United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Carlsbad Fish and Wildlife Office
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Carlsbad, California 92008

In Reply Refer To:
FWS-SB/KRN-12B0203-14F0423

June 30, 2014

Mr. Scott Quinnell, Office Chief
Biological Studies and Permits
District 8, California Department of Transportation
464 W. 4th Street, 6th Floor, MS-822
San Bernardino, California 92401-1400

Subject: Biological Opinion for State Route 58 Kramer Junction Expressway Project, Kern and San Bernardino Counties, California

Dear Mr. Quinnell:

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion based on our review of the California Department of Transportation's (Caltrans) proposal to widen and realign approximately 13 miles of an existing 2-lane conventional highway into a 4-lane expressway. The project area is located on State Route 58 west of the city of Barstow between post mile R143.5 in Kern County to post mile 12.9 in San Bernardino County. This biological opinion addresses the effects of the proposed action on the federally threatened desert tortoise (*Gopherus agassizii*) and its designated critical habitat within the Fremont-Kramer Critical Habitat Unit.

We received your December 18, 2013, request for formal consultation on December 23, 2013. The Federal Highway Administration has delegated responsibility for consultation to Caltrans for federally funded actions. This document was prepared in accordance with section 7(a)(2) of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*).

We based this biological opinion on information that accompanied your request for consultation, the biological assessment (Caltrans 2013), additional information that you provided during the course of consultation, and information in our files. We can make a record of this consultation available at the Palm Springs Fish and Wildlife Office.

Consultation History

Caltrans, the Service, and Bureau of Land Management (BLM) began coordinating on this project in 2001. However, between 2002 and 2008, Caltrans halted coordination due to funding issues. In 2009, Caltrans re-started discussions with the Service on the project and subsequently we provided Caltrans with species lists in 2012 and 2013.

In 2013, we received a preliminary draft biological assessment from Caltrans for review and comment. On September 13, 2013, we provided comments to Caltrans on the preliminary draft biological assessment.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED PROJECT

We summarized the following description of the proposed action from the biological assessment (Caltrans 2013). Caltrans proposes to relocate the segment of the existing highway from approximately 7 miles west of Kramer Junction to approximately 6 miles east of Kramer Junction. The 13-mile-long project would result in a 4-lane divided expressway throughout the length of the project area. Design features include full-width shoulders, improved sight distances, full-access control to the freeway, and a clear recovery zone, which is an area clear of fixed objects adjacent to the road where drivers of out-of-control vehicles can attempt to regain control. The proposed action also includes an interchange east of Highway 395, between the new alignment and the exiting State Route 58.

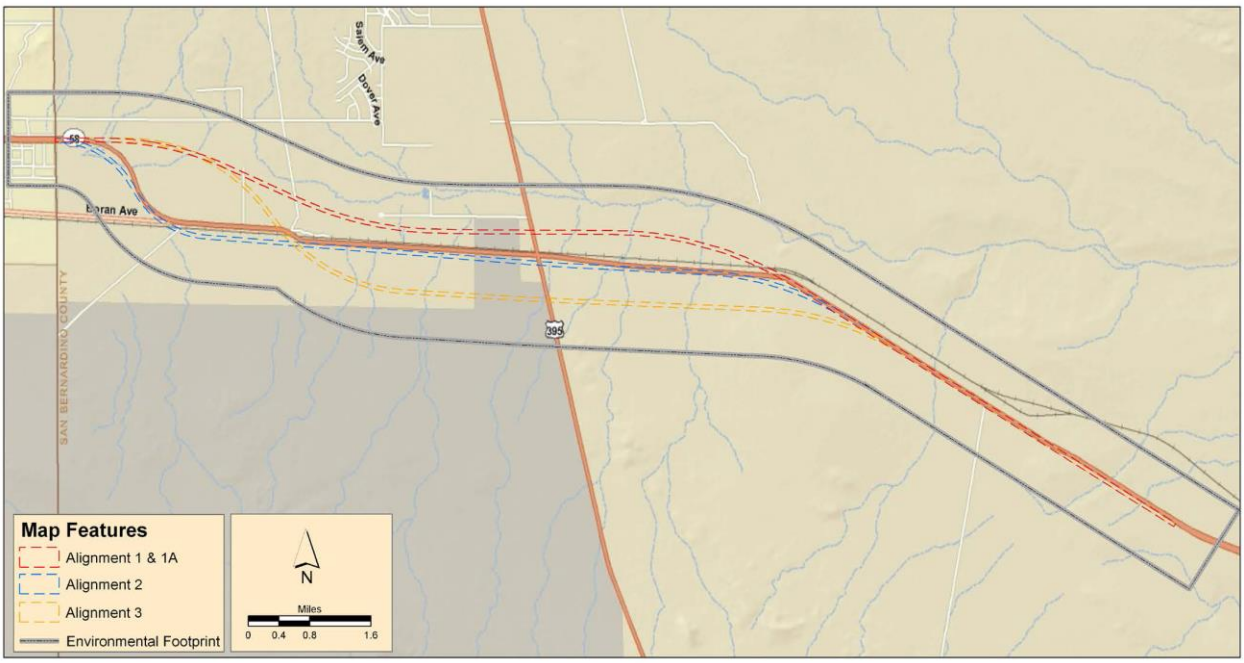


Figure 1. Proposed expressway. The red line depicts the location of the proposed expressway described in this biological opinion (Caltrans 2012).

Construction Activities

Caltrans anticipates that construction would begin in the spring of 2017 and last approximately 2 years. Caltrans would build the eastern and western portions of the new expressway in the

same alignment as the existing State Route 58; traffic would continue to use one lane of the existing State Route 58 in construction areas while the new road alignment is constructed. The middle section of new expressway would be located to the north of the existing road.

Caltrans would use typical highway construction equipment for the project, which includes excavators, backhoes, trucks, rollers, and paving machines. Staging areas would be located within the right-of-way at either end of the alignment. All activities would take place within the right-of-way.

Caltrans would also install two large soft-bottom culverts east and west of Highway 395, which crosses State Route 58. It has not finalized the design and location of these culverts.

Caltrans would also remove approximately 1.2 miles of the existing State Route 58 after construction of the new expressway. This segment of road is located between the border of Kern and San Bernardino counties and post mile 1.2 in San Bernardino County. Following removal, Caltrans would re-vegetate this section of the old road.

Avoidance and Minimization Measures

The proposed action includes the following measures that Caltrans will implement during construction to avoid and minimize adverse effects to the desert tortoise (Caltrans 2013). The Service and Caltrans revised these measures from those contained in the biological assessment to improve clarity and organization.

Field Contact Representative

1. Caltrans will assign a staff person to act as the field contact representative (e.g., Resident Engineer or Caltrans Staff Inspector) with specific experience in the implementation of environmental compliance programs. The field contact representative will serve as the environmental compliance monitor for the project and be present throughout construction. This individual will serve as liaison among the Service, Caltrans, construction workers, authorized biologist(s), and biological monitor(s). The field contact representative and authorized biologist will work closely together to ensure compliance with the conditions and requirements of project permits and approvals set forth in the biological opinion and supporting plans appended to the biological assessment.

2. The field contact representative will have the authority to stop project activities if a desert tortoise is in danger or protective measures are not adequately implemented.

Authorized Biologist and Biological Monitors

3. Caltrans will employ authorized biologists approved by the Service and biological monitors approved by an authorized biologist to ensure compliance with the protective

measures for the desert tortoise. Use of authorized biologists and biological monitors will be in accordance with the most up-to-date Service guidance and will be required for monitoring of any construction activities that may injure or kill desert tortoises. The current guidance may be found at: http://fws.gov/ventura/species_information/protocols_guidelines/index.html

4. Caltrans will review the credentials of all individuals seeking approval as authorized biologists. Caltrans will provide the credentials of appropriate individuals to the Service for approval at least 30 days prior to the time they must be in the field.

5. The authorized biologists will be responsible for all aspects of clearance surveys, monitoring, developing and implementing the worker environmental awareness program, contacts with agency personnel, reporting, and long-term monitoring and reporting and be present, along with approved biological monitors during construction, operation, and maintenance that could affect desert tortoises. Biological monitors will be supervised and trained by the authorized biologists. Training by authorized biologist(s) may include ensuring biological monitors are qualified to capture, handle, and move desert tortoises in situations where an authorized biologist is unavailable.

6. Caltrans' field contact representative will act on the advice of the authorized biologist(s) and biological monitor(s) to ensure conformance with the protective measures set forth in this biological opinion. The authorized biologist(s) will have the authority to immediately stop any activity that is not in compliance with these conditions.

Worker Environmental Awareness Program

7. Caltrans will ensure that all workers at the site receive worker environmental awareness training prior to construction and during construction. Only workers who have successfully completed the education program will be allowed to work on the project site. The field contact representative and authorized biologist will administer the training to all onsite personnel including surveyors, construction engineers, employees, contractors, contractor's employees, supervisors, inspectors, subcontractors, and delivery personnel. Caltrans will implement the worker environmental awareness program to ensure the project's construction is conducted within a framework of safeguarding environmentally sensitive resources. The worker environmental awareness program will be available in English and Spanish. Wallet-sized cards summarizing the information will be provided to all construction personnel. The worker environmental awareness training will:

    a. Be developed by or in consultation with the authorized biologist and consist of an onsite or training center presentation in which supporting written material and electronic media, including photographs of protected species, is made available to all participants;

b. Provide an explanation of the purpose and function of the desert tortoise avoidance and minimization measures and the possible penalties for not adhering to them;

c. Inform workers that the field contact representative and the authorized biologists have the authority to halt work in any area where there would be an unauthorized adverse impact to biological resources if the activities continued;

d. Discuss general safety protocols such as hazardous substance spill prevention and containment measures and fire prevention and protection measures;

e. Provide an explanation of the sensitivity and locations of the vegetation, biological resources, and habitat within and adjacent to work areas, and proper identification of these resources;

f. Place special emphasis on the desert tortoise, including information on physical characteristics, photographs, distribution, behavior, ecology, sensitivity to human activities, legal protection, reporting requirements, and protective measures required for the project;

g. Provide contact information for the authorized biologist(s) and biological monitor(s) to handle late comments and questions about the material discussed in the program, as well as notification of any dead or injured wildlife species encountered during project-related activities;

h. Direct all worker environmental awareness program trainees to report all observations of listed species and their sign to an authorized biologist for inclusion in the monthly compliance report;

i. Include a training acknowledgment form to be signed by each worker indicating that they received training and will abide by the guidelines; and

j. Provide information regarding the effects of predation on the desert tortoise by common ravens (*Corvus corax*) and other predators and the measures that have been developed to reduce the likelihood predators will be attracted to the construction area.

Exclusionary Fencing

8. Prior to the start of construction, Caltrans will require the contractor to install permanent fencing to exclude desert tortoises from all work areas and right-of-way under the direction of an authorized biologist. The permanent fencing will extend from post mile R143.5 in Kern County to post mile 7.8 in San Bernardino County; exclusionary fencing currently exists between post miles 7.8 and 12.9. Caltrans will construct the fence according to the protocols provided in Chapter 8 of the Desert Tortoise Field Manual (Service 2009). If desert tortoises are encountered during installation of the fence, the

authorized biologist will move the individual the shortest distance possible to an area outside the fence where it will be safe. The authorized biologist will use his or her judgment regarding the best measures to use to ensure the desert tortoise does not immediately return to the area inside of the fence. The authorized biologist may contact the Service to discuss specific situations if the need arises.

9. After the exclusionary fencing has been installed and before the onset of ground-disturbing activities, the authorized biologist will survey the area and remove all desert tortoises. The authorized biologist will survey the area following established survey protocols to ensure that all desert tortoises have been found; generally, all desert tortoises will be considered to have been removed once a complete survey of the work area is conducted without finding any additional animals. Desert tortoises that are found inside the fenced area will be placed on the other side of the exclusion fence. The authorized biologist will use his or her best judgment to determine the optimal location for placement of desert tortoises, which would include ensuring the animals are not moved into areas that may isolate them from the desert tortoise population in the area. Caltrans will follow the guidance at http://www.fws.gov/carlsbad under "Survey Information" for current information on conducting clearance surveys for desert tortoises.

10. Caltrans will maintain the integrity of the fence to ensure that desert tortoises are excluded from the work area during construction and from the roadway thereafter. The fence will be inspected regularly; initially, it will be inspected on a monthly basis, but Caltrans may adopt a different schedule, based on acquired experience. Caltrans will inspect and, if necessary, repair the fence immediately after significant rainstorms that occur during times of the year or at temperatures when desert tortoises are likely to be active.

11. Caltrans will follow the direction in the most recent programmatic biological opinion for its maintenance activities that is in place at the time fences need repair.

Construction Monitoring

12. An appropriate number of authorized biologists and biological monitors will be available during construction for the protection of desert tortoise. Authorized biologists will be assigned to monitor each area of activity where conditions exist that may result in injury or mortality of desert tortoise (e.g., clearing, grading, re-contouring, and restoration activities).

13. The authorized biologist or a qualified biological monitor will survey ahead of the project activities and halt construction if he or she finds a desert tortoise in the path of construction equipment. Project activities will not resume until the desert tortoise moves out of harm's way or the authorized biologist or qualified biological monitor a has relocated it.

14. An authorized biologist or biological monitor will inspect all excavations that are not within desert tortoise exclusion fencing on a regular basis (several times per day) and immediately prior to filling of the excavation. If project personnel discover a desert tortoise in an open trench, an authorized biologist or qualified biological monitor will move it to a safe location in accordance with the Desert Tortoise Field Manual (2009).

15. Caltrans will use best management practices and measures to help reduce the possibility of introducing new invasive plants into the project area. These measures will include the inspection and cleaning of construction equipment, commitments to ensure the use of invasive-free mulches, topsoil, and seed mixes, and other strategies to help reduce existing populations of invasive non-native plants, or those that could occur in the future.

