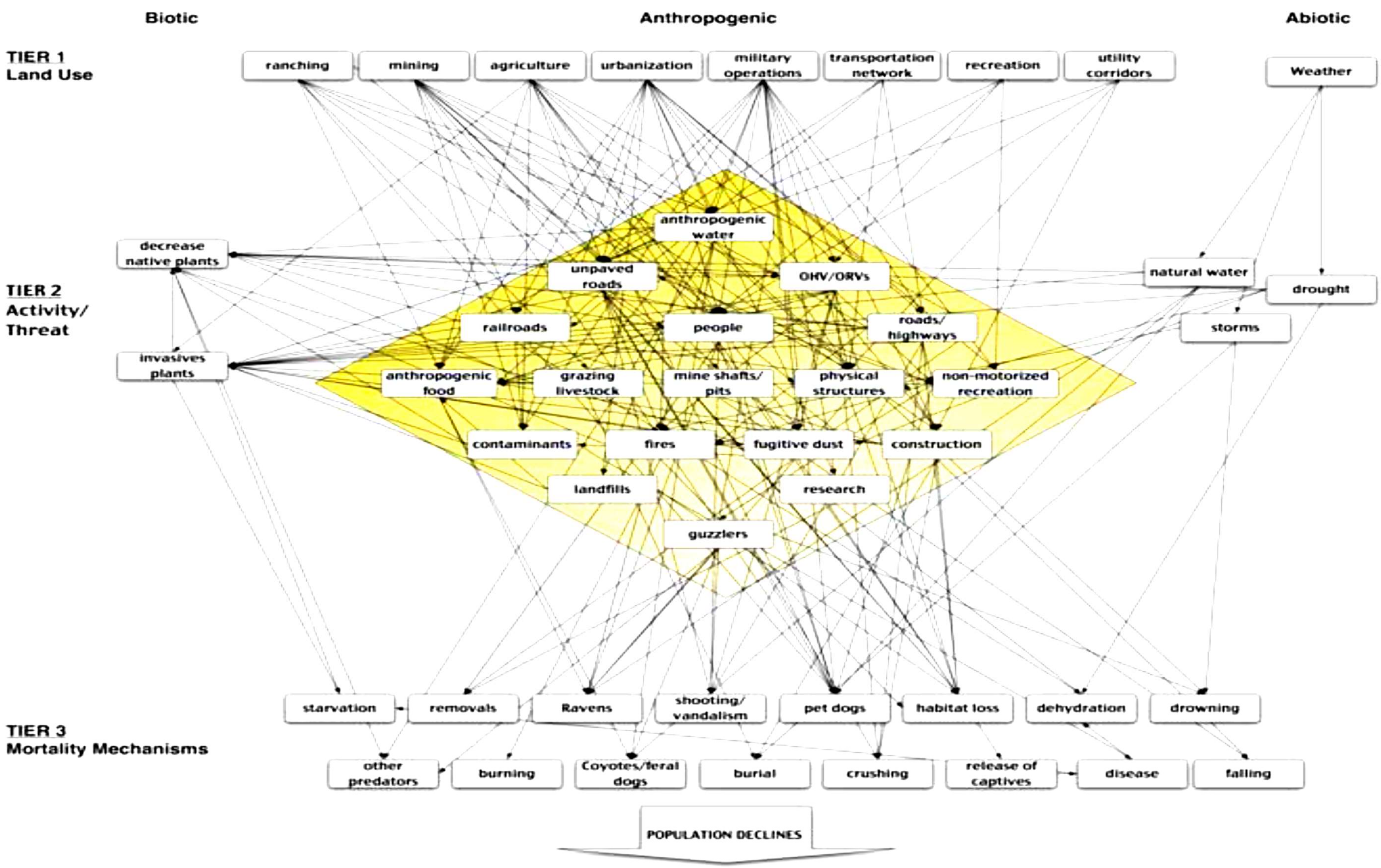

Figure 2. Network of threats demonstrating the interconnectedness between multiple human activities that interact to adversely impact tortoise populations. Tier 1 includes the major land use patterns that facilitate various activities (Tier 2) that impact tortoise populations through a suite of mortality factors (Tier 3). (From Tracy et al. 2004)

7. **DEGREE AND IMMEDIACY OF THREAT**

Indicate the immediacy of the threat and the magnitude of loss or rate of decline that has occurred to the present or is expected to occur without protective measures.

