

State of California  
Natural Resources Agency  
Department of Fish and Wildlife

## REPORT TO THE FISH AND GAME COMMISSION

EVALUATION OF A PETITION FROM THE DESERT TORTOISE COUNCIL, THE DESERT TORTOISE PRESERVE COMMITTEE, AND DEFENDERS OF WILDLIFE TO CHANGE THE STATUS OF MOHAVE DESERT TORTOISE (*GOPHERUS AGASSIZII*) FROM THREATENED TO ENDANGERED UNDER THE CALIFORNIA ENDANGERED SPECIES ACT



Mohave Desert Tortoise (*Gopherus agassizii*) (Photo by BLM)

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## EXECUTIVE SUMMARY

Defenders of Wildlife, the Desert Tortoise Council, and the Desert Tortoise Preserve Committee (Petitioners) submitted a petition (Petition) to the Fish and Game Commission (Commission) to change the status of Mohave desert tortoise (*Gopherus agassizii*) from threatened to endangered under the California Endangered Species Act (CESA).

The Commission referred the Petition to the Department of Fish and Wildlife (Department) in accordance with Fish and Game Code Section 2073 (Cal. Reg. Notice Register 2020, No. 18-Z, p. 693). Pursuant to Fish and Game Code section 2073.5 and California Code of Regulations, title 14, section 670.1, the Department prepared this evaluation report (Petition Evaluation) of the Petition. The purpose of the Petition Evaluation is to assess the scientific information discussed and cited in the Petition in relation to other relevant and available scientific information possessed or received by the Department during the evaluation period and to recommend to the Commission whether the scientific information in the Petition is sufficient under the criteria prescribed by CESA to accept and consider the Petition to list Mohave desert tortoise as endangered.

After reviewing the Petition and other relevant information, the Department determined the Petition meets the requirement in Fish and Game Code section 2072.3 that it include sufficient scientific information to indicate the petitioned action may be warranted. Specifically, the Department determined:

- *Population Trend.* The information in the Petition is sufficient to indicate the Mohave desert tortoise population in California has declined substantially from historical levels and has continued to trend downward since the species was listed as a threatened species by the Commission in 1989.
- *Range and Distribution.* Information in the Petition and otherwise available to the Department indicates the geographic range of the Mohave desert tortoise in California has not substantially changed since the early 1900s; however, some changes in its distribution within the range have occurred in recent years.
- *Abundance.* The Petition provides sufficient information to indicate substantial reductions in Mohave desert tortoise abundance have occurred in large areas of their range, and that the abundance has continued to decline since the species was listed as threatened in California in 1989.

- *Life History.* The Petition provides sufficient information on the life history of the Mohave desert tortoise.
- *Kind of Habitat Necessary for Survival.* The Petition presents sufficient information on Mohave desert tortoise habitat requirements.
- *Factors Affecting the Ability to Survive and Reproduce.* The Petition presents a list of the factors that affect the survival and reproduction of the Mohave desert tortoise, including land uses (ranching, mining, agriculture, urbanization, military operations, transportation networks, recreation, and utility corridors), weather impacts (storms, drought, availability of natural water), predation from artificially high predator populations, and factors associated with climate change.
- *Degree and Immediacy of Threat.* The Petition describes the degree and immediacy of threats to the continued existence of Mohave desert tortoise in California.
- *Impact of Existing Management Efforts.* The Petition describes land ownership and includes a cursory discussion of land management practices by ownership within designated Mohave desert tortoise Critical Habitat Units. However, it does not provide similar information for the species' entire range in California which encompasses an area far greater than the Critical Habitat Units. Nonetheless, the Petition provided sufficient information on the general patterns of land ownership and land management practices in the species' range.
- *Suggestions for Future Management.* The Petition includes potential monitoring suggestions, management actions, and additional protective measures that would benefit Mohave desert populations.
- *A Detailed Distribution Map.* The Petition provides internet links to three distribution maps for Mohave desert tortoise in California.
- *Availability and Sources of Information.* Numerous scientific references were cited in the Petition and listed in Petition Attachment 4 – Literature Cited.

In completing its Petition Evaluation, the Department has determined the Petition provides sufficient scientific information to indicate that the petitioned action to change the status of the Mohave Desert Tortoise from threatened to endangered may be warranted. Therefore, the Department recommends the Commission accept the Petition for further consideration under CESA.

## INTRODUCTION

### Candidacy Evaluation

The Commission has the authority to list certain “species” or “subspecies” as threatened or endangered under CESA. (Fish & G. Code, §§ 2062, 2067, and 2070.) The listing process is the same for species and subspecies. (Fish & G. Code, §§ 2070-2079.1.)

CESA sets forth a two-step process for listing a species as threatened or endangered. First, the Commission determines whether to designate a species as a candidate for listing by evaluating whether the petition provides “sufficient information to indicate that the petitioned action may be warranted.” (Fish & G. Code, § 2074.2, subd. (e)(2).) If the petition is accepted for consideration, the second step requires the Department to produce, within 12 months of the Commission’s acceptance of the petition, a peer reviewed report based upon the best scientific information available that indicates whether the petitioned action is warranted. (Fish & G. Code, § 2074.6.) Finally, the Commission, based on that report and other information in the administrative record, determines whether the petitioned action to list the species as threatened or endangered is warranted. (Fish & G. Code, § 2075.5.)

A petition to list a species under CESA must include “information regarding the population trend, range, distribution, abundance, and life history of a species, the factors affecting the ability of the population to survive and reproduce, the degree and immediacy of the threat, the impact of existing management efforts, suggestions for future management, and the availability and sources of information. The petition shall also include information regarding the kind of habitat necessary for species survival, a detailed distribution map, and any other factors that the petitioner deems relevant.” (Fish & G. Code, § 2072.3; see also Cal. Code Regs., tit. 14, § 670.1, subd. (d)(1).) The range of a species for the Department’s petition evaluation and recommendation is the species’ California range. (*Cal. Forestry Assn. v. Cal. Fish and Game Com.* (2007) 156 Cal.App.4th 1535, 1551.)

Within 10 days of receipt of a petition, the Commission must refer the petition to the Department for evaluation. (Fish & G. Code, § 2073.) The Commission must also publish notice of receipt of the petition in the California Regulatory Notice Register. (Fish & G. Code, § 2073.3.) Within 90 days of receipt of the petition (or 120 days if the Commission grants an extension), the Department must evaluate the petition on its face and in relation to other relevant information and submit to the Commission a written evaluation report with one of the following recommendations:

- Based upon the information contained in the petition, there is not sufficient information to indicate that the petitioned action may be warranted, and the petition should be rejected; or
- Based upon the information contained in the petition, there is sufficient information to indicate that the petitioned action may be warranted, and the petition should be accepted and considered.