Desert Tortoise Translocation

16. Desert tortoises found on the project area will be handled and moved by an authorized biologist or qualified biological monitor in accordance with the most current Service protocol (currently Service 2009). Desert tortoises excavated from burrows will be moved to unoccupied natural or artificially constructed burrows immediately following excavation. The artificial or unoccupied natural burrows must occur 150 to 300 feet from the original burrow. Moved desert tortoises will not be placed in existing occupied burrows. If an existing burrow that is similar in size, shape, and orientation to the original burrow is unavailable, the authorized biologists or qualified biological monitor would construct one. Desert tortoises moved during inactive periods will be monitored for at least 2 days after placement in the new burrows to ensure their safety.

Designated Areas

17. Prior to the start of construction, work areas (e.g., staging areas, access roads, sites for temporary placement of construction materials and spoils) will be delineated with orange construction fencing or staking and flagging to identify clearly the limits of work. The fencing or markers will be verified after installation, periodically checked by an authorized biologist or biological monitor, and maintained until work is complete.

18. Caltrans will confine all project activities to the smallest practical area, considering topography, placement of facilities, location of burrows, public health and safety, and other limiting factors. It will use previously disturbed habitat as much as possible for all storage areas and vehicle turn-around locations. Caltrans will restrict project vehicles to the right-of-way, designated areas, or existing roads and will prohibit off-road or cross-country travel except in emergencies. Caltrans will not create any new dirt or additional paved roads. If unforeseen circumstances require disturbance beyond the project right-of-way, Caltrans will notify the Service immediately.

Vehicle Use

19. The field contact representative or authorized biologist will inform workers at morning tailgate briefings if desert tortoises are likely to be active that day or in the foreseeable future. When desert tortoises are expected to be active, workers will inspect the ground around and underneath any vehicle or construction equipment that has been parked longer than 2 minutes within habitat of desert tortoises prior to moving the vehicle. If the worker observes a desert tortoise, he or she will contact an authorized biologist or biological monitor. If possible, the desert tortoise will be left to move out of harm's way on its own. If the desert tortoise does not move out of harm's way of its own volition, an authorized biologist or qualified biological monitor will move it out of harm's way in accordance with the handling procedures.

Prohibited Activities

20. Caltrans will ensure that workers do not bring firearms and pets into the project area. This measure does not apply to law enforcement personnel and working dogs.

Trash and Food

21. To reduce the attractiveness of the construction area to common ravens and coyote (*Canis latrans*), trash will be placed in a sealed container and emptied at the close of business each day. The project area will be kept as clean of debris as possible.

Caltrans has also committed to implementing the following measures to contribute to the long-term conservation of the desert tortoise:

1. Installation of permanent exclusionary desert tortoise fencing along the new alignment from post mile R143.5 to post mile 7.8. Exclusionary fencing already exists between post miles 7.8 and 12.9;

2. Removal and re-vegetation of approximately 1.2 miles of the existing State Route 58 to improve connectivity of desert tortoise habitat;

3. Installation of two oversized soft bottom culverts to facilitate north-south movement of desert tortoises under State Route 58. These culverts will be approximately 6 feet tall and 10 feet wide (Caltrans 2013); and

4. Acquisition of desert tortoise habitat to mitigate for the loss of habitat because of construction. Caltrans will acquire habitat at the ratios of one to one for the area west of Highway 395 and of five to one east of Highway 395 because this area is within critical habitat (Quinnell 2014).

At this time, Caltrans is still developing the specific details and locations within the right-of-way for the permanent desert tortoise fencing and culverts. Therefore, the mapped locations of the culverts in the biological assessment are preliminary and could change. Caltrans also has not yet identified the location of the lands it proposes to acquire.

ANALYTICAL FRAMEWORK FOR THE JEOPARDY AND ADVERSE MODIFICATION DETERMINATIONS

Jeopardy Determination

Section 7(a)(2) of the Endangered Species Act requires that Federal agencies ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of listed species. "Jeopardize the continued existence of" means "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 Code of Federal Regulations 402.02).

The jeopardy analysis in this biological opinion relies on four components: (1) the Status of the Species, which evaluates the range-wide condition of the desert tortoise, the factors responsible for that condition, and its survival and recovery needs; (2) the Environmental Baseline, which evaluates the condition of the desert tortoise in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the desert tortoise; (3) the Effects of the Action, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the desert tortoise; and (4) the Cumulative Effects, which evaluates the effects of future, non-Federal activities in the action area on the desert tortoise.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of the current status of the desert tortoise, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the desert tortoise in the wild.

Adverse Modification Determination

This biological opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 Code of Federal Regulations 402.02. Instead, we have relied on the statutory provisions of the Endangered Species Act to complete the following analysis with respect to critical habitat.

In accordance with policy and regulation, the adverse modification analysis in this biological opinion relies on four components: (1) the Status of Critical Habitat, which evaluates the range-wide condition of designated critical habitat for the desert tortoise in terms of primary constituent elements, the factors responsible for that condition, and the intended recovery function of the

critical habitat overall; (2) the Environmental Baseline, which evaluates the condition of the critical habitat in the action area, the factors responsible for that condition, and the recovery role of the critical habitat in the action area; (3) the Effects of the Action, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated and interdependent activities on the primary constituent elements and how that will influence the recovery role of the affected critical habitat units; and (4) Cumulative Effects, which evaluates the effects of future non-Federal activities in the action area on the primary constituent elements and how that will influence the recovery role of affected critical habitat units.

For purposes of the adverse modification determination, the effects of the proposed Federal action on the critical habitat of the desert tortoise are evaluated in the context of the range-wide condition of the critical habitat, taking into account any cumulative effects, to determine if the critical habitat range-wide would remain functional (or would retain the current ability for the primary constituent elements to be functionally established in areas of currently unsuitable but capable habitat) to serve its intended recovery role for the desert tortoise.

The analysis in this biological opinion places an emphasis on using the intended range-wide recovery function of critical habitat for the desert tortoise and the role of the action area relative to that intended function as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the adverse modification determination.

STATUS OF THE DESERT TORTOISE AND CRITICAL HABITAT

Status of the Desert Tortoise

Section 4(c)(2) of the Endangered Species Act requires the Service to conduct a status review of each listed species at least once every 5 years. The purpose of a 5-year review is to evaluate whether or not the species' status has changed since it was listed (or since the most recent 5-year review); these reviews, at the time of their completion, provide the most up-to-date information on the range-wide status of the species. For this reason, we are appending the 5-year review of the status of the desert tortoise (Appendix 1; Service 2010) to this biological opinion and are incorporating it by reference to provide most of the information needed for this section of the biological opinion. The following paragraphs provide a summary of the relevant information in the 5-year review.

In the 5-year review, the Service discusses the status of the desert tortoise as a single distinct population segment and provides information on the Federal Register notices that resulted in its listing and the designation of critical habitat. The Service also describes the desert tortoise's ecology, life history, spatial distribution, abundance, habitats, and the threats that led to its listing (i.e., the five-factor analysis required by section 4(a)(1) of the Endangered Species Act). In the 5-year review, the Service concluded by recommending that the status of the desert tortoise as a threatened species be maintained.

With regard to the status of the desert tortoise as a distinct population segment, the Service concluded in the 5-year review that the recovery units recognized in the original and revised recovery plans (Service 1994 and 2011, respectively) do not qualify as distinct population segments under the Service's distinct population segment policy (61 Federal Register 4722; February 7, 1996). We reached this conclusion because individuals of the listed taxon occupy habitat that is relatively continuously distributed, exhibit genetic differentiation that is consistent with isolation-by-distance in a continuous-distribution model of gene flow, and likely vary in behavioral and physiological characteristics across the area they occupy as a result of the transitional nature of, or environmental gradations between, the described subdivisions of the Mojave and Colorado deserts.

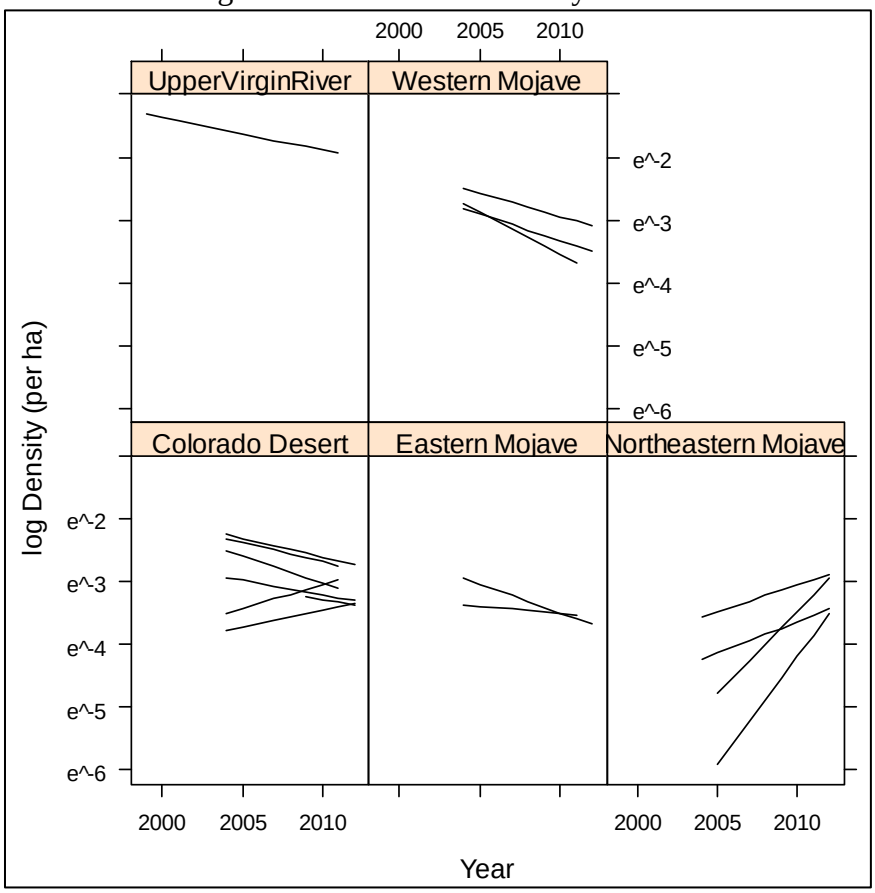
In the 5-year review, the Service summarizes information with regard to the desert tortoise's ecology and life history. Of key importance to assessing threats to the species and to developing and implementing a strategy for recovery is that desert tortoises are long lived, require up to 20 years to reach sexual maturity, and have low reproductive rates during a long period of reproductive potential. The number of eggs 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. Predation seems to play an important role in clutch failure. Predation and environmental factors also affect the survival of hatchlings.

In the 5-year review, the Service also discusses various means by which researchers have attempted to determine the abundance of desert tortoises and the strengths and weaknesses of those methods. Due to differences in area covered and especially to the non-representative nature of earlier sample sites, data gathered by the Service's current range-wide monitoring program cannot be reliably compared to information gathered through other means at this time.

The Service provides a summary table of the results of range-wide monitoring, initiated in 2001, in the 5-year review. This ongoing sampling effort is the first comprehensive attempt to determine the densities of desert tortoises across their range. Table 1 of the 5-year review provides a summary of data collected from 2001 through 2007; we summarize data from the 2008 through 2012 sampling efforts in subsequent reports (Service 2012a, 2012b, 2012c, 2012d).

The Desert Tortoise Recovery Office (Service 2014) used these annual density estimates to evaluate range-wide trends in the density of desert tortoises over time. This analysis indicates that densities in the Northeastern Mojave Recovery Unit have increased by approximately 13.6 percent per year since 2004, with the rate of increase apparently resulting from increased survival of adults and subadults moving into the adult size class. The analysis also indicates that the populations in the other 4 recovery units are declining: Upper Virgin River (-5.1 percent), Eastern Mojave (-6.0 percent), Western Mojave (-8.6 percent), and Colorado Desert (-3.4 percent; however, densities the Joshua Tree and Piute Valley conservation areas within this unit seem to be increasing). Table 1 shows linear trends in the log-transformed densities in each desert tortoise conservation area by recovery unit. Data for the Upper Virgin River Recovery Unit are from 1999 to the present; data for all other recovery units are from 2004 to the present.

Table 1. Range-wide trends in the density of desert tortoises.



Allison (2014) also evaluated changes in size distribution of desert tortoises since 2001. In the Western Mojave and Colorado Desert recovery units, the relative number of juveniles to adults indicates that juvenile numbers are declining faster than adults. In the Eastern Mojave, the number of juvenile desert tortoises is also declining, but not as rapidly as the number of adults. In the Upper Virgin River Recovery Unit, trends in juvenile numbers are similar to those of adults; in the Northeastern Mojave Recovery Unit, the number of juveniles is increasing, but not as rapidly as are adult numbers in that recovery unit. Juvenile numbers, like adult densities, are responding in a directional way, with increasing, stable, or decreasing trends, depending on the recovery unit where they area found.

In the 5-year review, the Service provides a brief summary of habitat use by desert tortoises; the revised recovery plan contains more detailed information (Service 2011). In the absence of specific and recent information on the location of habitable areas of the Mojave Desert, especially at the outer edges of this area, the 5-year review also describes and relies heavily on a quantitative, spatial habitat model for the desert tortoise north and west of the Colorado River that incorporates environmental variables such as precipitation, geology, vegetation, and slope and is based on occurrence data of desert tortoises from sources spanning more than 80 years, including data from the 2001 to 2005 range-wide monitoring surveys (Nussear et al. 2009). The

model predicts the probability that desert tortoises will be present in any given location; calculations of the amount of desert tortoise habitat in the 5-year review and in this biological opinion use a threshold of 0.5 or greater predicted value for potential desert tortoise habitat. The model does not account for anthropogenic effects to habitat and represents the potential for occupancy by desert tortoises absent these effects.

To begin integrating anthropogenic activities and the variable risk levels they bring to different parts of the Mojave and Colorado deserts, the Service completed an extensive review of the threats known to affect desert tortoises at the time of their listing and updated that information with more current findings in the 5-year review. The review follows the format of the five-factor analysis required by section 4(a)(1) of the Endangered Species Act. The Service described these threats as part of the process of its listing (55 Federal Register 12178; April 2, 1990), further discussed them in the original recovery plan (Service 1994), and reviewed them again in the revised recovery plan (Service 2011).