Desert tortoise populations in California have declined by approximately 90% since surveys were initially conducted starting in 1975, and also declined by over 50% since line-distance sampling began in 2004. Nine out of 10 populations in critical habitat units are now below the minimum viable density of adult tortoises (3.9/km^2 or 10/mi^2), and the steep population declines are continuing. This situation results in populations that have little or no resilience to stochastic events (e.g., drought, disease, fire, etc.) and are likely to become extinct in the foreseeable future.

Additional protective measures need to be implemented immediately to prevent desert tortoise populations from becoming extinct in California. Conservation and recovery actions funded and implemented to date have proven ineffective as demonstrated through line-distance sampling and the annual reports published by the Desert Tortoise Recovery Office. There is an urgent need to ensure the survival of adult tortoises, and especially reproductive females, so that populations can slowly recover; and to drastically reduce loss of hatchling and immature individuals due to predation by excessive raven populations.

Detailed information on threats to Agassiz's desert tortoise are described above in Sections 1 ("Population Trends"), 2 ("Range and Distribution"), 3 ("Abundance") and 6 ("Factors Affecting Ability to Survive and Reproduce").

8. **IMPACT OF EXISTING MANAGEMENT EFFORTS**

Describe any ongoing protective measures or existing management plans for the species or its habitat. Information on species or land management activities that are impacting populations or portions of the range and information on proposed land-use changes should be included. This may be best accomplished by discussing populations or portions of the range, where a chart display may be useful.

Include available information on any or all of the following:

(1) property ownership/jurisdiction for known populations or portions of the range;

The following information on property ownership/jurisdiction for populations of the desert tortoise in California is from the USFWS Federal Register Notice on designation of critical habitat (USFWS 1994B) and additional land acquisition and jurisdictional changes occurring after 1994:

4,754,000 acres of critical habitat was designated in California with the following ownership/jurisdictions and acreage:

- BLM: 2,968,300 acres
- National Park Service: 828,000 acres

- Department of Defense: 450,200 acres
- State of California: 132,900 acres
- Private: 1,051,500 acres

Current and historic desert tortoise habitat loss, deterioration, and fragmentation is largely attributable to urban development, military operations, and multiple-uses off public land, such as off-highway vehicle (OHV) activities and livestock grazing.

(2) current land use;

<u>Federal land managed by the BLM</u>: These federal lands are managed by BLM under provisions in the CDCA Plan, most recently amended by the DRECP and the West Mojave Plan, and are managed to provide a variety of multiple uses including livestock grazing, utility rights of way, livestock grazing, OHV use, wildlife habitat management, wilderness and wild and scenic rivers. The CDCA Plan prohibits or restricts some lands uses within desert tortoise conservation areas, such as renewable energy projects and pipelines, but the plan has been amended many times to allow for these uses to occur. We anticipate that the BLM will propose to significantly diminish biological resources conservation lands and conservation actions in the near future when it releases an amended DRECP.

<u>Federal land managed by the National Park Service</u>: These federal lands are located within the Mojave National Preserve and Joshua Tree National Park. They are managed under provisions of General Management Plans, which emphasize natural and cultural resources protection.