(Fish & G. Code, § 2073.5, subds. (a)-(b).) The Department's candidacy recommendation to the Commission is based on an evaluation of whether the petition provides sufficient scientific information relevant to the petition components set forth in Fish and Game Code Section 2072.3 and the California Code of Regulations, Title 14, Section 670.1, subdivision (d)(1).

In *Center for Biological Diversity v. California Fish and Game Commission* (2008) 166 Cal.App.4th 597, the California Court of Appeals addressed the parameters of the Commission's determination of whether a petitioned action should be accepted for consideration pursuant to Fish and Game Code Section 2074.2, subdivision (e), resulting in the species being listed as a candidate species. The court began its discussion by describing the standard for accepting a petition for consideration previously set forth in *Natural Resources Defense Council v. California Fish and Game Commission* (1994) 28 Cal.App.4th 1104:

As we explained in *Natural Resources Defense Council*, "the term 'sufficient information' in section 2074.2 means that amount of information, when considered with the Department's written report and the comments received, that would lead a reasonable person to conclude the petitioned action may be warranted." The phrase "may be warranted" "is appropriately characterized as a 'substantial possibility that listing could occur.'" "Substantial possibility," in turn, means something more than the one-sided "reasonable possibility" test for an environmental impact report but does not require that listing be more likely than not.

(*Center for Biological Diversity, supra*, 166 Cal.App.4th at pp. 609-10 [internal citations omitted].) The court acknowledged that "the Commission is the finder of fact in the first instance in evaluating the information in the record." (*Id.* at p. 611.) However, the court clarified:

[T]he standard, at this threshold in the listing process, requires only that a substantial possibility of listing could be found by an objective, reasonable person. The Commission is not free to choose between conflicting inferences on subordinate issues and thereafter rely upon those choices in assessing how a reasonable person would view the listing decision. Its decision turns not on rationally based doubt about listing, but on the absence of any substantial possibility that the species could be listed after the requisite review of the status of the species by the Department under [Fish and Game Code] section 2074.6. (*Ibid.*)

CESA defines the “species” eligible for listing to include “species or subspecies” (Fish and G. Code, §§ 2062, 2067, and 2068), and courts have held that the term “species or subspecies” includes “evolutionarily significant units.” (*Central Coast Forest Assn. v. Fish & Game Com.* (2018) 18 Cal.App.5th 1191, 1236, *citing Cal. Forestry Assn., supra*, 156 Cal.App.4th at pp. 1542 and 1549.)

### **Desert Tortoise Taxonomy**

Desert tortoises are members of the order Testudines, family Testudinidae, genus *Gopherus*. When the Commission listed desert tortoise in 1989, *Gopherus agassizii* was understood to range from southeastern California, across southern Nevada, through western Arizona, and south into Sonora and Sinaloa, Mexico (Figure 1). Since that time, studies of tortoise genetics, morphometrics, and ecology have led experts to conclude that the complex formerly known as “desert tortoise” in fact consists of two separate species, Mohave desert tortoise and Sonoran desert tortoise (Murphy et al. 2011, Iverson et al. 2017). Mohave desert tortoise, also known as Agassiz’s desert tortoise, retains the binomial *G. agassizii*, and ranges across the deserts of southeastern California, southern Nevada, and small areas of Arizona and Utah north of the Colorado River. Desert tortoises south of the Colorado River in Arizona and northern Mexico are now classified as Sonoran desert tortoise, also known as Morafka’s desert tortoise, (*Gopherus morafkai*). Only the Mohave (Agassiz’s) desert tortoise occurs in California. References to Agassiz’s desert tortoise and Mohave desert tortoise in the Petition and this evaluation should be considered synonymous. This evaluation uses the common name Mohave desert tortoise when referring to *G. agassizii* as the species is currently understood.

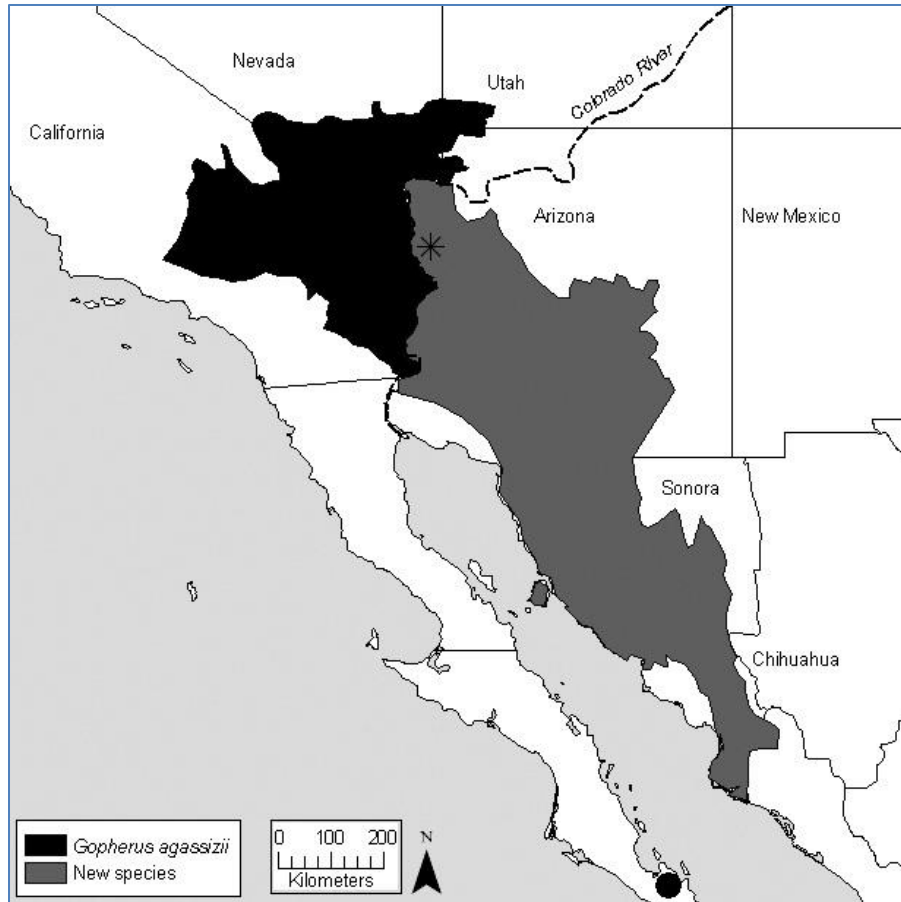


Figure 1. Distribution of Agassiz's or Mohave desert tortoise (*Gopherus agassizii*, black polygon) and Morafka's or Sonoran desert tortoise (*Gopherus morafkai*, gray polygon). Prior to taxonomic revision the two species collectively were considered "desert tortoise" (*G. agassizii*). Figure from Murphy et al. (2011).