To understand better the relationship of threats to populations of desert tortoises and the most effective manner to implement recovery actions, the Desert Tortoise Recovery Office is developing a spatial decision support system that models the interrelationships of threats to desert tortoises and how those threats affect population change. The spatial decision support system describes the numerous threats that desert tortoises face, explains how these threats interact to affect individual animals and habitat, and how these effects in turn bring about changes in populations. For example, we have long known that the construction of a transmission line can result in the death of desert tortoises and loss of habitat. We have also known that common ravens, known predators of desert tortoises, use the transmission line's pylons for nesting, roosting, and perching and that the access routes associated with transmission lines provide a vector for the introduction and spread of invasive weeds and facilitate increased human access into an area. Increased human access can accelerate illegal collection and release of desert tortoises and their deliberate maiming and killing, as well as facilitate the spread of other threats associated with human presence, such as vehicle use, garbage and dumping, and invasive plants (Service 2011). Changes in the abundance of native plants because of invasive weeds can compromise the physiological health of desert tortoises, making them more vulnerable to drought, disease, and predation. The spatial decision support system allows us to map threats across the range of the desert tortoise and model the intensity of stresses that these multiple and combined threats place on desert tortoise populations.

The threats described in the listing rule and both recovery plans continue to affect the species. Indirect impacts to desert tortoise populations and habitat occur in accessible areas that interface with human activity. Most threats to the desert tortoise or its habitat are associated with human land uses; research since 1994 has clarified many mechanisms by which these threats act on desert tortoises. As stated earlier, increases in human access can accelerate illegal collection and release of desert tortoises and deliberate maiming and killing, as well as facilitate the spread of other threats associated with human presence, such as vehicle use, garbage and dumping, and invasive weeds.

Some of 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 activity, and habitat invasion by non-native invasive plant species. However, we remain unable to quantify how threats affect desert tortoise populations. The assessment of the original recovery plan emphasized the need for a better understanding of the implications of multiple, simultaneous threats facing desert tortoise populations and of the relative contribution of multiple threats on demographic factors (i.e., birth rate, survivorship, fecundity, and death rate; Tracy et al. 2004).

The following map depicts the 12 critical habitat units of the desert tortoise, linkages between conservation areas for the desert tortoise, and the aggregate stress that multiple, synergistic threats place on desert tortoise populations (Figure 2). Conservation areas include designated critical habitat, lands managed by the National Park Service, and other lands managed for the long-term conservation of the desert tortoise (e.g., the Desert Tortoise Natural Area in Kern County, California). The revised recovery plan (Service 2011) recommended the linkages based on an analysis of least-cost pathways (i.e., areas with the highest potential to support desert tortoises) between conservation areas for the desert tortoise. This map illustrates that, across the range, desert tortoises in areas under the highest level of conservation management remain subject to numerous threats, stresses, and mortality sources.

Since the completion of the 5-year review, the Service has issued several biological opinions that affect large areas of desert tortoise habitat because of numerous proposals to develop renewable energy within its range. These biological opinions concluded that proposed solar plants were not likely to jeopardize the continued existence of the desert tortoise primarily because they were located outside of critical habitat and desert wildlife management areas that contain most of the land base required for the recovery of the species. The proposed actions also included numerous measures intended to protect desert tortoise during the construction of the projects, such as translocation of affected individuals. In aggregate, these projects would result in an overall loss of approximately 37,503 acres of habitat of the desert tortoise. We also predicted that these projects would translocate or kill up to 1,732 desert tortoises; we concluded that most of the individuals in these totals would be juveniles. To date, 372 desert tortoises have been observed during construction of projects; most of these individuals were translocated from work areas, although some desert tortoises have been killed (see Appendix 2). The mitigation required by BLM and California Energy Commission, the agencies permitting these facilities, will result in the acquisition of private land and funding for the implementation of various actions that are intended to promote the recovery of the desert tortoise. Although most of these mitigation measures are consistent with recommendations in the recovery plans for the desert tortoise and the Service continues to support their implementation, we cannot assess how desert tortoise populations will respond because of the long generation time of the species.

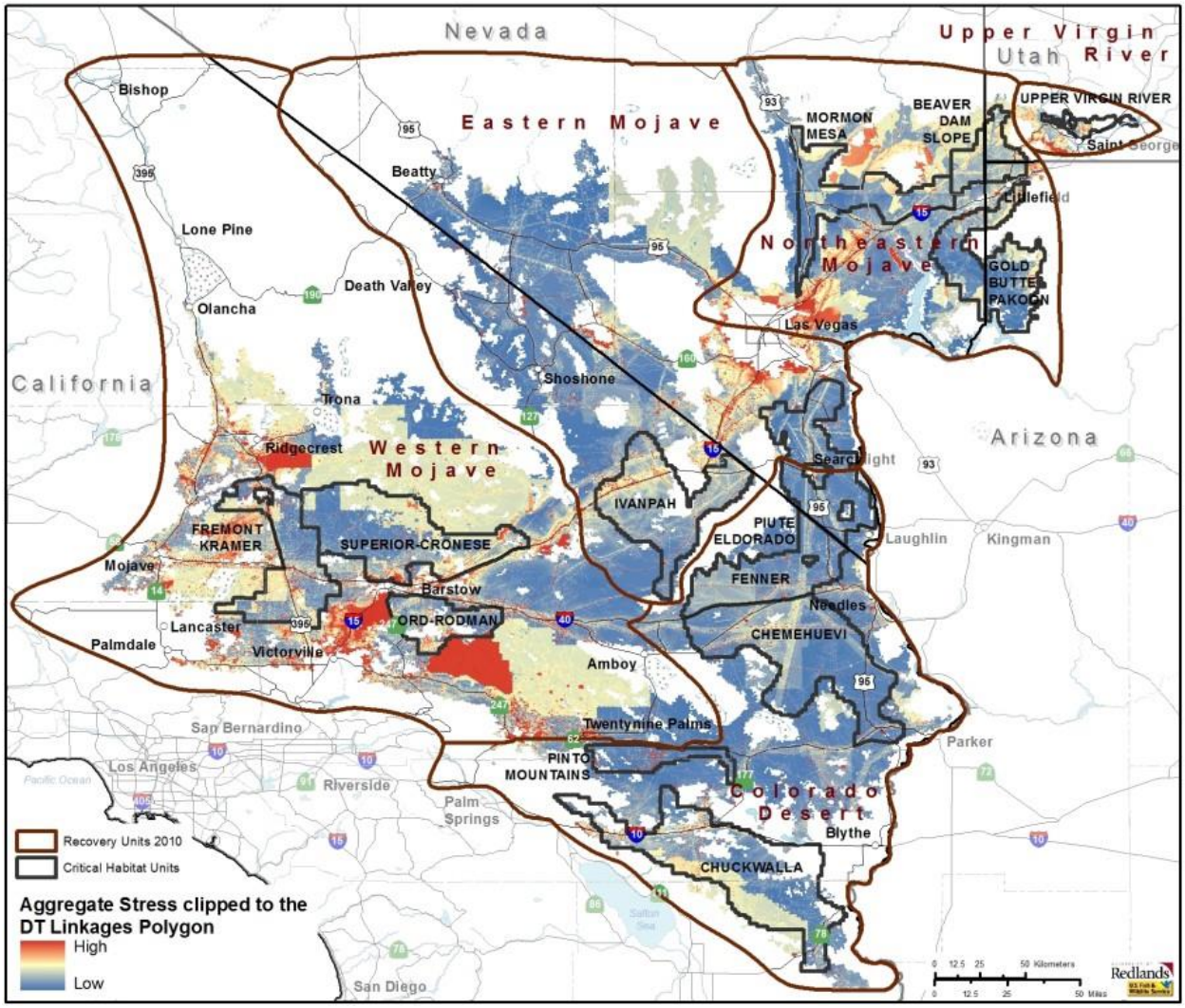


Figure 2. Critical habitat units of the desert tortoise, linkages between conservation areas for the desert tortoise, and the aggregate stress that multiple, synergistic threats place on desert tortoise populations.

In addition to the biological opinions issued for solar development within the range of the desert tortoise, the Service (2012e) also issued a biological opinion to the Department of the Army for the use of additional training lands at Fort Irwin. As part of this proposed action, the Department of the Army removed approximately 650 desert tortoises from 18,197 acres of the southern area of Fort Irwin, which had been off-limits to training. The Department of the Army would also use an additional 48,629 acres that lie east of the former boundaries of Fort Irwin; much of this parcel is either too mountainous or too rocky and low in elevation to support numerous desert tortoises.

The Service also issued a biological opinion to the Marine Corps that considered the effects of the expansion of the Marine Corps Air Ground Combat Center at Twentynine Palms (Service 2012f). We concluded that the Marine Corps' proposed action, the use of

approximately 167,971 acres for training, was not likely to jeopardize the continued existence of the desert tortoise. Most of the expansion area lies within the Johnson Valley Off-highway Vehicle Management Area.

The incremental effect of the larger actions (i.e., solar development, the expansions of Fort Irwin, and the Marine Corps Air Ground Combat Center) on the desert tortoise is unlikely to be positive, despite the numerous conservation measures that have been (or will be) implemented as part of the actions. The acquisition of private lands as mitigation for most of these actions increases the level of protection afforded these lands; however, these acquisitions do not create new habitat and Federal, State, and privately managed lands remain subject to most of the threats and stresses we discussed previously in this section. Although land managers have been implementing measures to manage these threats, we have been unable, to date, to determine whether the measures have been successful, at least in part because of the low reproductive capacity of the desert tortoise. Therefore, the conversion of habitat into areas that are unsuitable for this species continues the trend of constricting the desert tortoise into a smaller portion of its range.

As the Service notes in the 5-year review (Service 2010), "(t)he threats identified in the original listing rule continue to affect the (desert tortoise) today, with invasive species, wildfire, and renewable energy development coming to the forefront as important factors in habitat loss and conversion. The vast majority of threats to the desert tortoise or its habitat are associated with human land uses." Oftedal's work (2002 in Service 2010) suggests that invasive weeds may adversely affect the physiological health of desert tortoises. Current information indicates that invasive species likely affect a large portion of the desert tortoise's range (Figure 3). Furthermore, high densities of weedy species increase the likelihood of wildfires; wildfires, in turn, destroy native species and further the spread of invasive weeds.

Global climate change is likely to affect the prospects for the long-term conservation of the desert tortoise. For example, predictions for climate change within the range of the desert tortoise suggest more frequent and/or prolonged droughts with an increase of the annual mean temperature by 3.5 to 4.0 degrees Celsius. The greatest increases will likely occur in summer (June-July-August mean increase of as much as 5 degrees Celsius [Christensen et al. 2007 in Service 2010]). Precipitation will likely decrease by 5 to 15 percent annually in the region with winter precipitation decreasing by up to 20 percent and summer precipitation increasing by up to 5 percent. Because germination of the desert tortoise's food plants is highly dependent on cool-season rains, the forage base could be reduced due to increasing temperatures and decreasing precipitation in winter. Although drought occurs routinely in the Mojave Desert, extended periods of drought have the potential to affect desert tortoises and their habitats through physiological effects to individuals (i.e., stress) and limited forage availability. To place the consequences of long-term drought in perspective, Longshore et al. (2003) demonstrated that even short-term drought could result in elevated levels of mortality of desert tortoises.

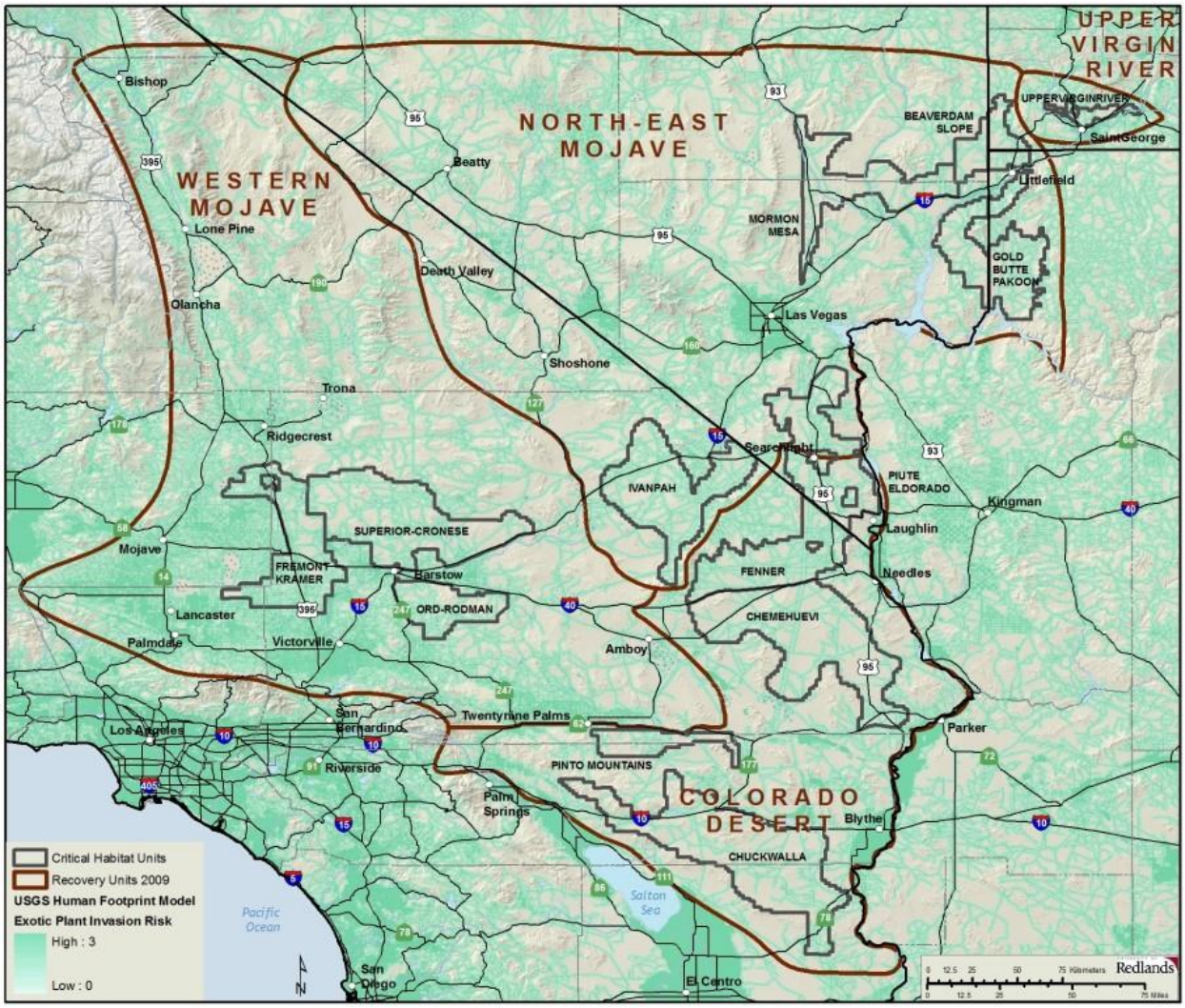


Figure 3. Invasion risk of non-native invasive plant species within the range of the desert tortoise.