<u>Lands managed by the State of California</u>: These lands are managed primarily by the California Department of Parks and Recreation and state parks and preserves, and by the California Department of Fish and Wildlife as State Wildlife Areas and State Ecological Reserves. High quality habitat for the desert tortoise occurs in the Western Mojave and Fremont Valley Ecological Reserves. The are managed for conservation with limited public use allowed, but unauthorized OHV use frequently occurs due to limited law enforcement capability.

<u>Federal land managed by the Department of Defense</u>: These federal lands are located within four large installations (China Lake Naval Air Weapons Station, Edwards Air Force Base, Fort Irwin, the Marine Corps Air Ground Combat Center, and the Chocolate Mountains Gunnery Range). They are used primarily for weapons development and testing, aircraft testing and research, and military training. Natural resources within these installations, including the desert tortoise, are managed under provisions of Integrated Natural Resource Management Plans.

<u>Private lands</u>: Private lands designated as critical habitat are typically interspersed among federal lands managed by the BLM and National Park Service. They are managed by local agencies under county General Plans for a variety of land uses that include residential development, agriculture, open space, mining, etc. Activities that would impact the desert tortoise or adversely modify critical habitat would require the project proponent to obtain an incidental take permit from the

CDFW and USFWS, the latter of which would require preparation and implementation of a Habitat Conservation Plan.

(3) protective measures being taken, if any, and effectiveness of current management activities;

Federal lands have a variety of protective measures in place to minimize or compensate for adverse impact to the desert tortoise and its habitat. The most protective measures are associated with National Park Service General Management Plans for the Mojave National Preserve and Joshua Tree National Park where conservation of natural and cultural resources is paramount. However, with high public visitation, these park units have experienced loss of desert tortoises due to mortality due to vehicle strikes. Speed limit signing and law enforcement patrols have had little effect in reducing threats due to vehicle strikes.

Department of Defense lands have a wide range of effects on the desert tortoise and its habitat. Installations used for large-scale mechanized training and live-fire of weapons (e.g., Fort Irwin and the Marine Corps Air Ground Combat Center) have resulted in loss and fragmentation of habitat and loss of tortoise hatchlings and juveniles that were not detected during capture and translocation operations. However, activities at the China Lake Naval Air Weapons Station and Edwards Air Force Base typically do not disturb significant amounts of habitat because their weapons development and testing activities occur within designated military airspace, with very limited use of habitat for weapons impact sites.

In order to minimize direct mortality of desert tortoises from large-scale projects, such as solar energy generation facilities, the CDFW and USFWS typically require that desert tortoises be captured and translocated to secured habitat as close to the site as possible, and that the project site be fenced to prevent tortoises from entering the facility. Translocation is considered an experimental technique to minimize mortality, but it has undergone improvements over time, resulting in higher levels of tortoise survival following translocation in the short-term. Long term effects are being studied. Short-term adverse impacts documented through field studies include mortality due to environmental exposure, elevated predation, dehydration and lower reproductive activity.

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(4) current research on the species;

Current research on the desert tortoise includes:

1) annual population estimates in Critical Habitat Units using line distance sampling;

2) disease occurrence and related mortality;

3) toxic elements in blood and liver tissue;

4) experimental translocation,

5) captive breeding and survival of young individuals into natural settings; and

6) existing management/recovery plans and the extent of their implementation.

The initial and subsequent recovery plans include recommendations for management of the species and its habitat that will contribute to the goal of recovery and eventual delisting, provided recovery goals are met.

With regard to the 1994 recovery plan, the USFWS stated in its 1994 rule (USFWS 1994b) for designation of Critical Habitat, that "*Desert tortoise populations have declined substantially throughout the Mojave Region in the last 2 decades, primarily due to habitat loss. These populations grow slowly, and significant improvement in the status of the Mojave population will be a very long process, measured in decades or centuries in most parts of the Mojave Region*."