### Petition History

The desert tortoise was listed as a threatened species by the U.S. Fish and Wildlife Service (USFWS) in 1980 throughout its range which includes southeastern California. In 1989, the Commission listed desert tortoise as a threatened species under CESA. On March 23, 2020, the Commission received a Petition from The Desert Tortoise Council, The Desert Tortoise Preserve Committee, and Defenders of Wildlife to change the status of Mohave desert tortoise from threatened to endangered. On April 13, 2020, the Commission referred the Petition to the Department for evaluation. At its meeting on April 16, 2020, the Commission officially received the Petition.



The Department evaluated the scientific information presented in the Petition as well as other relevant information the Department possessed at the time of review. Pursuant to Fish and Game Code Section 2072.3 and Section 670.1, subdivision (d)(1), of Title 14 of the California Code of Regulations, the Department evaluated whether the Petition included sufficient scientific information regarding each of the following petition components to indicate that the petitioned action may be warranted:

- Population trend;
- Range;
- Distribution;
- Abundance;
- Life history;
- Kind of habitat necessary for survival;
- Factors affecting the ability to survive and reproduce;
- Degree and immediacy of threat;
- Impact of existing management efforts;
- Suggestions for future management;
- Availability and sources of information; and
- A detailed distribution map.

### **Overview of Mohave Desert Tortoise Ecology**

Information in this section is summarized from Berry and Murphy's (2019) recent monograph on the species. The carapaces (shells) of hatchling Mohave desert tortoises average about 44 mm (1.7 in.) long while adult carapaces range in length from 178 to >370 mm (7.0 – 14.5 in.). Females are typically slightly smaller, averaging approximately 220 mm (8.7 in.), while males average about 243 mm (9.6 in.).

In California, the species occupies much of the Mojave Desert and portions of the Sonoran and Great Basin Deserts. It ranges from the southern end of the Owens Valley in the north to the Mexican border near the southeastern corner of the state, and from the Colorado River in the east to the lower slopes of the Sierra Nevada, Tehachapi, San Gabriel, San Bernardino, and Peninsular Mountains in the west (Figure 2).

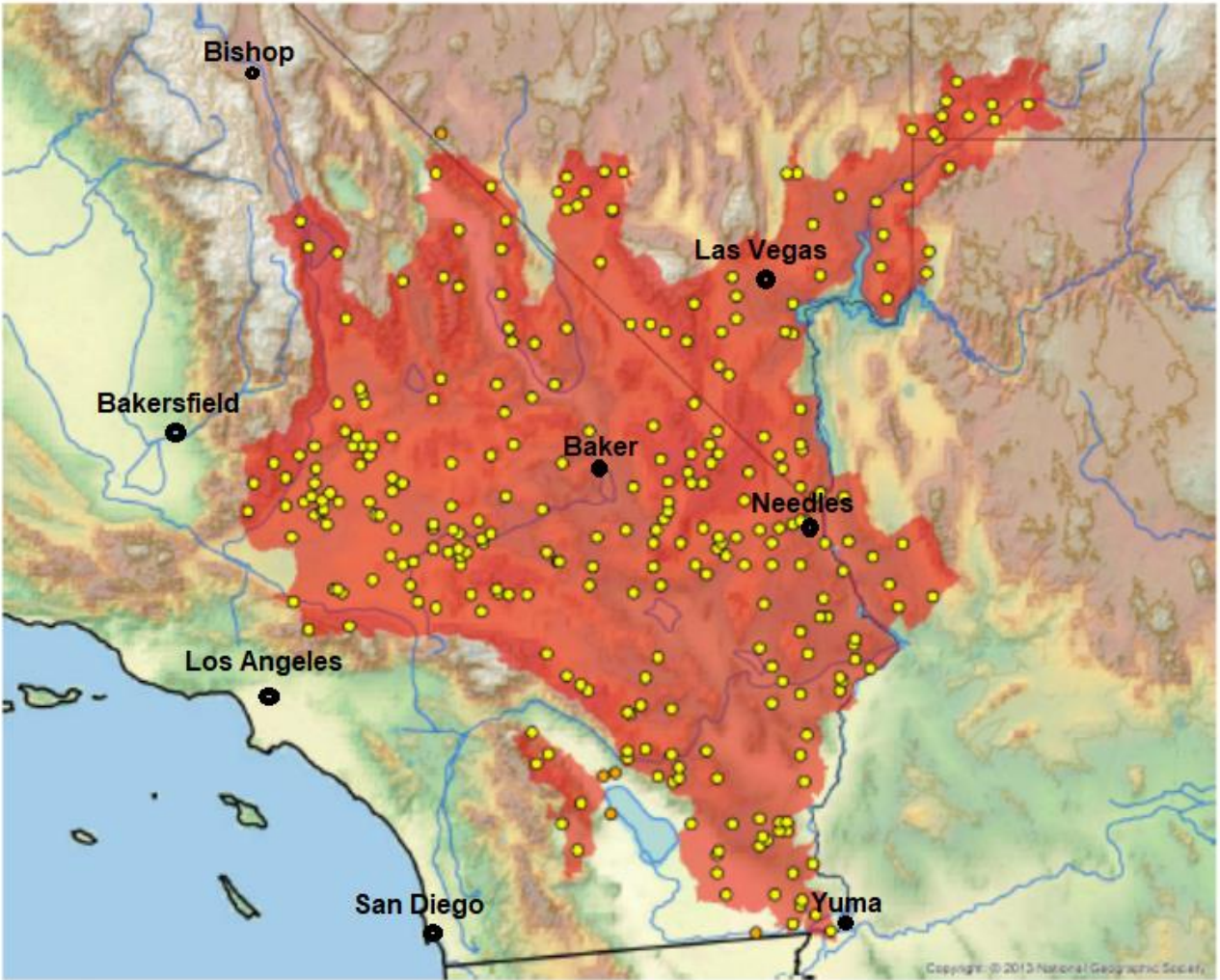


Figure 2. Range and distribution (yellow dots) of Mohave desert tortoise. Figure from Berry and Murphy (2019).

Mohave desert tortoises require topography, geologic features such as rock crevices and the banks of washes, and suitable soils for cover and the construction of burrows and dens. Shrub or tree cover is essential for protection from extreme temperature, precipitation, and predators. Over 70% of burrows occur beneath shrubs, with the larger shrubs or trees preferred. In the lowlands and dry lakebeds of the Mojave Desert ecosystem, tortoises are associated with several vegetation types in the Chenopodiaceae subfamily, including saltbush (*Atriplex* spp.). Most vegetation associations used by desert tortoise contain creosote bush (*Larrea tridentata*), often with white bur-sage (*Ambrosia dumosa*) or cheesebush (*A. salsola*) and several other species of shrubs, cacti, and perennial grasses. At higher elevations tree yuccas (Joshua tree, *Yucca brevifolia*, and Mojave yucca, *Y. schidigera*) and woody shrubs become more common, including blackbrush (*Coleogyne ramosissima*) associations at the highest elevations. The hotter western Sonoran Desert is characterized by creosote bushes, but also includes woodlands of blue palo verde (*Parkinsonia florida*), smoke tree (*Psoralea arguta*), and ironwood (*Oleina tesota*) associated with dry stream channels interspersed with sparse ocotillo (*Fouquieria splendens*), creosote bush, and other shrubs, and cacti. Mohave desert tortoise densities are highest where diverse assemblages of grass, cacti, shrub, and tree cover occur, and low where shrub cover is sparse and precipitation is scarce and erratic. Densities also decline in areas modified by human activities.