Therefore, long-term drought is likely to have even greater effects, particularly given that the current fragmented nature of desert tortoise habitat (e.g., urban and agricultural development, highways, freeways, military training areas, etc.) will make recolonization of extirpated areas difficult, if not impossible.

The Service notes in the 5-year review that the combination of the desert tortoise's late breeding age and a low reproductive rate challenges our ability to achieve recovery. When determining whether a proposed action is likely to jeopardize the continued existence of a species, we are required to consider whether the action would "reasonably be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 Code of Federal Regulations 402.02). Although the Service does not explicitly address these metrics in the

5-year review, we have used the information in that document to summarize the status of the desert tortoise with respect to its reproduction, numbers, and distribution.

In the 5-year review, the Service notes that desert tortoises increase their reproduction in high rainfall years; more rain provides desert tortoises with more high quality food (i.e., plants that are higher in water and protein), which, in turn, allows them to lay more eggs. Conversely, the physiological stress associated with foraging on food plants with insufficient water and nitrogen may leave desert tortoises vulnerable to disease (Oftedal 2002 in Service 2010), and the reproductive rate of diseased desert tortoises is likely lower than that of healthy animals. Young desert tortoises also rely upon high-quality, low-fiber plants (e.g., native forbs) with nutrient levels not found in the invasive weeds that have increased in abundance across its range (Oftedal et al. 2002; Tracy et al. 2004). Compromised nutrition of young desert tortoises likely represents an effective reduction in reproduction by reducing the number that reaches adulthood. Consequently, although we do not have quantitative data that show a direct relationship, the abundance of weedy species within the range of the desert tortoise has the potential to affect the reproduction of desert tortoises and recruitment into the adult population in a negative manner.

Data from long-term study plots, which were first established in 1976, cannot be extrapolated to provide an estimate of the number of desert tortoises on a range-wide basis; historical densities in some parts of the desert exceeded 100 adults in a square mile (Desert Tortoise Recovery Office 2014). Using data from the long-term study plots, the Service (2010) concluded that "appreciable declines at the local level in many areas, which coupled with other survey results, suggest that declines may have occurred more broadly." Other sources indicate that local declines are continuing to occur. For example, surveyors found "lots of dead [desert tortoises]" in the western expansion area of Fort Irwin (Western Mojave Recovery Unit) in 2008 (Fort Irwin Research Coordination Meeting 2008). After the onset of translocation, coyotes killed 105 desert tortoises in Fort Irwin's southern translocation area (Western Mojave Recovery Unit); other canids may have been responsible for some of these deaths. Other incidences of predation were recorded throughout the range of the desert tortoise during this time (Esque et al. 2010). Esque et al. (2010) hypothesized that this high rate of predation on desert tortoises was influenced by low population levels of typical prey for coyotes due to drought conditions in previous years. Recent surveys in the Ivanpah Valley (Eastern Mojave Recovery Unit) for a proposed solar facility detected 31 live desert tortoises and the carcasses of 25 individuals that had been dead less than 4 years (Ironwood 2011); this ratio of carcasses to live individuals over such a short period of time may indicate an abnormally high rate of mortality for a long-lived animal. In summary, the number of desert tortoises range-wide likely decreased substantially from 1976 through 1990 (i.e., when long-term study plots were initiated through the time the desert tortoise was listed as threatened), although we cannot quantify the amount of this decrease. The Desert Tortoise Recovery Office (2014) used the acreages of remaining habitat (see Table 3) and the densities of the recovery units to develop the information in Table 2. We acknowledge that these numbers are not precise but consider this a reasonable way to describe overall changes in the population. For example, we base the density estimate of each recovery unit on surveys conducted with desert tortoise conservation areas and then extend this density to the entire recovery unit although we presume densities are highest within the conservation areas.

Table 2. Estimated number of desert tortoises greater than 1,800 millimeters in length in each recovery unit.

Recovery Units	2004	2012	Change
Western Mojave	152,967	76,644	-76,323
Colorado Desert	111,749	85,306	-26,443
Northeastern Mojave	13,709	40,838	+27,129
Eastern Mojave	68,138	42,055	-26,083
Upper Virgin River	12,678	8,399	-4,280
Total	359,242	253,242	-106,000

The distribution of the desert tortoise has not changed substantially since the publication of the original recovery plan in 1994 (Service 2010e) in terms of the overall extent of its range. 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-road vehicle use (e.g., portions of off-road management areas managed by BLM and unauthorized use in areas such as east of California City, California). Since 1994, urban development around Las Vegas has likely been the largest contributor to habitat loss throughout the range. Desert tortoises have been essentially removed from the 18,197-acre southern expansion area at Fort Irwin (Service 2012e).

Table 3. Acreages of habitat (as modeled by Nussear et al. 2009, using only areas with a probability of occupancy by desert tortoises greater than 0.5 as potential habitat) within various regions of the desert tortoise's range and of impervious surfaces as of 2006 (Fry et al. 2011). Impervious surfaces include paved and developed areas and other disturbed areas that have zero probability of supporting desert tortoises.

Recovery Units	Modeled Habitat (acres)	Impervious Surfaces within Modeled Habitat	Percent of Modeled Habitat that is now Impervious
Western Mojave	7,582,092	1,864,214	25
Colorado Desert	4,948,900	494,981	10
Northeastern Mojave	3,013,677	378,497	13
Eastern Mojave	4,763,257	794,546	17
Upper Virgin River	232,320	80,853	35
Total	20,540,246	3,613,052	18

In conclusion, we have used the 5-year review (Service 2010), revised recovery plan (Service 2011), and additional information that has become available since these publications to review the reproduction, numbers, and distribution of the desert tortoise. The reproductive capacity of the desert tortoise may be compromised to some degree by the abundance and distribution of

invasive weeds across its range; the continued increase in human access across the desert likely continues to facilitate the spread of weeds and further affect the reproductive capacity of the species. Prior to its listing, the number of desert tortoises likely declined range-wide, although we cannot quantify the extent of the decline; since the time of listing, data suggest that declines continue to occur throughout most of the range, although recent information suggests that densities may have increased slightly in the Northeastern Mojave Recovery Unit. The continued increase in human access across the desert continues to expose more desert tortoises to the potential of being killed by human activities. The distributional limits of the desert tortoise's range have not changed substantially since the issuance of the original recovery plan in 1994; however, desert tortoises have been extirpated from large areas within their range (e.g., Las Vegas, other desert cities). The species' low reproductive rate, the extended time required for young animals to reach breeding age, and the multitude of threats that continue to confront desert tortoises combine to render its recovery a substantial challenge.

Status of Critical Habitat of the Desert Tortoise

The Service designated critical habitat for the desert tortoise in portions of California, Nevada, Arizona, and Utah in a final rule published February 8, 1994 (59 Federal Register 5820). The Service designates critical habitat to identify the key biological and physical needs of the species and key areas for recovery and to focus conservation actions on those areas. Critical habitat is composed of specific geographic areas that contain the biological and physical features essential to the species' conservation and that may require special management considerations or protection. These features, which include space, food, water, nutrition, cover, shelter, reproductive sites, and special habitats, are called the primary constituent elements of critical habitat. The specific primary constituent elements of desert tortoise critical habitat are: sufficient space to support viable populations within each of the six 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.

Critical habitat of the desert tortoise would not be able to fulfill its conservation role without each of the primary constituent elements being functional. As examples, having a sufficient amount of forage species is not sufficient if human-caused mortality is excessive; an area with sufficient space to support viable populations within each of the six recovery units and to provide for movement, dispersal, and gene flow would not support desert tortoises without adequate forage species.

The final rule for designation of critical habitat did not explicitly ascribe specific conservation roles or functions to the various critical habitat units. Rather, it refers to the strategy of establishing recovery units and desert wildlife management areas recommended by the recovery plan for the desert tortoise, which had been published as a draft at the time of the designation of critical habitat, to capture the "biotic and abiotic variability found in desert tortoise habitat"

(59 Federal Register 5820, see page 5823). Specifically, we designated the critical habitat units to follow the direction provided by the draft recovery plan (Service 1993) for the establishment of desert wildlife management areas. The critical habitat units in aggregate are intended to protect the variability that occurs across the large range of the desert tortoise; the loss of any specific unit would compromise the ability of critical habitat as a whole to serve its intended function and conservation role.

Despite the fact that desert tortoises do not necessarily need to move between critical habitat units to complete their life histories, both the original and revised recovery plans highlight the importance of these critical habitat units and connectivity between them for the recovery of the species. Specifically, the revised recovery plan states that "aggressive management as generally recommended in the 1994 Recovery Plan needs to be applied within existing (desert) tortoise conservation areas (defined as critical habitat, among other areas being managed for the conservation of desert tortoises) or other important areas … to ensure that populations remain distributed throughout the species' range …. (Desert tortoise) conservation areas capture the diversity of the Mojave population of the desert tortoise within each recovery unit, conserving the genetic breadth of the species, providing a margin of safety for the species to withstand catastrophic events, and providing potential opportunities for continued evolution and adaptive change …. Especially given uncertainties related to the effects of climate change on desert tortoise populations and distribution, we consider (desert) tortoise conservation areas to be the minimum baseline within which to focus our recovery efforts (pages 34 and 35, Service 2011)."

The 12 critical habitat units range in area from 85 to 1,595 square miles. However, the optimal reserve size recommended to preserve viable desert tortoise populations was 1,000 square miles (Service 1994); only 4 critical habitat units meet this threshold. Consequently, for some smaller critical habitat units, their future effectiveness in conserving the desert tortoise is largely dependent on the status of populations immediately adjacent to their boundaries or within intervening linkages that connect these smaller critical habitat units to other protected areas. Although the Service (1994) recommended the identification of buffer zones and linkages for smaller desert tortoise conservation areas, land management agencies have generally not established such areas.

Population viability analyses indicate that reserves should contain from 10,000 to 20,000 adult desert tortoises to maximize estimated time to extinction (i.e., approximately 390 years, depending on rates of population change; Service 1994). However, during the three most recent years of monitoring within the critical habitat units, only three (in 2009 and 2010) to five (in 2008) of the critical habitat units met this target (McLuckie et al. 2010; Service 2012a, 2012b). Some critical habitat units share boundaries and form contiguous blocks (e.g., Superior-Cronese and Fremont-Kramer Critical Habitat Units), and those blocks in California include combined estimated abundances of over 10,000 adult desert tortoises. These blocks are adjacent to smaller, more isolated units (e.g., Ord-Rodman Critical Habitat Unit) that are not currently connected to other protected habitat by preserved habitat linkages.

We did not designate the Desert Tortoise Natural Area and Joshua Tree National Park in California and the Desert National Wildlife Refuge in Nevada as critical habitat because they are "primarily managed as natural ecosystems" (59 Federal Register 5820, see page 5825) and provide adequate protection to desert tortoises. Since the designation of critical habitat, Congress increased the size of Joshua Tree National Park and created the Mojave National Preserve. A portion of the expanded boundary of Joshua Tree National Park lies within critical habitat of the desert tortoise; portions of other critical habitat units lie within the boundaries of the Mojave National Preserve.

Within each critical habitat unit, both natural and anthropogenic factors affect the function of the primary constituent elements of critical habitat. As an example of a natural factor, in some specific areas within the boundaries of critical habitat, such as within and adjacent to dry lakes, some of the primary constituent elements are naturally absent because the substrate is extremely silty; desert tortoises do not normally reside in such areas. Comparing the acreage of desert tortoise habitat as depicted by Nussear et al.'s (2009) model to the gross acreage of the critical habitat units demonstrates quantitatively that the entire area within the boundaries of critical habitat likely does not support the primary constituent elements. The acreage for modeled habitat is for the area in which the probability that desert tortoises are present is greater than 0.5. The acreages of modeled habitat are from Service (2012b); they do not include loss of habitat due to human-caused impacts. The difference between gross acreage and modeled habitat is 653,214 acres; that is, approximately 10 percent of the gross acreage of the designated critical habitat is not considered modeled habitat.

Table 4. Comparison of the gross acreages of critical habitat units of the desert tortoise with the acreages of modeled habitat.

Critical Habitat Unit	**Gross Acreage**	**Modeled Habitat**
Superior-Cronese	766,900	724,967
Fremont-Kramer	518,000	501,095
Ord-Rodman	253,200	184,155
Pinto Mountain	171,700	144,056
Piute-Eldorado	970,600	930,008
Ivanpah Valley	632,400	510,711
Chuckwalla	1,020,600	809,319
Chemehuevi	937,400	914,505
Gold Butte-Pakoon	488,300	418,189
Mormon Mesa	427,900	407,041
Beaver Dam Slope	204,600	202,499
Upper Virgin River	54,600	46,441
Totals	6,446,200	5,792,986

Condition of the Primary Constituent Elements of Critical Habitat

Human activities can have obvious or more subtle effects on the primary constituent elements. The grading of an area and subsequent construction of a building removes the primary

constituent elements of critical habitat; this action has an obvious effect on critical habitat. The revised recovery plan identifies human activities such as urbanization and the proliferation of roads and highways as threats to the desert tortoise and its habitat; these threats are examples of activities that have a clear effect on the primary constituent elements of critical habitat.