Although the USFWS designated Critical Habitat for the Mojave population of the desert tortoise in 1994, it stated in the final rule (USFWS 1994b):

"*Designating critical habitat does not create a management plan, it does not establish numerical population goals, it does not prescribe specific management actions (inside or outside of critical habitat), nor does it have a direct effect on areas not designated as critical habitat. Specific management recommendations for critical habitat are more appropriately addressed in recovery plans, management plans, and section 7 consultations*."

Of the 4,754,000 acres of Critical Habitat in California, 2,968,300 acres are public lands managed by the BLM. Recovery of the species is largely dependent on provisions in that agency's CDCA Plan that protect Critical as well as non-Critical Habitat (e.g., linkage habitats between CHUs) through effective and timely implementation of specific management actions that reduce threats, and protect and restore elements of the habitat that Agassiz's desert tortoise requires for survival, growth and reproduction.

Subsequent to the federal listing of the desert tortoise as threatened in 1990, the CDCA Plan was amended through several regional plan amendments that added goals and objectives and specific management actions intended to contribute to the recovery of the species. A few of these regional plan amendments included:

1) Northern and Eastern Mojave Plan (BLM 2002);
2) Northern and Eastern Colorado Desert Plan (BLM and CDFG 2002);
3) Western Colorado Desert Plan (BLM 2003):
4) West Mojave Plan (BLM et al. 2006); and
5) Desert Renewable Energy Conservation Plan (BLM 2016)

BLM's 2002, 2003 and 2006 regional plan amendments to the CDCA Plan established Areas of Critical Environmental Concern (ACECs) and associated land use restrictions to protect tortoise habitat; largely corresponding to Critical Habitat designated for the species in 1994. These amendments allowed off-highway vehicle use to continue on designated open routes, as well as livestock grazing with limitations on season of use and forage utilization.

These plan amendments did not envision renewable energy development demand on public lands, an issue that emerged in approximately 2007 when right-of-way applications for large-scale solar energy and wind energy projects were filed with the BLM on over 100,000 acres of public land. As a result, 10 large-scale solar energy projects were approved in occupied tortoise habitat, outside of Critical Habitat in the Ivanpah Valley, Chuckwalla Valley, Blythe Mesa and the central Mojave of California, totaling 31,578 acres.

Off-highway vehicle routes were also designated in these regional plan amendments within Agassiz's desert tortoise habitat as open, closed or, in rare instances, as limited to certain types of vehicles. BLM's route designation on 3 million acres of public land in the West Mojave Plan (WEMO) area was found to have violated the provisions of the National Environmental Policy Act, Executive Orders, and regulations governing the use of off-highway vehicles on public land, and the CDCA Plan.

Subsequently, BLM (2019) revised the WEMO Plan route designation to address these legal deficiencies. Defenders of Wildlife urged the CDFW to review and comment on this plan when it was being developed, but that did not happen. Unfortunately, the final plan established open routes and livestock grazing in Critical Habitat that were largely the same as in the 2006 WEMO Plan, with a few deleterious additions, including promoting unrestricted motorized vehicle use on

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dry lake beds in Critical Habitat and introducing competitive event corridors through Critical Habitat.

In its request for formal consultation with the USFWS, the BLM determined the DRECP amendments of 2016 to the CDCA Plan would adversely affect both Agassiz's desert tortoise and its Critical Habitat. It is noteworthy that the DRECP established "development caps" within tortoise ACECs ranging from 0.1% - 0.5%; the latter of which applies to all Critical Habitat Units. However, these development caps do not include the effects of livestock grazing or indirect effects of off-highway vehicle use and development projects whose impacts extend beyond the direct footprint of the projects and vehicle routes. Standardized compensatory mitigation ratios were also established at 5:1 in Critical Habitat and 1:1 outside of Critical Habitat; and 2:1 within mapped tortoise habitat linkages that connect conservation areas (i.e., ACECs).