Mohave desert tortoises eat annual plants, herbaceous perennials, succulents (cacti), and flowers and leaves of a few perennial shrubs.

Mohave desert tortoises spend >90% of their lives inactive and underground in burrows, pallets (shallow burrows which provide at least partial cover from the sun and predators), caves, or other cover which they can excavate themselves within a few days of hatching. While underground tortoises can reduce their metabolic rates to conserve water and energy. Burrows are often  $\geq 3$  m (9 ft.) long and  $\geq 1$  m (3 ft.) below the surface. Denning burrows, which may be used by multiple tortoises, are often found in washes, and may contain side rooms. Underground refuges provide shelter during periods of extreme heat and during droughts and food shortages. Mohave desert tortoise burrows and dens are important landscape features utilized by a wide range of invertebrates, reptiles, birds, and mammals (Henen et al.1998).

Activity patterns, both daily and seasonal, are strongly influenced by temperatures, the timing and amounts of precipitation, availability of free water to drink, and the availability of forage. Tortoises generally emerge from hibernation or brumation (a torpor like state of slowed metabolic activity) in late winter or early spring, followed by above-ground foraging and interactions with other tortoises. By late spring most individuals retreat to burrows, dens, pallets, and rock structures. Tortoises occasionally emerge from cover in early morning or late evening in June and July. From August through late October or early November above ground activity increases until temperatures fall, when individuals retreat underground to hibernate.

Courtship takes place in both the spring and fall, and polyandry (multiple males breeding with the same female) is not uncommon. Females first breed at 12 to 20 years of age and can store sperm and use it to fertilize eggs for several years after mating. Females lay up to three clutches of 1 to 10 eggs in nests within dens, burrows, pallets, and mounds as well as under shrubs. More eggs are laid when forage conditions are favorable. The sex of offspring is determined by the temperature eggs reach during incubation. Warmer conditions result in more females, and colder in more males. Consequently, local populations often have highly skewed sex ratios.

Home ranges of males are generally larger than females. In the central Mojave Desert, Harless et al. (2009) found males had home ranges of 43 to 49 ha (106 to 121 ac.), and females 16 to 17 ha (39.5 to 42 ac.) using minimum convex polygons. Home ranges of juveniles were smaller than those of adults.

Throughout their life stages, Mohave desert tortoises are subject to predation by a wide range of predators. Eggs are consumed by several vertebrate predators, such as Gila monsters (*Heloderma suspectum*), desert kit fox (*Vulpes macrotis*), coyote (*Canis latrans*), American badger (*Taxidea taxus*), and spotted skunks (*Spilogale gracilis*). Hatchlings can be killed by ants, including fire ants (*Solenopsis* spp.), common ravens (*Corvus corax*), bobcats (*Lynx rufus*), desert kit fox, rodents, and burrowing owls (*Athene cunicularia*). Adults are known to be preyed upon by common ravens, golden eagles (*Aquila chrysaetos*), coyotes, bobcats, mountain lions (*Puma concolor*), American badgers, and domestic dogs (*Canis lupus familiaris*).

## **SUFFICIENCY OF SCIENTIFIC INFORMATION TO INDICATE THE PETITIONED ACTION FOR MOHAVE DESERT TORTOISE MAY BE WARRANTED**

The Petition components are evaluated below, pursuant to Fish and Game Code Section 2072.3 and Section 670.1, subdivision (d)(1), of Title 14 of the California Code of Regulations.

## Population Trend

### *Scientific Information in the Petition*

The Petition discusses population trends on pages 7 to 21 under the heading “Population Trends”.

The Petition relies upon analyses of long-term Mohave desert tortoise monitoring projects to characterize the population trend of the species. The Petition presents (see Petition Tables 1a. and 1b.) results from a long-term, fixed plot intensive search monitoring project conducted by the U.S. Bureau of Land Management (BLM) in the late 1970s and later surveyed by the U.S. Geologic Survey (Figure 3). These data illustrate a general pattern of decline in adult Mohave desert tortoise population density estimates in the Desert Tortoise Recovery Units (RUs), Critical Habitat Units (CHUs), Conservation Areas (CAs) and Wildlife Management Areas (WMAs) sampled 1977 to 2000; with a few exceptions such as the Joshua Tree Unit where populations appear to have increased or remained stable. Berry (2003) analyzed the results of these periodic intensive search surveys and found declines of 50% to 96% in adult tortoise densities between the late 1970s and early 2000s. In the Desert Tortoise Research Natural Area within the Western Mojave Recovery Unit, from 1982 to 1992 the overall Mohave desert tortoise population declined by 86%, with the adult population declining by about 94%, primarily due to Mycoplasmosis disease mortality (Brown et al. 1999).

Population estimates of permanent study plots in the Colorado Desert Recovery Unit at Chemehuevi Valley and Chuckwalla Bench showed population declines as high as 90% from the early 1990s to the 2000s (BLM and CDFG 2002). Surveys performed in 2000 showed all tortoise size classes in sampled eastern Mojave Desert Critical Habitat Units declined from previous tortoise population estimates, some by 76% to 80%. Larger tortoise size classes were estimated to have declined by as much as 90% from previous estimates (Berry 2000, BLM 2002).

Beginning in 2001, at the direction of the interagency Desert Tortoise Management Oversight Group, the long-term monitoring strategy was changed to line-distance sampling on randomly established plots to determine density estimates. Petition Table 3 presents the Mohave desert tortoise density estimates derived from annual line-distance sampling surveys by year from 2001 to 2019. Density estimates trend lower across all units except for the Ivanpah CHU, where the trend is less apparent. The USFWS (2015) analyzed density estimate data from 2004 to 2014 and found declines of 30 to 65% over the decade across the units except for the Joshua Tree sampling unit where the density estimate increased by 178%. Despite the dramatic increase in the Joshua Tree sampling unit, the overall density estimate for the larger Colorado Desert Recovery Unit, which contains Joshua Tree and five other sampling units, declined by more than 36% (USFWS 2015).

The 1994 Recovery Plan for the Mojave Population of the Desert Tortoise (USFWS 1994) determined that the minimum viable tortoise population density is 3.9 adults per square kilometer, or approximately 10 per square mile. The density estimates in nine of the 10 California Mohave desert tortoise sampling units were below the minimum viable density in 2014 (USFWS 2015).