We have included the following paragraphs from the revised recovery plan for the desert tortoise (Service 2011) to demonstrate that other anthropogenic factors affect the primary constituent elements of critical habitat in more subtle ways. All references are in the revised recovery plan (i.e., in Service 2011); we have omitted some information from the revised recovery plan where the level of detail was unnecessary for the current discussion.

> Surface disturbance from [off-highway 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). 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 desert annuals, an important food source for [desert] tortoises.
>
> [Off-highway vehicle] activity can also disturb fragile cyanobacterial-lichen soil crusts, a dominant source of nitrogen in desert ecosystems (Belnap 1996). Belnap (1996) showed that anthropogenic surface disturbances may have serious implications for nitrogen budgets in cold desert ecosystems, and this may also hold true for the hot deserts that [desert] tortoises occupy. Soil crusts also appear to be an important source of water for plants, as crusts were shown to have 53 percent greater volumetric water content than bare soils during the late fall when winter annuals are becoming established (DeFalco et al. 2001). DeFalco et al. (2001) found that non-native plant species comprised greater shoot biomass on crusted soils than native species, which demonstrates their ability to exploit available nutrient and water resources. Once the soil crusts are disturbed, non-native plants may colonize, become established, and out-compete native perennial and annual plant species (DeFalco et al. 2001, D'Antonio and Vitousek 1992). 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. Many species of non-native plants from Europe and Asia have become common to abundant in some areas, particularly where disturbance has occurred and is ongoing. As non-native plant species become established, native perennial and annual plant species may decrease, diminish, or die out (D'Antonio and Vitousek 1992). Land managers and field scientists identified

> 116 species of non-native plants in the Mojave and Colorado deserts (Brooks and Esque 2002).
>
> Increased levels of atmospheric pollution and nitrogen deposition related to increased human presence and combustion of fossil fuels can cause increased levels of soil nitrogen, which in turn may result in significant changes in plant communities (Aber et al. 1989). Many of the non-native annual plant taxa in the Mojave region evolved in more fertile Mediterranean regions and benefit from increased levels of soil nitrogen, which gives them a competitive edge over native annuals. Studies at three sites within the central, southern, and western Mojave Desert indicated that increased levels of soil nitrogen can increase the dominance of non-native annual plants and promote the invasion of new species in desert regions. Furthermore, increased dominance by non-native annuals may decrease the diversity of native annual plants, and increased biomass of non-native annual grasses may increase fire frequency (Brooks 2003).

This summary from the revised recovery plan (Service 2011) demonstrates how the effects of human activities on habitat of the desert tortoise are interconnected. In general, surface disturbance causes increased rates of erosion and generation of dust. Increased erosion alters additional habitat outside of the area directly affected by altering the nature of the substrate, removing shrubs, and possibly destroying burrows and other shelter sites. Increased dust affects photosynthesis in the plants that provide cover and forage to desert tortoises. Disturbed substrates and increased atmospheric nitrogen enhance the likelihood that invasive species will become established and outcompete native species; the proliferation of weedy species increases the risk of large-scale fires, which further move habitat conditions away from those that are favorable to desert tortoises.

The following paragraphs generally describe how the threats described in the revised recovery plan affect the primary constituent elements of critical habitat of the desert tortoise.

Sufficient space to support viable populations within each of the six recovery units and to provide for movement, dispersal, and gene flow.

In considering the following discussion, bear in mind the information provided previously in this biological opinion regarding the recommended and actual sizes of critical habitat units for the desert tortoise. The original recovery team based the recommended size of desert wildlife management areas on the amount of space required to maintain viable populations. (The recovery plan [Service 1994] defined conservation areas for the desert tortoise as ‘desert wildlife management areas;’ we based the boundaries of critical habitat on the recovery team’s general recommendation for the desert wildlife management areas.) The current low densities of desert tortoises within critical habitat units exacerbate the difficulties of effecting recovery within these areas.

Urban and agricultural development, concentrated use by off-road vehicles, and other activities of this nature completely remove habitat. Although we are aware of local areas within the

boundaries of critical habitat that have been heavily disturbed, we do not know of any areas that have been disturbed to the intensity and extent that this primary constituent element has been compromised. To date, the largest single loss of critical habitat is the use of 18,197 acres of additional training land in the southern portion of Fort Irwin. In our biological opinion for that proposed action (Service 2012e), we stated:

> The proposed action would essentially eliminate the primary constituent elements from approximately 2.40 percent of the Superior-Cronese Critical Habitat Unit; additionally, the conservation role of the remainder of this critical habitat unit and the other critical habitat units has been compromised by substantial human impact on the second and sixth primary constituent elements. However, the protective measures that the Army implemented as part of the proposed action offset, at least to some extent, the adverse effects of the use of the additional training lands in the southern expansion area. Consequently, we have concluded that, although the second and sixth primary constituent elements are not functioning appropriately throughout most of designated critical habitat of the desert tortoise and the proposed action would result in substantial disturbance to 18,197 acres of the Superior-Cronese Critical Habitat Unit, the change in the condition of critical habitat brought about by the Army's proposed action (i.e., use of the southern expansion area for training and implementation of the conservation actions) is not likely to cause an overall decrease in the conservation value and function of the Superior-Cronese Critical Habitat Unit.

The widening of existing freeways likely caused the second largest loss of critical habitat. Despite these losses of critical habitat, which occur in a linear manner, the critical habitat units continue to support sufficient space to support viable populations within each of the six recovery units.

In some cases, major roads likely disrupt the movement, dispersal, and gene flow of desert tortoises. State Route 58 and Highway 395 in the Fremont-Kramer Critical Habitat Unit and Fort Irwin Road in the Superior-Cronese Critical Habitat Unit are examples of large and heavily travelled roads that likely disrupt movement, dispersal, and gene flow. Roads that have been fenced and provided with underpasses may alleviate this fragmentation to some degree; however, such facilities have not been in place for sufficient time to determine whether they will eliminate fragmentation.

The threats of invasive plant species described in the revised recovery plan generally do not result in the removal of this primary constituent element because they do not convert habitat into impervious surfaces, as would urban development.

<u>Sufficient quality and quantity of forage species and the proper soil conditions to provide for the growth of these species</u>.

This primary constituent element addresses the ability of critical habitat to provide adequate nutrition to desert tortoises. As described in the revised recovery plan and 5-year review,

grazing, historical fire, invasive plants, altered hydrology, drought, wildfire potential, fugitive dust, and climate change/temperature extremes contribute to the stress of "nutritional compromise." Paved and unpaved roads through critical habitat of the desert tortoise provide avenues by which invasive native species disperse; these legal routes also provide the means by which unauthorized use occurs over large areas of critical habitat. Nitrogen deposition from atmospheric pollution likely occurs throughout all the critical habitat units and exacerbates the effects of the disturbance of substrates. Because paved and unpaved roads are so widespread through critical habitat, this threat has compromised the conservation value and function of critical habitat throughout the range of the desert tortoise, to some degree. See the Status of the Desert Tortoise section of this biological opinion for a map that depicts the routes by which invasive weeds have access to critical habitat; the routes shown on the map are a subset of the actual number of routes that actually cross critical habitat of the desert tortoise.

Suitable substrates for burrowing, nesting, and overwintering.

Surface disturbance, motor vehicles traveling off route, use of off-highway vehicles management areas, off-highway vehicles events, unpaved roads, grazing, historical fire, wildfire potential, altered hydrology, and climate change leading to shifts in habitat composition and location, storms, and flooding can alter substrates to the extent that they are no longer suitable for burrowing, nesting, and overwintering. Erosion caused by these activities can alter washes to the extent that desert tortoise burrows placed along the edge of a wash, which is a preferred location for burrows, could be destroyed. We expect that the area within critical habitat that is affected by off-road vehicle use to the extent that substrates are no longer suitable is relatively small in relation to the area that desert tortoises have available for burrowing, nesting, and overwintering; consequently, off-road vehicle use has not had a substantial effect on this primary constituent element.

Most livestock allotments have been eliminated from within the boundaries of critical habitat. Of those that remain, livestock would compact substrates to the extent that they would become unsuitable for burrowing, nesting, and overwintering only in areas of concentrated use, such as around watering areas and corrals. Because livestock grazing occurs over a relatively small portion of critical habitat and the substrates in most areas within livestock allotments would not be substantially affected, suitable substrates for burrowing, nesting, and overwintering remain throughout most of the critical habitat units.

Burrows, caliche caves, and other shelter sites.

Human-caused effects to burrows, caliche caves, and other shelter sites likely occur at a similar rate as effects to substrates for burrowing, nesting, and overwintering for the same general reasons. Consequently, sufficient burrows, caliche caves, and other shelter sites remain throughout most of the critical habitat units.

Sufficient vegetation for shelter from temperature extremes and predators.

In general, sufficient vegetation for shelter from temperature extremes and predators remains throughout critical habitat. In areas where large fires have occurred in critical habitat, many of the shrubs that provide shelter from temperature extremes and predators have been destroyed; in such areas, cover sites may be a limiting factor. The proliferation of invasive plants poses a threat to shrub cover throughout critical habitat as the potential for larger and more frequent wildfires increases.

In 2005, wildfires in Nevada, Utah, and Arizona burned extensive areas of critical habitat (Service 2010). Although different agencies report slightly different acreages, the following table provides an indication of the scale of the fires.

Table 5. Acreages of critical habitat burned in the 2005 wildfires.

Critical Habitat Unit	Total Area Burned (acres)	Percent of the Critical Habitat Unit Burned
Beaver Dam Slope	53,528	26
Gold-Butte Pakoon	65,339	13
Mormon Mesa	12,952	3
Upper Virgin River	10,557	19

The revised recovery plan notes that the fires caused statistically significant losses of perennial plant cover, although patches of unburned shrubs remained. Given the patchiness with which the primary constituent elements of critical habitat are distributed across the critical habitat units and the varying intensity of the wildfires, we cannot quantify precisely the extent to which these fires disrupted the function and value of the critical habitat.

Habitat protected from disturbance and human-caused mortality.

In general, the Federal agencies that manage lands within the boundaries of critical habitat have adopted land management plans that include implementation of some or all of the recommendations contained in the original recovery plan for the desert tortoise. (See pages 70 to 72 of Service 2010.) To at least some degree, the adoption of these plans has resulted in the implementation of management actions that are likely to reduce the disturbance and human-caused mortality of desert tortoises. For example, these plans resulted in the designation of open routes of travel and the closure (and, in some cases, physical closure) of unauthorized routes. Numerous livestock allotments have been relinquished by the permittees and cattle no longer graze these allotments. Because of these planning efforts, BLM's record of decision included direction to withdraw some areas of critical habitat from mineral entry. Because of actions on the part of various agencies, many miles of highways and other paved roads have been fenced to prevent desert tortoises from wandering into traffic and being killed. The Service and other agencies of the Desert Managers Group in California are implementing a plan to remove common ravens that prey on desert tortoises and to undertake other actions that would reduce

subsidies (i.e., food, water, sites for nesting, roosting, and perching, etc.) that facilitate their abundance in the California Desert (Service 2008).

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. For example, many highways and other paved roads in California remain unfenced. Twelve desert tortoises were reported to be killed on paved roads from within Mojave National Preserve in 2011, and we fully expect that desert tortoises are being killed at similar rates on many other roads, although these occurrences are not discovered and reported as diligently as by the National Park Service. Employees of the Southern California Gas Company reported two desert tortoises in 2011 that were crushed by vehicles on unpaved roads.

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.

Although BLM has approved, through its land use planning processes, the withdrawal of areas of critical habitat from mineral entry, it has not undertaken the administrative procedures to complete withdrawals in all areas. Absent this withdrawal, new mining claims can be filed and further disturbance of critical habitat could occur.

Finally, BLM has not allowed the development of solar power plants on public lands within the boundaries of its desert wildlife management areas (which largely correspond to the boundaries of critical habitat). Conversely, the County of San Bernardino is considering the approval of the construction and operation of at least two such facilities within the boundaries of the Superior-Cronese Critical Habitat Unit north of Interstate 15 near the Minneola Road exit.

Summary of the Status of Critical Habitat of the Desert Tortoise

As noted in the revised recovery plan for the desert tortoise and 5-year review (Service 2011, 2010), critical habitat of the desert tortoise is subject to landscape level impacts in addition to the site-specific effects of individual human activities. On the landscape level, atmospheric pollution is increasing the level of nitrogen in desert substrates; the increased nitrogen exacerbates the spread of invasive plants, which outcompete the native plants necessary for desert tortoises to survive. As invasive plants increase in abundance, the threat of large wildfires increases; wildfires have the potential to convert the shrubland-native annual plant communities upon which desert tortoises depend to a community with fewer shrubs and more invasive plants. In such a community, shelter and forage would be more difficult for desert tortoises to find.

Invasive plants have already compromised the conservation value and function of critical habitat to some degree with regard to the second primary constituent element (i.e., sufficient quality and quantity of forage species and the proper soil conditions to provide for the growth of these species). These effects likely extend to the entirety of critical habitat, given the numerous routes by which invasive plants can access critical habitat and the large spatial extent that is subject to nitrogen from atmospheric pollution. (See maps from previous sections of this biological opinion regarding the extent of the threat of invasive plants and the aggregate stress that multiple threats, including invasive plants, place on critical habitat.)

Critical habitat has been compromised to some degree with regard to the last primary constituent element (i.e., habitat protected from disturbance and human-caused mortality) as a result of the wide variety of human activities that continues to occur within its boundaries. These effects result from the implementation of discrete human activities and are thus more site-specific in nature.

Although the remaining primary constituent elements have been affected to some degree by human activities, these impacts have not, to date, substantially compromised the conservation value and function of the critical habitat units. We have reached this conclusion primarily because the effects are localized and thus do not affect the conservation value and function of large areas of critical habitat.