Although these various amendments to the CDCA Plan were intended to contribute to the recovery of Agassiz's desert tortoise (e.g., BLM 2016, BLM et al. 2005), the results of line distance sampling conducted by the USFWS DTRO show those intentions have not been met. They show tortoise populations in all Critical Habitat Units within California as continuing to decline rapidly, with most below the minimum viable density of 3.9 adults per square kilometer.

In its biological opinion for the DRECP adopted by the BLM in 2016, the USFWS (2016b) stated:

"*Despite the implementation of these actions, disturbance and human-caused mortality continue to occur in many areas of critical habitat (which overlap the desert wildlife management areas for the most part and are the management units for which most data are collected) to the extent that the conservation value and function of critical habitat is, to some degree, compromised*."

And that,

"*Unauthorized off-road vehicle use continues to disturb habitat and result in loss of vegetation within the boundaries of critical habitat (e.g., Coolgardie Mesa in the Western Mojave Recovery Unit); although we have not documented the death of desert tortoises as a direct result of this activity, it likely occurs. Additionally, the habitat disturbance caused by this unauthorized activity exacerbates the spread of invasive plants, which displace native plants that are important forage for the desert tortoise, thereby increasing the physiological stress faced by desert tortoises*."

The USFWS (2016b) also concluded that under the DRECP amendments:

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"*…development of renewable energy facilities …would remove or degrade up to 11,290 acres of desert tortoise habitat within the action area*."

Of these, 4,734 acres are within Critical Habitat. However, the biological opinion does not address the effects of future renewable energy projects that may be proposed outside of Development Focus Areas (DFAs) for renewable energy; namely public lands now termed General Public Lands and Variance Process Lands.

The only documented exception to these ongoing declines is in the DTRNA in the Western Mojave Recovery Unit. The USFWS did not designate Critical Habitat for Agassiz's desert tortoise in this area because the existing reserve-level protection provisions largely eliminated threats to the species and its habitat, including:

1) closure to all off-highway vehicle use;
2) closure to all livestock grazing;
3) closure to mineral development; and
4) a protective perimeter fence to prevent trespass of vehicles and livestock.

Recent field research has confirmed that these protective actions have been effective in reversing ongoing declines in the Agassiz's desert tortoise population within the DTRNA compared to adjacent areas lacking these protective measures.

Berry et al. (2014) surveyed 260 km^2 in the Western Mojave Desert to evaluate relationships between condition of tortoise populations and habitat on lands that have experienced three different levels of management and protection. The DTRNA was most protected; Critical Habitat designated for the desert tortoise in the Western Rand Mountains Area of Critical Environmental Concern was considered moderately protected; and private lands were considered to have no protection.

The researchers found that live tortoise density was:

1) Six-times greater inside the DTRNA compared to adjacent Critical Habitat where intensive off-highway vehicle use occurs on a designated route network; and
2) Four-times greater than on adjacent private lands.

The crude annual death rates for adult tortoises was lowest in the DTRNA (2.8% per year), followed by private lands (6.3% per year) and Critical Habitat (20.4% per year). The high death rates in Critical Habitat were of particular concern. When causes of death could be determined, they included vehicle crushing, gunshot, and predation by ravens and mammals.

(6) *Proposed land-use changes (include knowledge of forthcoming California Environmental Quality Act documents that may or should address impacts, and lead agencies involved);*

On 2/1/2018, the BLM issued a notice it intended to amend the DRECP in response to President Trump's executive orders requiring federal agencies to review regulations that unnecessarily impede energy development and deployment of broadband telecommunication facilities. We anticipate that BLM will propose amendments to the DRECP that reduce conservation lands designated in 2016, allow renewable energy development in ACECs and eliminate compensatory mitigation for land uses that adversely impact habitat for various focal species, including the desert tortoise. Proposed amendments to the DRECP are expected to be released for public review and comment in the spring of 2020. The BLM's notice is available here: https://www.blm.gov/california/BLM-to-consider-changes-desert-renewable-energy-conservation-plan.

(7) *County general plans, federal and State agency plans/actions or other plans/actions that address or should address the species*.