Taken together, the two long-term monitoring projects indicate the Mohave desert tortoise population declined substantially in most sampling units from 1977 to 2000, and then substantially declined further from 2001 to 2014. The most recent estimates indicate the population densities in most sampling units are below the minimum density determined necessary to sustain populations.

#### *Other Relevant Scientific Information*

The USFWS Range-Wide Monitoring of the Mohave Desert Tortoise 2019 Annual Report (USFWS 2020) indicates that density estimates in eight of the nine reported sampling units remain below the minimum viable density of 3.9 adults per square kilometer.

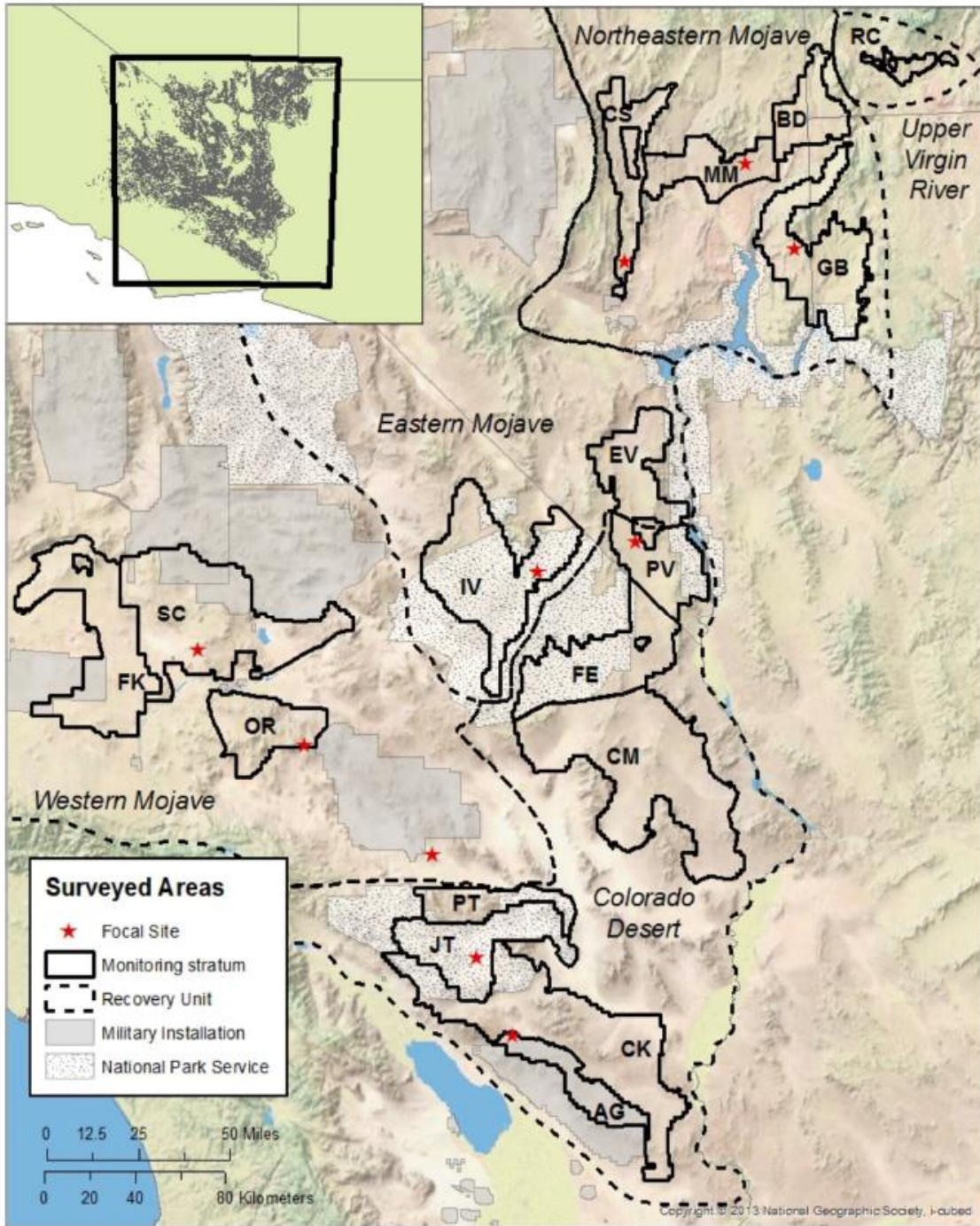


Figure 3. Mohave desert tortoise Recovery Units (dashed lines) and Critical Habitat Units (solid lines, shown as “Monitoring stratum” in legend). FK = Fremont-Kramer, SC = Superior-Cronese, OR = Ord-Rodman, PT = Pinto Mountains, JT = Joshua Tree, CK = Chuckwalla, AG = Chocolate Mtns, Aerial Gunnery Range, CM = Chemehuevi, FE = Fenner, IV = Ivanpah. This figure appears as Figure 1 in the Petition. Figure source is USFWS (2020).

## *Conclusion*

While the Petition did not include a Mohave desert tortoise population estimate it presented observed population density data that indicate populations have dramatically declined over the last 40 years. Population census data is lacking for most wildlife species and the use of density estimates as a surrogate for tracking trends in population size is a commonly accepted practice (e.g. Anderson et al. 1979). The information in the Petition is sufficient to indicate the Mohave desert tortoise population in California has declined substantially from historical levels and has continued to trend downward since the species was listed as a threatened species by the Commission in 1989.

## **Geographic Range and Distribution**

### *Scientific Information in the Petition*

The Petition discusses geographic range and distribution on pages 21 to 25.

The Petition provided information on changes in Mohave desert tortoise distribution associated with the expansion of two military installations: Fort Irwin in 2002, and the U.S. Marine Corps Air Ground Combat Center in 2013. This information indicates changes in the distribution of Mohave desert tortoises may have occurred, but it does not inform trends in the historical or current geographic range.

### *Other Relevant Scientific Information*

The Mohave desert tortoise is distributed through the Mojave Desert and portions of the Sonoran and Great Basin Deserts from the southern end of the Owens Valley in the north to the Mexican border near the southeastern corner of the state, and from the Colorado River in the east to the lower slopes of the Sierra Nevada, transverse, and Peninsular Mountains in the west (Berry and Murphy 2019). Grinnell and Camp (1917) produced an early desert tortoise distribution map based on museum records available at the time (Figure 4), and Patterson (1981), produced the first map of desert tortoise distribution derived from available literature and museum records as well as the observation of herpetologist (Figure 5). These early distribution maps show the same general pattern of distribution and range as contemporary maps such as Berry and Murphy (2019, see Figure 2). Accordingly, The USFWS (2019) concluded the species' distribution has not changed substantially in terms of the overall extent of its range, although desert tortoises have been removed from portions of their range for solar developments, military activities, and other development projects.