Land managers have undertaken actions to improve the status of critical habitat. For example, as part of its efforts to offset the effects of the use of additional training maneuver lands at Fort Irwin (Service 2004), the Department of the Army acquired the private interests in the Harper Lake and Cronese Lakes allotments, which are located within critical habitat in the Western Mojave Recovery Unit; as a result, cattle have been removed from these allotments. Livestock have been removed from numerous other allotments through various means throughout the range of the desert tortoise. The retirement of allotments assists in the recovery of the species by eliminating disturbance to the primary constituent elements of critical habitat by cattle and range improvements.

ENVIRONMENTAL BASELINE

Action Area

The implementing regulations for section 7(a)(2) of the Endangered Species Act define the action area as “all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action” (50 Code of Federal Regulations 402.02). The action area begins at post mile R143.5 in Kern County in the west and ends at post mile 12.9 in San Bernardino County in the east. The action area includes the construction zone within the new alignment, temporary staging areas, and 300 feet beyond the outer edge of the construction right-of-way. We included the 300-foot-wide area beyond the construction right-of-way and staging areas because Caltrans would move desert tortoises from the right-of-way into this area.

In this biological opinion, we use the term "project area" to indicate areas that Caltrans may disturb during construction (e.g., roadways and staging areas); this area covers approximately 667.7 acres. Therefore, the action area comprises the 667.7-acre project area and the 300-foot-wide area beyond the project area into which Caltrans may translocate desert tortoises.

Previous Consultations in the Action Area

We issued a biological opinion to BLM regarding the effects of a proposed amendment to the California Desert Conservation Area Plan for the western Mojave Desert on the desert tortoise and its critical habitat (Service 2006). BLM's proposed action was a substantial revision of the California Desert Conservation Area Plan, with the fundamental goal of adopting numerous management prescriptions intended to promote the recovery of the desert tortoise. These prescriptions addressed grazing, land use classification, recreation, and numerous other elements of BLM's management of the western Mojave Desert. Through the land use plan amendment, BLM also established a mitigation policy for projects on its lands; within areas to be managed for the recovery of the desert tortoise, BLM would require compensation for disturbance at a ratio of five to one; outside of areas deemed important for recovery, BLM's mitigation ratio is one to one. The Service concluded that BLM's amendment of the California Desert Conservation Area Plan for the western Mojave Desert was not likely to jeopardize the continued existence of the desert tortoise or adversely modify its critical habitat because the vast majority of changes addressed in the amendment reduced the intensity of use and were protective of the desert tortoise. We established thresholds for the re-initiation of formal consultation in an amendment to this biological opinion (Service 2007). To date, although some desert tortoises have been killed, none of the re-initiation thresholds have been met. The entire action area for this project is within the action area for the California Desert Conservation Area Plan consultation.

Characteristics of the Action Area

To the best of our knowledge, lands within the action area to the west of Highway 395 are privately owned. BLM manages most of the lands to the east of Highway 395.

We summarized the following description of the action area from the biological assessment (Caltrans 2013). The topography in the project area is gently to moderately undulating with elevations ranging from approximately 2,300 to 2,500 feet above sea level. Habitat types within the action area include atriplex scrub, creosote bush scrub, and desert sink scrub.

Within the 667.7-acre project area, approximately 524.7 acres support scrub vegetation that could provide habitat for desert tortoises. Because of the fence that Caltrans installed to prevent desert tortoises from accessing the highway, approximately 104.9 acres of habitat are no longer available for their use. Consequently, the project area contains approximately 419.8 acres of available habitat for the desert tortoise.

Human-caused disturbances are evident within the action area; they include Highway 395, off-highway vehicle use, numerous unpaved roads, sites where the public has illegally dumped trash, transmission line and pipeline corridors with their associated maintenance roads, and residential, industrial, and commercial developments (e.g., homes, gas stations, restaurants, truck stop). The action area also includes the potions of the existing State Route 58 where the widened roadway would occur within its right-of-way; it would also include the portion of the old road that Caltrans proposes to remove and restore. The eastern portion of the project area, between post miles 7.8 and 12.9, is currently fenced to prevent desert tortoises from entering the highway and is no longer available as habitat.

In the eastern portion of the action area, the Burlington Northern and Santa Fe Railroad runs parallel to and several hundred north of State Route 58; it may lie partially within the action area. The solar power plant to the northwest of Kramer Junction covers a large area to the north of the action area and contributes to the overall degradation of the quality of desert tortoise habitat in this portion of the western Mojave Desert.

Highway 395, State Route 58, and the railroad likely restrict the movement of desert tortoise in this area. Desert tortoise may be able to cross the highways occasionally when traffic is light; however, desert tortoises are also likely to be killed when attempting to cross. Desert tortoises can sometimes cross railroad tracks; however, we are aware that they have been struck by trains and have died of heat stress while walking between the rails.

Status of the Desert Tortoise in the Action Area

We summarized the following description of the action area from the biological assessment (Caltrans 2013). Caltrans surveyed the project area for desert tortoises in May 2001. The survey consisted of walking 33-foot-wide transects throughout the project area and belt transects around the perimeter of the project area at approximately 100, 300, 600, 1,200, and 2,400 feet from edge of the area. Caltrans found 7 desert tortoises, 75 burrows, 5 pallets, 86 pieces of scat, and 22 carcasses in the surveyed area. The biological assessment does not contain a map that depicts the location of the desert tortoises or the sign.

In 2009, Caltrans conducted similar surveys between post miles 0.0 and 13.8 and found 2 desert tortoises and 101 sign (i.e., shelter sites, scat, carcasses, tracks, etc.). Although the desert tortoises occurred immediately adjacent to the project area, most of the sign was located along the belt transects outside of the project area. We do not know if these desert tortoises were different individuals than the animals encountered in 2001. The surveyors found the desert tortoises at the far eastern end of the study area and most of the sign east of Highway 395.

The information in the biological assessment is not adequate to estimate the likely number of desert tortoises in the project area. The project area is linear in configuration and narrow; desert tortoises could move into and out of the area in a relatively brief time. Consequently, we used the density estimate that the Service derived for the Fremont-Kramer Critical Habitat Unit during range-wide sampling in 2012 to estimate the number of desert tortoises greater than

180 millimeters in length that may be in the project area. (We will refer to desert tortoises that are greater than 180 millimeters in length as large desert tortoises and those under this size as small.) The Service (2012d) estimated this density to be approximately 5.72 animals per square mile. Based on this information, the 419.8 acres of habitat within the project area should support approximately 4 large desert tortoises. (See Appendix 3.)

We expect that the project area may support fewer than four large desert tortoises for several reasons. Von Seckendorff Hoff and Marlow (2002) found that the density of desert tortoises adjacent to heavily used roads is depressed; portions of the project area overlie the existing road, which likely has resulted in a lower density of animals in adjacent areas. Highway 395, which crosses the action area, likely also contributes to a depressed density within the action area. In addition to these roads, the action area is located in an area that has experienced, and continues to experience, various types of disturbances due to its proximity to scattered residential, industrial, and commercial development. In the eastern portion of the project area, the rail line to the north of the existing State Route 58 and the existing State Route 58 itself confine a narrow strip of habitat; we expect that desert tortoise densities in that area are below average. Finally, the western portion of the action area contains alkali scrub and sink habitat; we generally do not consider these habitats as being suitable for desert tortoises.

We have not attempted to estimate the number of small desert tortoises (i.e., those less than 180 millimeters in length) or eggs in the action area because of the numerous variables involved. We expect that the action area likely supports few, if any, small desert tortoises and eggs because of the scarcity of large animals.

Status of the Desert Tortoise Critical Habitat in the Action Area

The portion of the action area east of Highway 395 is located within the Fremont-Kramer Critical Habitat Unit. The biological assessment (Caltrans 2013) states that 539.4 of the project area's 667.7 acres lie within critical habitat; it also characterizes 95 acres of critical habitat as being developed or disturbed. We are unable to discern from the biological assessment how Caltrans arrived at these acreages or determined what it considered to be disturbed or developed.

The section of the existing State Route 58 between post miles 7.8 and 12.9 has been fenced to prevent desert tortoises from entering the roadway. Although habitat persists between the fence and the road, it no longer supports the conservation function of the critical habitat unit. Caltrans did not provide acreage of the area of critical habitat within the fence.

The critical habitat within the action area has been disturbed by historical and ongoing human activities such as off-road vehicle use and transmission line and pipeline corridors with their associated maintenance roads. The developed area at Kramer Junction also lies within the boundaries of critical habitat; this area no longer contains any of the primary constituent elements of critical habitat. In general, human activities in this region of the desert have negatively affected the primary constituent elements and compromised the conservation value and function of the critical habitat within the action area to some degree.

EFFECTS OF THE ACTION

Effects of the Proposed Action on Desert Tortoises

Capture and Translocation of Desert Tortoises

Caltrans proposes to remove all desert tortoises from the project area. Caltrans will install desert tortoise exclusion fencing around all areas affected by the project. An authorized biologist will perform clearance surveys (in accordance with the most recent Service survey protocols) of the enclosed area and translocate any desert tortoises found within the enclosure to areas immediately adjacent to and outside of the fence.

We estimated that four large desert tortoises occur within the project area; we expect that some small desert tortoises and eggs may also be present but did not attempt to estimate their numbers. We expect that Caltrans is likely to find most, if not all, of the large desert tortoises during its surveys; we expect that Caltrans will not detect all of the small desert tortoises and eggs.

Capturing desert tortoises may cause elevated levels of stress that may render these animals more susceptible to disease or directly result in injury or mortality. Handling desert tortoises sometimes causes them to void the contents of their bladder, which may represent loss of important fluids that could be fatal (Averill-Murray 1999 in Boarman 2002). Averill-Murray 1999 (in Boarman 2002) provided some evidence that handling-induced voiding may adversely affect survivability, although the amount of fluid discharged is usually small. However, because Caltrans will use only experienced biologists (i.e., authorized biologists) approved by the Service and approved handling techniques, collected desert tortoises are unlikely to suffer substantially elevated stress levels, or be killed or injured.

Biologists considered translocation to be an ineffective tool in reducing the impacts of projects on desert tortoises and raised concerns regarding its numerous potential adverse effects (e.g., overcrowding, increased disease transmission, increased mortality, elevation of stress hormones, vulnerability to drought, etc.). Over the past approximately 10 years, several researchers have undertaken studies to more carefully evaluate the effects of translocation on desert tortoises; some of these studies have included the monitoring of control and resident animals. (Desert tortoises used as controls inhabit areas that are disjunct from those occupied by translocated animals; resident animals occupy areas into which desert tortoises have been translocated.) These studies have indicated that translocated, resident, and control animals do not have significant differences in mortality rates or in levels of stress hormones. The reproductive output of translocated is slightly lower than that of residents or controls for the first year after translocation and translocated animals tend to move more but settle down after a period of time.

The Service's (2013) biological opinion for the Stateline and Silver State South solar projects contains an extensive discussion of the potential effects of translocation on desert tortoises; we incorporate that analysis herein by reference. Because the action area for the action under

consideration in this biological opinion supports a very small number of desert tortoises, we anticipate that any effects of translocation on either resident or translocated animals are likely to be negligible. The potential exists that a small number of translocated or resident desert tortoises may die or be injured during the translocation because of the specific circumstances; however, we consider this likelihood.to be extremely low.

Caltrans has proposed to monitor desert tortoises moved during inactive periods for at least 2 days after placement in the new burrows to ensure their safety. This statement seems to contradict the commitment in Caltrans' protective measure 16 to follow the Service's guidance with regard to translocation of desert tortoises, which calls for translocation to occur during active periods. Despite the overall success of well-planned efforts to translocate desert tortoises, this activity is not without risk. We will discuss these issues in the remaining paragraphs in this section.

The successful translocation of desert tortoises depends greatly on the techniques used. Research on translocated desert tortoises indicates that they tend to spend more time above ground and move more than resident or control animals. The extended time above ground can increase the exposure of desert tortoises to predators and weather extremes; we are aware that desert tortoises will occasionally walk along newly installed fences within their territories until they become overheated and die. For these reasons, the Service's (2009) guidance recommends that workers translocate desert tortoises when weather conditions are the most conducive to the desert tortoise's activity patterns (April and May and September and October, although translocation slightly before or after these months may be appropriate, depending on the weather in any given year).

Caltrans' proposal to move desert tortoises during inactive periods is likely to place these animals at increased risk of predation or exposure to unfavorable weather conditions, regardless of whether it moves the animals during inactive seasons or times of the day. Desert tortoises moved during these times may continue to spend excessive time above ground well beyond the 2 days during which Caltrans has proposed to monitor them; additionally, Caltrans has not proposed any actions that it may undertake if monitoring provides evidence that translocation has caused desert tortoises to behave in an unsafe manner. Desert tortoises also generally do not remain in artificial or natural burrows immediately after translocation; attempting to force them to stay in the burrows may increase their stress levels. Taken together, these issues indicate the importance of a well-conceived approach to moving desert tortoises from harm's way.

Construction on Desert Tortoises

Desert tortoises may be killed or injured by construction activities associated with the proposed project if they are not removed from work areas prior to the onset of ground-disturbing activities. Because of the desert tortoise's cryptic coloration and fossorial habits, all individuals may not be detected during surveys; smaller individuals and eggs are more likely to be missed than larger animals. Desert tortoises could also be killed or injured if the re-enter the work area through a breech in the exclusion fencing. Because of the numerous protective measures that Caltrans will

implement and the small number of desert tortoises likely to occur within the action area, we expect that few desert tortoises are likely to be killed or injured during construction.

Desert tortoises may be killed or injured by vehicles associated with the proposed project as they travel along access roads to work sites. We are unable to separate the potential effects of project-associated vehicles from those of the general public. On paved roads, the general volume of traffic would likely mask any effect of the project vehicles; on unpaved routes, project vehicles may comprise a measurable, although still small portion of the traffic. Because all workers will have undergone a worker awareness and education program about desert tortoises, workers are less likely to strike desert tortoises than a casual user. Additionally, we expect much of the access to the project area would occur along the existing State Route 58. Therefore, we expect that few desert tortoises are likely to be killed or injured along access roads.