At this time, we are aware of only one local agency plan that places restrictions on development of renewable energy projects on private land, the Renewable Energy and Conservation Element of the San Bernardino County General Plan. That element of the General Plan restricts utility-scale solar energy development to private lands within DFAs designated by the BLM.

9. SUGGESTIONS FOR FUTURE MANAGEMENT

Describe activities that may be necessary to ensure future survival of the species after listing or delisting. Include recommendations for any or all of the following:

Although the desert tortoise is currently listed as threatened under the CESA and ESA, we provide recommendations for additional management actions that would promote its recovery under applicable items, below.

(1) *activities that would protect existing populations (site maintenance, preserve design establishment, etc.);*

While a majority of Agassiz's desert tortoise Critical Habitat in California has been designated as ACECs by the BLM for habitat protection and to promote recovery of the species, the types and intensity of land use activities allowed and

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authorized on a regular basis within these areas continue to adversely impact the species. These ACECs should be managed as biological reserves in a manner similar to the DTRNA, where activities that adversely impact the species are largely prohibited (e.g., off-highway vehicle use, use of unlicensed motorized vehicles, and livestock grazing). This management level was stated in the 1994 Recovery Plan as a recovery action. However, this is not occurring.

Fencing highways and roads with tortoise exclusion fence would eliminate these linear features as population sinks and greater reduce the “road effect zone.” This action would reduce tortoise mortality. Fencing highways is occurring in Nevada.

(2) *monitoring programs and studies;*

Science-based systematic monitoring of the impacts of off-highway vehicle use and livestock grazing is needed to assess the magnitude and extent of impact these activities have on Agassiz’s desert tortoise, which would be used to develop additional protective measures or restrictions through the adaptive management process. Such systematic monitoring has not been initiated in California.

However, the BLM and others have developed an extensive bibliography of reliable information on the known adverse impacts of both recreational vehicle use and livestock grazing upon Agassiz’s desert tortoise, some of which follows:

D.S. Ouren, et al. 2007. Report prepared for U.S. Geological Survey. Environmental Effects of Off-highway Vehicles on Bureau of Land Management Lands: A Literature Synthesis, Annotated Bibliographies, Extensive Bibliographies, and Internet Resources. Open File Report 2007-1353. https://pubs.usgs.gov/of/2007/1353/report.pdf.

R.H. Webb. H.G. Wilshire. 1983. Environmental Effects of Off-highway Vehicles. Impacts and Management in Arid Regions. https://www.springer.com/gp/book/9781461254560.

H.G. Wilshire, J.E. Nielson, and R.W. Hazlett. 2008. The American West at Risk. Science, Myths, and Politics of Land Abuse and Recovery. https://onlinelibrary.wiley.com/doi/full/10.1002/ldr.1070.

D.L. Donahue. 1999. The Western Range Revisited. Removing Livestock from Public Lands to Conserve Native Biodiversity. https://digitalrepository.unm.edu/cgi/viewcontent.cgi?referer=&httpsredir=1&article=1572&context=nrj.

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(3) *needed amendments to existing management and land-use plans, including county general plans;*

The CDCA Plan is the primary document guiding management of public lands and was initially adopted in 1980 and amended many times over the past 39 years, such as by the DRECP in 2016 and by earlier regional plan amendments, identified above. The BLM finalized the West Mojave Plan Route Network and Livestock Grazing amendments to the CDCA Plan in 2019. (https://www.blm.gov/programs/planning-and-nepa/plans-development/california/west-mojave-plan-route-network).