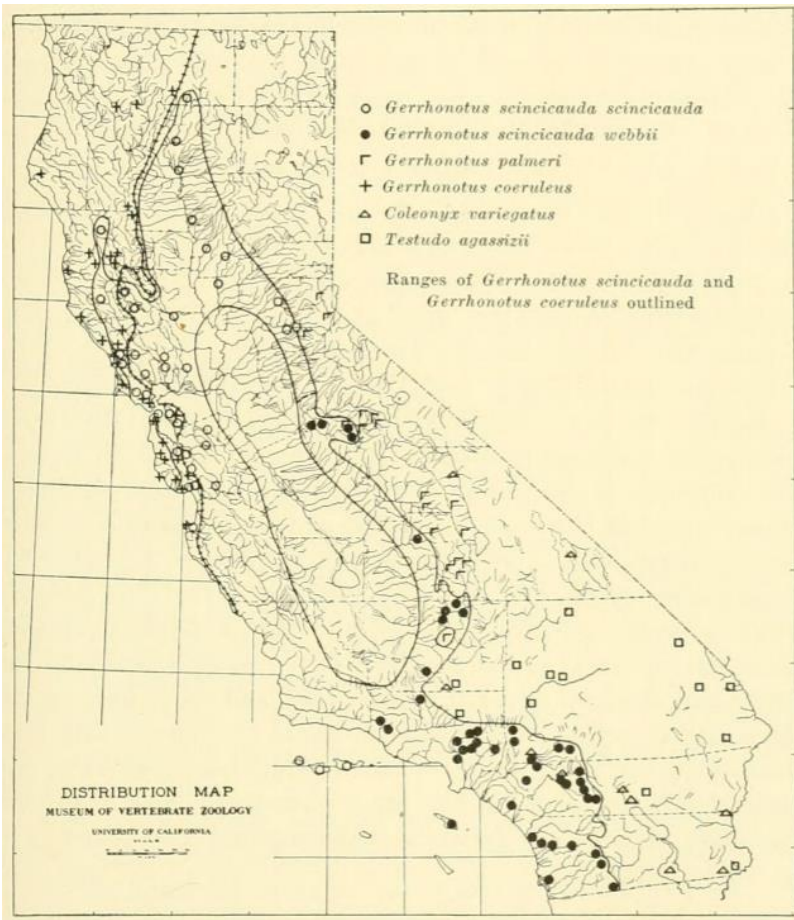


Figure 4. Distribution of desert tortoise records (open squares) from Grinnell and Camp (1917).

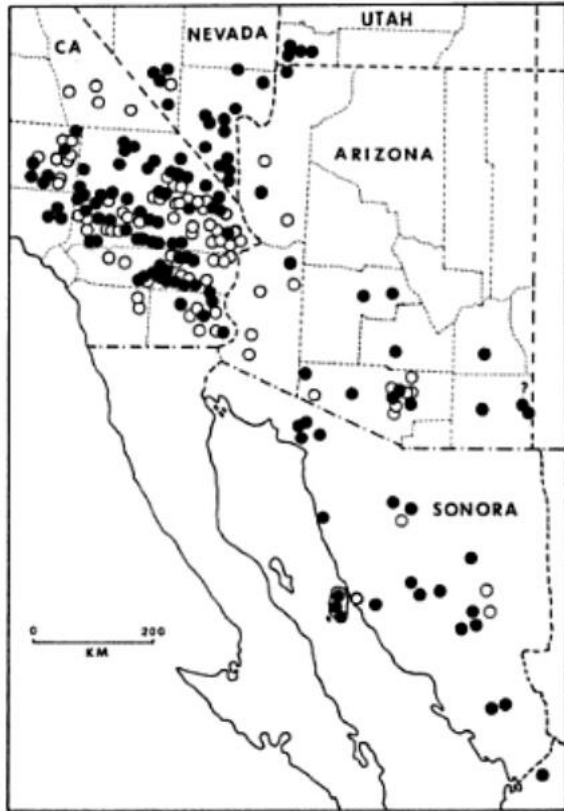


Figure 5. Distribution of desert tortoises from Patterson (1981). Black dots represent museum and literature records, open circles represent observations of professional and amateur herpetologists. Note that records outside of California include tortoises now ascribed to Morafka's desert tortoise and Goode's thornscrub tortoise (*Gopherus evgoodei*).

### *Conclusion*

Information available to the Department indicates that the Mohave desert tortoise range has not changed substantially since it was first documented in the early 1900s. The Petition provides sufficient information to indicate changes in its distribution within the range have occurred in recent years.

### **Abundance**

#### *Scientific Information in the Petition*

The Petition discusses the abundance of Mohave desert tortoises on pages 25 to 29.

The Petition restates information presented in the Population Trend section of the Petition, emphasizing that density estimates of adult Mohave desert tortoises in Critical Habitat Units declined by 51.3% from 2004 to 2014 (USFWS 2015); and that density estimates in the Western Mojave Recovery Unit appear to have declined by 85% to 95% since the earliest density information was collected in the late 1970s (USFWS 1994, 2015). The Petition restates that Mohave desert tortoise densities in eight of 10 sampling units are below the estimated minimum viable population density described in the Recovery Plan (USFWS 1994).

#### *Conclusion*

The Petition provides sufficient information to indicate substantial reductions in Mohave desert tortoise abundance have occurred in large areas of their range. Additionally, the Petition demonstrates that the abundance of Mohave desert tortoises has continued to decline since the species was listed as threatened in California in 1989.

### **Life History**

#### *Scientific Information in the Petition*

The Petition discusses the life history of the Mohave desert tortoise on pages 29 to 31.

The Petition provides a brief overview of the species' physical description, behavior, adaptations to the desert environment, reproductive biology, home range, and genetic diversity within California.

#### *Conclusion*

The Petition provides sufficient information on the life history of the Mohave desert tortoise.

### **Kind of Habitat Necessary for Survival**

#### *Scientific Information in the Petition*

The Petition discusses Mohave desert tortoise habitat requirements on pages 31 to 33.