Lastly, desert tortoises may be killed or injured by uninformed workers; for example, workers may collect them as pets. However, we do not expect any desert tortoises would be killed or injured in this manner because all project personnel will receive specific training, which would increase their awareness of this potential threat and inform them of the prohibitions against unauthorized handling of desert tortoise.

Habitat

Table 1 of the biological assessment (Caltrans 2013) states that Caltrans would affect approximately 525 acres of habitat during the construction of the new road alignment. This amount includes approximately 236 acres that would be permanently lost and approximately 289 acres of temporary impacts. (Of this total, the fence to prevent desert tortoises from entering State Route 58 in the easternmost portion of the project area precludes their use of approximately 104.9 acres.) We are unable to predict how long desert tortoises would be unable to use areas of temporary impact because of the many variables involved. For example, the extent of damage during construction, the extent of restoration efforts, weather, and the habitat types involved all affect the amount of time before the disturbed areas are of value to the desert tortoise.

The project area west of Kramer Junction is more degraded than that to the east; it also includes habitat types that are not of high value for desert tortoises (e.g., alkali sink and scrub). Consequently, disturbance and loss of desert tortoise habitat in this area are not likely to affect the status of the desert tortoise in a measurable manner.

Construction of the new alignment east of Highway 395 (i.e., that part of the project that would be located outside the existing right-of-way of State Route 58) would be the most detrimental aspect of this proposed project because it is located within higher quality and less disturbed habitat. Caltrans did not provide an estimate of the amount of habitat that would be permanently lost or temporarily disturbed in this area.

Installation of Culverts

The presence of State Route 58 and Highway 395 in the action area has caused fragmentation of habitat and probably substantially disrupted the movement of desert tortoises across this portion of the desert; we expect that few desert tortoises are able to cross over the highways, although they may use culverts to pass under it. Caltrans has proposed to install a large, soft-bottomed culvert on each side of Highway 395 to allow desert tortoises to cross under the new expressway; it also proposes to install permanent fencing to exclude desert tortoises from the right-of-way of the new alignment.

The presence of the new expressway will not substantially alter the degree of fragmentation to the west of Highway 395 because few desert tortoises reside in that area; the low density of desert tortoises in this area may be a function of the habitat being less suitable and more disturbed by human activities. Because of the low density of desert tortoises in this portion of the action area, the installation of a large culvert to facilitate the movement of desert tortoises under State Route 58 to the west of Highway 395 is unlikely to have much effect.

To the east of Kramer Junction, the new road alignment would increase the amount of fragmentation of habitat in the western Mojave Desert because it would introduce a new barrier to the north-south movement of desert tortoises in this area and at least partially isolate desert tortoises between it and the rail line. In this area, the installation of a large culvert to allow for the movement of desert tortoises under State Route 58 would likely offset the fragmentation to some degree. In both cases, the maintenance of the exclusion fence is key to the function of the culverts; absent the fences, most desert tortoises would continue to attempt to cross the expressway and be killed.

We do not know how the existing State Route 58 would function east of Highway 395 after the Caltrans completes the new expressway. Because it is not fenced to prevent entry by desert tortoises onto the road, it would continue to function as a mortality sink for desert tortoises if traffic levels remain high on this unfenced road.

Removal of the Existing State Route 58

Caltrans is proposing to obliterate and re-vegetate approximately 1.2 miles of the existing State Route 58 near the Kern County line as a means to facilitate the movement of desert tortoises. The work associated with obliterating the old road and re-vegetate the area is unlikely to adversely affect desert tortoises because the road currently does not support desert tortoises and Caltrans will fence the work area to prevent entry by desert tortoises. The potential exists that a desert tortoise may find a break through the fence, enter the work area, and be killed or injured; however, the likelihood of this event occurring is low, given the paucity of individuals in this area.

Regardless of the success of the re-vegetation effort, this action is unlikely to provide a measurable benefit to desert tortoises because surveys detected few signs of desert tortoises in

this area and, after Kramer Junction itself, is the portion of the action area most disturbed by human activities.

Invasive Non-Native Plant Species

Invasive non-native plant species have evolved outside of the area into which they are introduced. These plant species are not controlled by native predators and, therefore, may proliferate in an area into which they have been introduced. Invasive non-native plant species compete with native plant species for nutrients, light, and space.

Non-native plant species currently occur on the project area and are likely to occur in other portions of the action area at varying densities. Road construction activities have the potential to increase the distribution and abundance of non-native weed species within the action area due to surface-disturbing activities that favor the establishment of these species; equipment being brought in from off site may also introduce new species of weeds into the action area. In addition, access to the project site by personnel may increase the volume and distribution of non-native seed carried into the action area. If the proposed action results in an increased abundance of non-native weed species in the action area, they would likely reduce the quantity and quality of forage for desert tortoises and increase fire risk, which may result in future habitat loss beyond the action area. Wildfires also kill desert tortoises that are above ground and can deprive those that survive the fire of plants that they eat and use for shelter.

Caltrans will include, in the construction contract stipulations, measures to help reduce the possibility of introducing new invasive plants into the action area. These measures will include the inspection and cleaning of construction equipment; commitments to ensure the use of invasive-free mulches, topsoils, and seed mixes; and other strategies to help reduce existing populations of invasive non-native plants, or those that could occur in the future. We cannot reasonably predict the increase in non-native weed species abundance that this project will create within the action area nor the effects to the desert tortoise from the introduction of non-native weed species.

Increased Subsidies for Predators

Common ravens and coyotes are often attracted to human activity in the desert. Consequently, the proposed action has the potential to attract common ravens and coyotes; additional food sources for predators may also lead to increases in their reproductive rates. Increased numbers of predators would likely lead to further predation on desert tortoises in the vicinity of the project. Securing trash will eliminate it as a source of food for these and other predators, thereby reducing the attractiveness of the area to these predators. Caltrans proposes to provide animal resistant/proof trash containers and to remove trash in a timely manner. Implementation of these proposed measures should reduce the attraction of common ravens and coyotes to the new facilities; therefore, the proposed action is unlikely to cause a measurable increase in the level of predation of desert tortoises.

Effects of the Proposed Action on Critical Habitat

The proposed action would affect approximately 439 acres of designated critical habitat within the Fremont-Kramer Critical Habitat Unit; it would permanently cause the loss of approximately 198 acres and temporarily disturb approximately 242 acres (Caltrans 2013). These totals include critical habitat along the existing State Route 58 between post miles 7.8 and 12.9 that is fenced to prevent desert tortoises from entering the roadway. The approximately 104.9 acres of critical habitat that lie within this fenced area no longer provide the conservation function of critical habitat and their loss or disturbance does not comprise a new impact. Consequently, the proposed action would adversely affect approximately 334 acres of critical habitat.

In the following paragraphs, we consider the effects of the proposed action on the primary constituent elements of desert tortoise critical habitat.

Sufficient Space to Support Viable Populations within Each of the Six Recovery Units and to Provide for Movement, Dispersal, and Gene Flow

The proposed project would result in the reduction of the space available to support viable populations; because Caltrans would build the new alignment east of Highway 395 away from the existing State Route 58, the proposed action would reduce to some degree the ability of this area to support movement, dispersal, and gene flow. The proposed culvert in this area would assist in promoting movement, dispersal, and gene flow, albeit at a much reduced rate than currently occurs in the area.

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

The second through fifth primary constituent elements represent the plant species desert tortoises require for food and shelter, the substrates that are necessary for these plants to grow and for desert tortoises to construct burrows, and the burrows and other shelter sites they use. These features are the components of the environment necessary to meet desert tortoises' need for food and shelter.

The proposed project would result in the disturbance and loss of 334 acres of critical habitat that provide those features necessary for food and shelter. The Fremont-Kramer Critical Habitat Unit includes 518,000 acres, of which 501,095 acres have a model value of 0.5 or greater (Nussear et al. 2009).

The potentially more damaging effect of the proposed action on these primary constituent elements would be longer-term degradation of habitat that could occur if non-native invasive plant species established currently in the project area were to spread and become more abundant because of construction activities or if Caltrans introduces new weeds during construction.

Caltrans' proposed measures to prevent the introduction of non-native species would help in minimizing the potential spread of these plant species to undisturbed habitats.

Habitat Protected from Disturbance and Human-caused Mortality

The sixth primary constituent element is habitat protected from disturbance and human-caused mortality. In the portion of critical habitat where the new expressway would replace the existing State Route 58, the proposed action would lead to an increase in disturbance and human-caused mortality only during the brief period during construction. The construction of the expressway in the new alignment (i.e., where it does not overlap the existing road) would cause an increase in disturbance and human-caused mortality.

The presence of the new alignment in critical habitat is likely to increase the level of human-caused disturbance in this area, relative to current conditions, during operation of the new roadway. The new, heavily used route through critical habitat would facilitate the spread of weeds and trash through this area, attract common ravens to road-killed animals (despite the presence of a fence to exclude desert tortoises, animals of other species are still likely to be killed on the road), and increase the potential for wildfires caused by humans.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Endangered Species Act. A portion of the action area crosses land managed by BLM; any future actions on these lands would be subject to the consultation requirements of section 7(a)(2) of the Endangered Species Act and are therefore not considered cumulative effects. We are unaware of any non-Federal actions that are reasonably certain to occur in the action area.

CONCLUSIONS

Desert Tortoise

As we stated previously in the biological opinion, "jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 Code of Federal Regulations 402.02). This regulatory definition focuses on how the proposed action would affect the reproduction, numbers, or distribution of the species under consideration in the biological opinion. For that reason, we have used those aspects of the desert tortoise's status as the basis to assess the overall effect of the proposed actions on the species.

Additionally, we determine whether a proposed action is likely "to jeopardize the continued existence of the species" through an analysis of how a proposed action affects the listed taxon within the action area in relation to the range of the entire listed taxon. For the desert tortoise, this process involves considering the effects at the level of the action area, then at the level of the recovery unit (in this case, the Western Mojave Recovery Unit), and then finally for the range of the listed taxon. Logically, if a proposed action is unlikely to cause a measurable effect on the listed taxon within the action area, it is unlikely to affect the species throughout the recovery unit or the remainder of its range. Conversely, an action with measurable effects on the listed entity in the action area may degrade the status of the species to the extent that it is affected at the level of the recovery unit or range-wide.

In the following sections, we will synthesize the analyses contained in the Effects of the Action section of this biological opinion to determine how each of the proposed actions affects the reproduction, number, and distribution of the desert tortoise. We will then assess the effects of the proposed actions on the recovery of the species and whether they are likely to appreciably reduce the likelihood of both the survival and recovery of the desert tortoise.

Reproduction

Caltrans will move most, if not all, of the reproductive desert tortoises from work areas to adjacent habitat where they would continue to live and reproduce. Translocated desert tortoises may exhibit decreased reproduction in the first year following translocation. Based on research conducted by Nussear et al. (2012), however, the reproductive rates of translocated desert tortoises are likely to be the same as those of resident animals in subsequent years. Based on work conducted by Saethre et al. (2003), we do not expect the increased density of desert tortoises that would result from translocation to affect the reproduction of resident animals; additionally, as the generally lower densities of desert tortoises along roads provides an additional assurance that overcrowding would not occur. Construction would occur over a brief period relative to the reproductive lifespan of female desert tortoises. Finally, desert tortoises are well adapted to highly variable and harsh environments and their longevity helps compensate for their variable annual reproductive success (Service 1994). Consequently, the proposed action is not likely to have a measurable long-term effect on reproduction of desert tortoises that live adjacent to State Route 58

Numbers

We estimate that 4 large desert tortoises are likely to occur within 419.8 acres of available habitat for the desert tortoise within the project area. The proposed action is likely to result in the injury or mortality of few, if any, of these individuals because most construction activities will occur in areas that are fenced and cleared of desert tortoises and Caltrans will implement numerous avoidance and minimization measures. The proposed action is likely to result in injury or mortality of some small desert tortoises and eggs; because of their small size and cryptic nature, biologists are more likely to miss them during surveys, which would expose them to construction activities.

Implementation of the proposed action would have a negligible effect on the number of desert tortoises in the Western Mojave Recovery Unit. In a worst-case scenario (that is, all four large desert tortoises we estimate to be in the project area are killed during construction), the loss of 4 individuals from the overall number of large desert tortoises in the Western Mojave Recovery Unit (76,644; see Desert Tortoise Recovery Office 2014) would comprise 0.005 percent of the individuals in the recovery unit. We expect that Caltrans would not kill every large desert tortoise during construction because of the protective measures it will implement.

Distribution

The permanent loss of approximately 236 acres of desert tortoise habitat that would result from implementation of the proposed action would have a negligible effect on the distribution of the desert tortoise. The Western Mojave Recovery Unit may support as much as 11,847 square miles of desert tortoise habitat (Allison 2013). Consequently, the proposed actions would result in the loss of approximately 0.003 percent of the habitat in the Western Mojave Recovery Unit and an even smaller effect on the amount of habitat available range-wide.

Effects on Recovery

Caltrans has proposed to implement four actions to promote the recovery of the desert tortoise. We will review each of those actions to assess the value of its long-term contribution to the recovery of the species.

Installation of permanent exclusionary desert tortoise fencing along the new alignment from post mile R143.5 to 7.8.

Post mile R143.5 is located at the Kern County line. Based on the information in the biological assessment (Caltrans 2013), the area from the county line to Kramer Junction supports few desert tortoises; we expect that the habitat types and human disturbance in this area are responsible for the low density of desert tortoises. This area is mainly in private ownership and the Service does not consider it important to the long-term conservation of the desert tortoise. Consequently, the installation of desert tortoise fencing from post mile R143.5 to Highway 395 will not provide measurable benefit to the long-term conservation of the desert tortoise.

Conversely, the installation of desert tortoise fencing from Highway 395 to post mile 7.8 is likely to reduce the number of desert tortoises that are killed on the expressway. This fencing may prevent a zone of depressed density of desert tortoises from developing adjacent to the new alignment and should allow for the recolonization of habitat adjacent to the area where fencing will be installed along the existing highway. This segment of fencing will connect with existing fencing to the east along State Route 58. The installation of this fencing is highly consistent with recommendations in the recovery plans for the desert tortoise (Service 1994, 2011).