Based on a thorough review of the CDCA Plan, we recommend that it be further amended to:

- eliminate livestock grazing in desert tortoise Critical Habitat and habitat linkages;
  restrict the use of unlicensed or non-street legal off-highway vehicles to BLM-designated Open Areas;
- close and restore all redundant vehicle routes in desert tortoise Critical Habitat and habitat linkages;
- establish a 15 mile per hour vehicle speed limit in all desert tortoise Critical Habitat;
- establish seasonal and/or temporary closure of motorized vehicle routes to off-highway vehicle use during the spring season and during precipitation events when standing water is on dirt roads and trails; and
- enforce existing restrictions and the restrictions suggested above in Critical Habitat areas.

(4) *agencies/organizations that should be involved in planning and implementing management and recovery actions;*

BLM (California Desert District and Field Offices); Department of Defense (Fort Irwin, MCAGCC, China Lake, Edwards Air Force Base, Chocolate Mountain Aerial Gunnery Range); California Department of Parks and Recreation; CDFW; Caltrans; respective planning departments in Kern County, San Bernardino County, Riverside County, Imperial County, and Inyo County.

(5*) other activities that would help protect existing habitat or ensure survival of the species;*

Plan for and implement effective and timely control of common raven populations within all Desert Tortoise Recovery Units with priority given to Critical Habitat Units within the Western Mojave Recovery Unit.

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(6) *how other sensitive species (listed and unlisted) may benefit from protection of this species*; and

(7); *how other species/habitats may be impacted by management and recovery activities for this species*.

The state-listed Threatened Mohave ground squirrel would benefit because its declining range overlaps with the Agassiz's desert tortoise in large portions of the Western Mojave Recovery Unit. In addition, several federal and state-listed and sensitive plant species would benefit, such as the Barstow woolly sunflower, Desert cymopterus, Lane Mountain milk-vetch, Mojave monkeyflower, Mojave tarplant, Parish's daisy, and Triple-ribbed milk-vetch.

(8*) at what point this species would be considered stable and sustainable.*

The U.S. Fish and Wildlife established recovery criteria for the desert tortoise in its 1994 and Revised 2011 Recovery Plans. Recovery criteria include the management or elimination of threats, and addressing the five statutory delisting factors. However, at the time the Revised Recovery Plan was finalized, the USFWS considered the following three criteria applicable due to lack of information on the degree of threat posed by certain activities.

<u>Recovery Objective 1 (Demography)</u>. Maintain self-sustaining populations of desert tortoises within each Recovery Unit into the future.

> *<u>Recovery Criterion 1</u>. Rates of population change (λ) for desert tortoises are increasing (i.e., λ > 1) over at least 25 years (a single tortoise generation).*

<u>Recovery Objective 2 (Distribution)</u>. Maintain well-distributed populations of desert tortoises throughout each Recovery Unit.

> *<u>Recovery Criterion 2</u>. Distribution of desert tortoises throughout each tortoise conservation area is increasing over at least 25 years (i.e., ψ [occupancy] > 0).*

<u>Recovery Objective 3 (Habitat)</u>. Ensure that habitat within each Recovery Unit is protected and managed to support long-term viability of desert tortoise populations.

> *<u>Recovery Criterion 3</u>. The quantity of desert tortoise habitat within each desert TCA is maintained with no net loss until tortoise population*

viability is ensured. When parameters relating habitat quality to tortoise populations are defined and a mechanism to track these parameters established, the condition of desert tortoise habitat should also be demonstrably improving.

The Revised Recovery Plan estimated that if all the recovery actions were implemented and were successful, desert tortoise recovery would be expected to occur by the year 2025. However, since none of the recovery criteria have been met, especially positive rates of change in populations over at least 25 years, recovery will take much longer, likely multiple decades or perhaps over 100 years.

10. **AVAILABILITY AND SOURCES OF INFORMATION**

Cite literature, available specimen collection records, and other pertinent reference materials. Attach documents critical to the recommended action. Be sure to include recent status surveys. List names, addresses, and telephone numbers of persons providing unpublished information and list those supporting the recommended action.