The Petition states the required elements of Mohave desert tortoise habitat include sufficient suitable quantity and quality of plants for forage and cover, suitable substrates for burrow and nest sites, and low occurrence of predators. Most such habitat is found on flats and bajadas with soils ranging from sand to sandy gravel, and scattered shrubs with abundant inter-shrub space for growth of herbaceous plants; although tortoises are also found on rocky terrain and slopes in the Mojave region. Where Mohave desert tortoises occur in the Mojave Desert annual precipitation ranges from 10 to 21 cm (3.9 – 7.9 in.) (Germano et al. 1994). Other important requisites of Mohave desert tortoise habitat listed in the Petition include sufficient space for viable populations and protection from disturbance and human activity (USFWS 1994). The Petition describes the vegetation communities used by Mohave desert tortoises by Desert Tortoise Recovery Unit:

- Colorado Desert Recovery Unit
  - Succulent Scrub (*Fouquieria*, *Opuntia*, *Yucca*)
  - Blue Palo Verde-Smoke Tree Woodland
  - Creosote Bush Scrub
  - Blue Palo Verde-Ironwood-Smoke Tree Woodland
- Eastern Mojave Recovery Unit
  - Big Galleta-Scrub Steppe
  - Succulent Scrub (*Yucca*, *Opuntia* spp.)
  - Creosote Bush Scrub
  - Cheesebush Scrub
  - Indian Rice Grass (*Oryzopsis hymenoides*) Scrub-Steppe
- Western Mojave Recovery Unit
  - Saltbush-Allscale (*Atriplex polycarpa*) Scrub
  - Indian Rice Grass Scrub-Steppe
  - Hopsage (*Grayia spinosa*) Scrub
  - Big Galleta Scrub Steppe
  - Cheesebush Scrub
  - Desert Psammophytes
  - Blackbush (*Coleogyne ramosissima*) Scrub

### *Conclusion*

The Petition presents sufficient information on the habitat requirements of the Mohave desert tortoise.

## **Factors Affecting the Ability to Survive and Reproduce**

### *Scientific Information in the Petition*

The Petition discusses factors affecting the ability of Mohave desert tortoise to survive and reproduce on pages 33 to 35. Other information related to threats is discussed in the Population Trend, Geographic Range, Abundance, and Kind of Habitat Necessary for Survival sections.

Petition Figure 2 graphically displays the relationships between the various factors that threaten the ability of Mohave desert tortoises to survive and reproduce. Threats listed include land uses (ranching, mining, agriculture, urbanization, military operations, transportation networks, recreation, and utility corridors), and weather impacts (storms, drought, availability of natural water). These factors work through various pathways to cause mortality, either directly or indirectly, through starvation, predation, habitat loss, dehydration, drowning, crushing, burial, disease, and other mechanisms.

The Petition also presents information on the threat of artificially high predation pressure from subsidized predators (predator populations maintained at artificially high levels due to obtaining some of their food resources for humans or land use changes associated with humans) such as ravens and coyotes, diseases, and effects associated with climate change. Identified climate change impacts included increasing summer high temperatures, more frequent and prolonged drought, decreasing annual precipitation and associated changes in vegetation communities, and decreased availability of nutritious forage plants and shrub cover.

### *Conclusion*

The Petition provides sufficient information regarding the factors affecting the ability of Mohave desert tortoises to survive and reproduce.

## **Degree and Immediacy of Threat**

### *Scientific Information in the Petition*

The Petition generally discusses threats to Mohave desert tortoises on page 36. Additional information on threats affecting desert tortoises is included throughout the Petition, including information on: disease, drought, and predation impacts (p.15); urbanization (p. 22); off-highway vehicle impacts (OHVs, pp. 22, 26, 41); invasive species (p. 22); threats associated with military bases and military training (p. 22); renewable energy facilities (p. 24); roads (pp. 24, 32); human presence and subsidized predators (pp. 26, 27); impacts associated with climate change (pp. 27, 28, 34); grazing (p. 32); and translocations (p. 38).

## *Conclusion*

The Petition provides sufficient information on the threats affecting the Mohave desert tortoise.

## **Impact of Existing Management Efforts**

### *Scientific Information in the Petition*

The Petition discusses the impact of existing management efforts on Mohave desert tortoise populations on pages 36 to 43.

The Petition describes the property ownership pattern of land designated Desert Tortoise Critical Habitat by the USFWS (1994). USFWS designed critical habitat covers 19,239 km<sup>2</sup> (4,754,000 ac.) in California. The major landowners, in descending area of ownership, are BLM, private lands, U.S. National Park Service (NPS), U.S. Department of Defense (DOD), and the State of California.

Current land use on BLM lands in the Mohave desert tortoise range is governed by a series of Regional Plans. BLM lands are managed under a multiple use mandate which includes grazing, utility rights of way, off road vehicle recreation, wildlife habitat management, and wilderness and wild and scenic river areas. In recent years, BLM has received numerous applications for renewable energy development projects, totaling tens of thousands of acres. In response to these applications BLM—with support from USFWS, California Energy Commission, and the Department—enacted the Desert Renewable Energy Conservation Plan (DRECP) across 91,054 km<sup>2</sup> (approximately 22.5 million ac.) of southeastern California deserts, a landscape-scale plan for siting renewable energy facilities and preserving environmentally sensitive areas. The siting of these facilities could result in the removal or degradation of up to 4,569 ha (11,290 ac.) of Mohave desert tortoise habitat in the plan area, including 1,916 ha (4,734 ac.) of critical habitat (USFWS 2016). The BLM is currently considering amending the DRECP in response to Executive Order 13783 which directs federal agencies to review regulations that unnecessarily impede energy development (Fed. Reg. 83(23):4921-4922).

NPS lands in the Mohave desert tortoise range include the Mojave National Preserve and Joshua Tree National Park. NPS General Management Plans emphasize the protection of natural and cultural resources.

DOD lands in the Mohave desert tortoise range include China Lake Naval Air Weapons Station, Edwards Air Force Base, Fort Irwin (U.S. Army), Marine Corps Air Ground Combat Center, and the Chocolate Mountains Gunnery Range (U.S. Navy and U.S. Marine Corps). These lands are managed under Integrated Natural Resource Management Plans. Use of the lands includes weapons development, mechanized training, and weapons fire. These uses can result in the loss and fragmentation of habitat but use of the China Lake Naval Air Weapons Station and Edwards Air Force Base largely occurs in air space, with relatively little impact to Mohave desert tortoise habitat.

Private lands in the Mohave desert tortoise range are primarily used for residential and commercial development, agriculture, mining, and open space. Land use practices are governed by city and county general plans.

### *Conclusion*

The Petition describes land ownership and includes a cursory discussion of land management practices by ownership within designated Mohave desert tortoise Critical Habitat Units. However, it does not provide similar information for the species' entire range in California which encompasses an area far greater than the Critical Habitat Units. Nonetheless, the Petition provided sufficient information on the general patterns of land ownership and land management practices in the species' range.

## **Suggestions for Future Management**

### *Scientific Information in the Petition*

The Petition provides suggestions for future management of Mohave desert tortoises on pages 43 to 47, which are summarized below.

- Increase protections for Mohave desert tortoise in BLM Areas of Critical Environmental Concern using the measures proven effective in Desert Tortoise Reserve Natural Areas.
- Implement science-based monitoring of the extent and impact of OHV and grazing uses of BLM lands.
- Amend the California Desert Conservation Plan (BLM 1980) to reduce OHV and grazing uses on BLM lands, and to enforce protective measures.
- State and Federal management agencies should be actively engaged in planning and implementing recovery actions.
- Control ravens in desert tortoise Recovery Units.
- Meet the recovery goals of the USFWS Recovery Plan (1994).