All cited literature used in this petition are identified above and full citations are included in Attachment 4 (Literature Cited), with many having website links to documents. Additional sources of information in support of this petition include:

U.S. Fish and Wildlife Service, Desert Tortoise Recovery Office. https://www.fws.gov/nevada/desert_tortoise/dtro/

Desert Tortoise Council Symposium (1976-2019) Text-searchable Proceedings https://deserttortoise.org/annual-symposium/symposium-proceedings/

Desert Tortoise Council Plans and Best Management Practices https://deserttortoise.org/library/plans-bmps/

Berry, K.H., Lyren, L.M., Mack, J.S., Brand, L.A., and Wood, D.A., 2016, Desert tortoise annotated bibliography, 1991–2015: U.S. Geological Survey Open-File Report 2016-1023, 312 p., http://dx.doi.org/10.3133/ofr20161023.

J.P. Hohman, R.D. Ohmart, and J. Schwartzmann. 1980. An Annotated Bibliography of the Desert Tortoise, Gopherus agassizii. Desert Tortoise Council Special Publication No. 1. https://deserttortoise.org/ocr_DTCdocs/1980.1AnnotatedBibliography-DesertTortoise-OCR.pdf.

11. **DETAILED DISTRIBUTION MAP**

Delineate on appropriate maps the historic and present distribution (estimated if not known). Include one map of California showing general distribution, and U.S. Geological Survey topographical maps (or equivalent) of appropriate scale, for more detailed distribution information, including locations of occurrences, populations or portions of populations, as appropriate. Include historic and current distribution as documented by literature, museum records, California Natural Diversity Data Base and other California Department of Fish and Wildlife records, and testimony of knowledgeable individuals. All maps must be suitable for black and white reproduction and fully labeled, including borders, base map name, map scale and species name, and should not exceed 11" x 14" in size.

Distribution maps of the desert tortoise are available on the following website links:

https://www.fws.gov/nevada/desert_tortoise/dt/images/tortoisemap-large.jpg

https://www.fws.gov/nevada/desert_tortoise/documents/publications/2013-Conserving-popln-linkages-mdt.pdf

https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=2660&inline=1

CONCLUSION

Thirty years after its listing as Threatened under provisions of the California and federal Endangered Species Acts, Agassiz's desert tortoise is in much worse condition than it was in 1990, and the number and severity of threats have increased. Threats to the species at the time of the 1990 federal listing as Threatened have not abated; they are becoming more widespread and intense.

Tortoises and their habitats are impacted by a myriad of authorized and illegal human activities that degrade or eliminate suitable creosote bush scrub and other vegetation communities needed as habitat, subsidize predators whose increased numbers prey on tortoises, and facilitate invasion of non-native species of plants that degrade habitat quality and displace native forbs and grasses needed for adequate nutrition and reproduction/recruitment.

Based on systematic USFWS-funded line distance sampling conducted by the Service's Desert Tortoise Recovery Office, from 2004 through 2014, adult tortoises in the three California Recovery Units declined by 51.3 percent over 10 years; and 9 of the 10 populations in these Recovery Units in California were below viability density. This decline is a continuation of an ongoing decline since the 1980s as documented by the data from permanent study plots on the CHUs and Recovery Units for the tortoise in California.

Based on the best available scientific information, as identified and summarized in this petition, naturally-occurring populations of Agassiz's desert tortoise are on the verge of extirpation in California from a variety of human-related threats. Defenders of Wildlife,

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Desert Tortoise Council and Desert Tortoise Preserve Committee believe changing the status of Agassiz's desert tortoise from threatened to endangered under provisions of the California Endangered Species Act will more accurately reflect the status of the species under CESA; result in a higher-level of analysis of impacts from land use activities by CDFW; will result in more effective measures to avoid and minimize incidental take; and will result in higher levels of compensatory mitigation for unavoidable impacts. Combined, these outcomes will contribute to halting the decline of Agassiz's desert tortoise in California and provide conditions conducive to its recovery.