### *Conclusion*

The Petition provides sufficient information regarding suggestions for future management of Mohave desert tortoise and its habitat.

### **Detailed Distribution Map**

#### *Scientific Information in the Petition*

The Petition provides links to three websites containing Mohave desert tortoise distribution maps on page 48.

### *Conclusion*

The range maps linked in the Petition are sufficient.

### **Sources and Availability of Information**

#### *Scientific Information in the Petition*

The Petition cites an extensive list of sources in Appendix 4.

#### *Other Relevant Scientific Information*

The Department used additional sources of scientific information cited in this Petition Evaluation.

### *Conclusion*

The Petition provides sufficient information on the sources and availability of information used in the Petition.

## **RECOMMENDATION TO THE COMMISSION**

Pursuant to Section 2073.5 of the Fish and Game Code, the Department has evaluated the Petition on its face and in relation to other relevant information the Department possesses or received. In completing its Petition Evaluation, the Department has determined that the Petition and other relevant information indicates there is sufficient scientific information to indicate that the petitioned action to change the status of Mohave desert tortoise from threatened to endangered may be warranted. Therefore, the Department recommends the Commission accept the Petition for further consideration under CESA.



## LITERATURE CITED

The sources provided below were used during preparation of this Petition Evaluation and/or cited in the Petition.

- Anderson, D.R., J.L. Laake, B.R. Crain, and K.P. Burnham. 1979. Guidelines for line transect sampling of wildlife populations. *Journal of Wildlife Management* 43(1):70-78.
- Berry, K.H. 2000. Preliminary Report on the Spring Survey of Desert Tortoises at the Goffs Permanent Study Plot and Special Project on Effects of Roads. United States Geological Survey, Western Ecological Research Center, 6221 Box Springs Blvd., Riverside, California.
- Berry, K.H. 2003. Declining Trends in Desert Tortoise Populations at Long-term Study Plots in California between 1979 and 2002: Multiple Issues. 28th Annual Desert Tortoise Council Symposium, p. 75.
- Berry, K.H., and R.W. Murphy. 2019. *Gopherus agassizii* (Cooper 1861) – Mojave Desert Tortoise, Agassiz's Desert Tortoise. *in* A.G.J. Rhodin, J.B. Iverson, P.P. van Dijk, C.B. Stanford, E.V. Goode, K.A. Buhlmann, P.C.H. Pritchard, and R.A. Mittermeier, (eds.). *Conservation Biology of Freshwater Turtles and Tortoises: A Compilation Project of the IUCN/SSC Tortoise and Freshwater Turtle Specialist Group*. *Chelonian Research Monographs* 5(13):109.1–45.  
doi:10.3854/crm.5.109.agassizii.v1.2019
- Brown, M., K.H. Berry, M. Schumacher, K.A. Nagy, M.M. Christopher, P.A. Klein. 1999. Seroepidemiology of Upper Respiratory Tract Disease in the Desert Tortoise in the Western Mojave Desert of California. *Journal of Wildlife Diseases* 35(4):715-727.
- Bureau of Land Management. 1980. California Desert Conservation Area Plan. Riverside District Office, Riverside, CA.
- Bureau of Land Management. 2002. Proposed Northern and Eastern Mojave Desert Management Plan Amendment to the California Desert Conservation Area Plan and Final Environmental Impact Statement. California Desert District, Riverside, CA.
- Bureau of Land Management and California Department of Fish and Game. 2002. Proposed Northern & Eastern Colorado Desert Coordinated Management Plan, an amendment to the California Desert Conservation Area Plan 1980 and Sikes Act Plan with the California Department of Fish and Game and Final Environmental Impact Statement. U.S. Department of Interior, Bureau of Land Management, California Desert District and California Department of Fish and Game, Inland, Deserts, and Eastern Sierra Region.

- Germano, D.J., R.B. Bury, T.C. Esque, and T.H. Fritts. 1994. Range and habitat of the desert tortoise. Pages 57-72 in R.B. Bury and D.J. Germano (eds.), *Biology of the North American Tortoises*. National Biological Survey, Fish and Wildlife Research 13, Washington, D.C.
- Grinnell, J., and C.L. Camp. 1917. A Distributional List of the Amphibians and Reptiles of California. *University of California Publications in Zoology* 17(10):127-208.
- Harless, M.L., A.D. Walde, D.K. Delaney, L.L. Pater, and W.K. Hayes. 2009. Home range, spatial overlap, and burrow use of the Desert Tortoise in the west Mojave Desert. *Copeia* 2009:378–389.
- Henen, B.T., C.C. Peterson, I.R. Wallis, I.R., K.H. Berry, and K.A. Nagy. 1998. Effects of climatic variation on field metabolism and water relations of Desert Tortoises. *Oecologia* 117:365–373.
- Iverson, J.B., P.A. Meylan, and M.E. Seidel. 2017. Testudines – Turtles. in J.J. Moriarty (ed). *Scientific and Standard English Names of Amphibians and Reptiles of North America North of Mexico, With Comments Regarding Confidence in Our Understanding*. Society for the Study of Amphibians and Reptiles, Herpetological Circular number 43.
- Murphy, R.W., K.H. Berry, T. Edwards, A.E. Leviton, A. Lathrop, and J.D. Riedle. 2011. The dazed and confused identity of Agassiz's land tortoise, *Gopherus agassizii* (Testudines, Testudinidae) with the description of a new species, and its consequences for conservation. *ZooKeys* 113: 39–71. doi:10.3897/zookeys.113.1353
- Patterson, R. 1981. The distribution of the desert tortoise (*Gopherus agassizii*). in Bury, R. B., ed. 1981. *North American tortoise conservation and ecology*. Wildl. Res. Rep. 12. Washington, DC: U.S. Department of the Interior, Fish and Wildlife Service: 51-53.
- U.S. Fish and Wildlife Service. 1994. *Desert Tortoise (Mojave Population) Recovery Plan*. U.S. Fish and Wildlife Service, Portland, OR.
- U.S. Fish and Wildlife Service. 2015. *Range-wide Monitoring of the Mojave Desert Tortoise (Gopherus agassizii): 2013 and 2014 Annual Reports*. Report by the Desert Tortoise Recovery Office, U.S. Fish and Wildlife Service, Reno, Nevada.
- U.S. Fish and Wildlife Service. 2016. *Biological Opinion on the Proposed Land Use Plan Amendment under the Desert Renewable Energy Plan [1340 (CA 930) P, 1150 (CA 930) P]*
- U.S. Fish and Wildlife Service. 2019. *Status of the Desert Tortoise March 2019*. Recovery Office, Reno, Nevada.

U.S. Fish and Wildlife Service. 2020. Range-wide Monitoring of the Mojave Desert Tortoise (*Gopherus agassizii*): 2019 Annual Report. Report by the Desert Tortoise Recovery Office, U.S. Fish and Wildlife Service, Reno, Nevada.