Removal and re-vegetation of approximately 1.2 miles of the existing State Route 58

Caltrans has this action to improve connectivity of desert tortoise habitat in the western portion of the action area. As we noted in the previous section and elsewhere in this biological opinion, this area supports few desert tortoises, supports habitat types that are generally not favored by desert tortoises, and is subject to numerous human disturbances. Additionally, the Service does not consider it important to the long-term conservation of the desert tortoise. Consequently, the removal and re-vegetation of approximately 1.2 miles of the existing State Route 58 will not provide measurable benefit to the long-term conservation of the desert tortoise.

Installation of two oversized soft bottom culverts to facilitate north-south movement of desert tortoises under State Route 58

The culvert that Caltrans proposes to install to the west of Highway 395 would have little to no value for the long-term conservation of the desert tortoise for the reasons mentioned in the previous two sections. The culvert that Caltrans proposes to install to the east of Highway 395 would be essential to maintaining some connectivity in the area of the new alignment; this culvert should benefit the long-term conservation of the desert tortoise.

Acquisition of 419.76 acres of desert tortoise habitat to mitigate for the loss of habitat

The acquisition of private lands and their subsequent management by a resource agency, BLM, or a conservation organization would greatly reduce the likelihood of future development that may adversely affect the desert tortoise or its critical habitat. If the acquired lands were donated to BLM, the consultation provisions of section 7(a)(2) of the Endangered Species Act would apply. Such an acquisition would support the long-term conservation of the desert tortoise, if the acquired lands were within a larger area that is being managed for the desert tortoise; the acquisition of isolated parcels would render long-term, large-scale management difficult and severely compromise the effectiveness of the acquisition.

The construction and operation of the portion of the new alignment east of Highway 395 is likely to impair the recovery of the desert tortoise to some degree, primarily by further fragmenting critical habitat in this region of the Western Mojave Recovery Unit. Caltrans' proposals to fence State Route 58 east of Highway 395 and install a large culvert in this area should lessen this impairment to some degree. Although acquisition of private lands may further mitigate the adverse effects on recovery to some degree, we cannot assess how effective the acquisition would be because Caltrans has not identified the parcel to be acquired. Overall, we conclude that the proposed action is likely to diminish the likelihood of recovery of the desert tortoise by a negligible amount.

After reviewing the current status of the species, the environmental baseline for the action area, the effects of the proposed actions, and the cumulative effects, it is the Service's biological opinion that the proposed State Route 58 Kramer Junction Expressway Project is not likely to

jeopardize the continued existence of the desert tortoise. We reached this conclusion for this project because:

1. The proposed action will not affect the reproductive capacity of desert tortoises in the action area, Western Mojave Recovery Unit, or range-wide because Caltrans will move most large (reproductive) individuals from harm's way and research has demonstrated that such movements have only minor, short-term effects on reproductive capacity.

2. The proposed action will have negligible effect on the number of desert tortoises in the Western Mojave Recovery Unit and range-wide because Caltrans has proposed numerous measures to minimize injury and mortality during construction.

3. The proposed action will have negligible effect on the distribution of the desert tortoise because it would result in the loss of approximately 0.003 percent of desert tortoise habitat in the Western Mojave Recovery Unit and even less range-wide.

4. The actions proposed by Caltrans to mitigate for the loss of habitat and fragmentation would contribute, to a small degree, to the recovery of the desert tortoise.

Critical Habitat of the Desert Tortoise

After reviewing the current status of critical habitat, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the proposed action is not likely to result in the destruction or adverse modification of critical habitat of the desert tortoise. We have reached this conclusion because the amount of affected critical habitat comprises approximately 0.065 percent of the total amount of the critical habitat within the Fremont-Kramer Critical Habitat Unit (334 acres of disturbance within the 518,000-acre critical habitat unit) and an even smaller portion of critical habitat range wide. More conservatively, the 334 acres of disturbance comprises approximately 0.067 percent of modeled habitat within this critical habitat unit. Therefore, the amount of disturbance is not likely to compromise the conservation function and value of critical habitat for the desert tortoise.

INCIDENTAL TAKE STATEMENT

Section 9 of the Endangered Species Act and Federal regulations pursuant to section 4(d) of the Endangered Species Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as an intentional or negligent act or omission that creates the likelihood of injury to listed species by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to,

breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Endangered Species Act provided that such taking is in compliance with the protective measures proposed by Caltrans and the terms and conditions of this incidental take statement.

The measures described below are non-discretionary and must be undertaken by Caltrans for the exemption in section 7(o)(2) to apply. Caltrans has a continuing duty to regulate the activities covered by this incidental take statement. If Caltrans (1) fails to assume and implement the terms and conditions or (2) fails to require any contractors to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to any contract document, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, Caltrans must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 Code of Federal Regulations 402.14(i)(3)]. We also note that, because the Service considered the effects of the protective measures proposed by Caltrans in its analysis of the proposed action, these measures are also non-discretionary.

We estimated that four large desert tortoises are present within the project area. Desert tortoises are cryptic (i.e., individuals spend much of their lives underground or concealed under shrubs), they are inactive in years of low rainfall, and their numbers and distribution within the action area may have changed since the surveys were completed because of hatchings, deaths, immigration, and emigration. The numbers of hatchlings and eggs are even more difficult to quantify because of their small size, the location of eggs underground, and the fact that their numbers vary depending on the season; that is, at one time of the year, eggs are present but they become hatchlings later in the year. We did not attempt to estimate the number of small desert tortoises or eggs that may be present because of the numerous variables involved but expect that only few are present because of the overall low density of desert tortoises in the project area.

Determining the amount or extent of the forms in which the take is likely to occur (killed, injured, or captured) is also difficult. As we noted previously, Caltrans will likely capture and move most of the large individuals (i.e., those greater than 180 millimeters in length) within the project area from harm's way to adjacent habitat. Furthermore, Caltrans proposes to implement measures that will minimize the mortality or injury of desert tortoises. However, occasionally even larger animals remain undetected during clearance surveys. Also, as we have stated previously, small tortoises may be captured and moved during pre-construction clearance surveys. Any undetected animals are likely to be killed or injured during construction.

Therefore, we anticipate that all desert tortoises within the project site are likely to be taken. We anticipate that Caltrans will likely capture and move most of the large individuals within the project area from harm's way to adjacent habitat; any that are not detected during clearance surveys prior to construction may be killed or injured. Because of the difficulty in finding small desert tortoises (i.e., those less than 180 millimeters in length), we expect that most of these

individuals are likely to be killed or injured during construction. The protective measures proposed by Caltrans are likely to prevent mortality or injury of most large desert tortoises, and to a certain extent, some small tortoises. In addition, finding a dead or injured desert tortoise is unlikely.

Because we cannot precisely quantify the number of individuals that are likely to be killed, injured, or captured during construction of the proposed project, we will consider the amount or extent of take to be exceeded if two large desert tortoises are killed or injured within the project area. We are not establishing a re-initiation criterion for the number of large or small desert tortoises that would be moved out of harm's way during construction of the proposed project. Furthermore, we are not establishing a re-initiation criterion for the loss of small desert tortoises or eggs.

The exemption provided by this incidental take statement to the prohibitions against take contained in section 9 of the Endangered Species Act extends only to the action area as described in the Environmental Baseline section of this biological opinion.

REASONABLE AND PRUDENT MEASURE

The Service believes the following reasonable and prudent measure is necessary and appropriate to minimize take of desert tortoises during the construction of the proposed State Route 58 project:

> Caltrans must implement measures to protect desert tortoises during their translocation from the project area.

TERMS AND CONDITIONS

To be exempt from the prohibitions of section 9 of the Act, Caltrans must implement the following terms and conditions, which implement the reasonable and prudent measure, and the following reporting and monitoring requirements. These terms and conditions are non-discretionary.

The following terms and conditions implement the reasonable and prudent measure. They replace protective measure 16, as described in the Description of the Proposed Action section of this biological opinion.

1. Desert tortoises found on the project area must be handled and moved by an authorized biologist or qualified biological monitor in accordance with the most current Service protocol (currently Service 2009).

2. The authorized biologist or qualified biological monitor must move the desert tortoise to the closest suitable habitat to the location at which it was found. Prior to the onset of

construction, Caltrans must submit to the Service, for its review and approval, a list of the potential suitable locations to which desert tortoises may be translocated; the suitability criteria will include land ownership, habitat type, and amount of disturbance. Longer distance translocations may require testing blood for the presence of disease and additional monitoring to ensure that the desert tortoises do not endanger themselves by spending excessive time above ground. The authorized biologist may exercise his or her discretion regarding the most suitable place to release the desert tortoise within parcels that the Service and Caltrans deem suitable.

3. If Caltrans intends to move desert tortoises during seasons when they are inactive, it must first develop a disposition plan for the Service's review and approval that provides a detailed description of the manner in which these desert tortoises will be moved such that they are not unduly exposed to predators or extreme weather conditions. Such a plan may involve maintaining the animals in captivity where a qualified caretaker can monitor and protect them from predators and weather and keep them from contact with other desert tortoises or other animals.

4. The authorized biologist or qualified biological monitor must monitor each desert tortoise that they move from the project area until the authorized biologist is reasonably certain that the desert tortoise is unlikely to pace along the exclusion fence or spend an excessive amount of time above ground. Authorized biologists may attach radio transmitters to desert tortoises to assist in this task, provided that they have been specifically authorized by the Service to do so for this project.

5. If monitoring indicates that desert tortoises are pacing along the exclusion fence, Caltrans must place shade shelters at 100-foot intervals along the area where the animals are pacing.

REPORTING REQUIREMENTS

Within 60 days of the completion of the proposed action, Caltrans must provide a report to the Service that provides details on the effects of the action on the desert tortoise. Specifically, the report must include information on any instances when desert tortoises were killed, injured, or handled, the circumstances of such incidents, and any actions undertaken to prevent similar mortalities or injuries from re-occurring. In addition, Caltrans must provide an annual report by January 31 each year during the construction period with this information; if animals are moved from harm's way during this period, Caltrans must include that information in these reports.

We also request that Caltrans provide us with the names of any biological monitors who assisted the authorized biologist and an evaluation of the experience they gained on the project; the qualifications form on our website at http://www.fws.gov/carlsbad under "Survey Information," filled out for this project, along with any appropriate narrative would provide an appropriate level of information. This information would provide us with additional reference material in the event these individuals are submitted as potential authorized biologists for future projects.

DISPOSITION OF DEAD OR INJURED DESERT TORTOISES

Within 3 days of locating any dead or injured desert tortoises, you must notify the Palm Springs Fish and Wildlife Office by telephone 760-322-2070 or email at raymond_vizgirdas@fws.gov. The report must include the date, time, and location of the carcass, a photograph, cause of death, if known, and any other pertinent information.

Caltrans must take injured desert tortoises to a qualified veterinarian for treatment. If any injured tortoises survive, Caltrans must contact the Service regarding their final disposition.

Caltrans must take care in handling dead specimens to preserve biological material in the best possible state for later analysis, if such analysis is needed. The Service will provide the appropriate guidance when Caltrans provides notice that a desert tortoise has been killed by project activities.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Endangered Species Act directs Federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. We offer the following conservation recommendations for your consideration.

1. We recommend that Caltrans redirect funding for the installation of permanent exclusion fencing and large culvert, and the removal and re-vegetation of 1.2 miles of the old State Route 58 west of Highway 395 to the implementation of actions within the boundaries of critical habitat that would be more beneficial to the recovery of the desert tortoise. Such actions could include the restoration of disturbed areas, physical closure of unauthorized routes, and signing of conservation lands. We recommend that Caltrans participate in the recovery implementation team for the Western Mojave Recovery Unit to determine the best use of the redirected funds.

2. We recommend that Caltrans involve the Service in the selection of the lands it intends to acquire as mitigation. Our foremost recommendation is that Caltrans acquire lands within the Fremont-Kramer Desert Wildlife Management Area.

RE-INITIATION NOTICE

This concludes formal consultation on the proposed State Route 58 Kramer Junction Expressway Project in San Bernardino and Kern counties. As provided in 50 Code of Federal Regulations 402.16, re-initiation of formal consultation is required where discretionary Federal involvement or control over the action has been retained or is authorized by law and if: (1) the amount or

extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, the exemption issued pursuant to section 7(o)(2) will have lapsed and any further take would be a violation of section 4(d) or 9. Consequently, we recommend that any operations causing such take cease pending re-initiation.

If you have any questions regarding this biological opinion, please contact Ray Vizgirdas of my staff at 208-373-4020 or at raymond_vizgirdas@fws.gov.

Sincerely,

For Scott A. Sobiech
Acting Field Supervisor

APPENDICES

1. Mojave population of the desert tortoise (*Gopherus agassizii*). 5-year review: summary and evaluation. Available on disk or hard copy by request or at: http://ecos.fws.gov/docs/five_year_review/doc3572.DT%205Year%20Review_FINAL.pdf

2. Solar projects for which the U.S. Fish and Wildlife Service has issued biological opinions or incidental take permits.

3. Methodology used to estimate the number of desert tortoises present in the action area.

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Appendix 2. Solar projects for which the U.S. Fish and Wildlife Service has issued biological opinions or incidental take permits.

The following table summarizes information regarding the proposed solar projects that have undergone formal consultation with regard to the desert tortoise. In the Citations column, a single reference indicates that the acres of desert tortoise habitat and number of desert tortoises are estimates from the biological opinion; when the column includes two citations, the first is for the acres of desert tortoise habitat from the biological opinion and the second is for number of desert tortoises that are known to have been translocated or killed during construction.

Project and Recovery Unit	Acres of Desert Tortoise Habitat	Desert Tortoises Estimated[1]	Desert Tortoises Observed[2]	Citations[3]
Eastern Mojave				
Ivanpah Solar Electric Generating System	3,582	1,136	173	Service 2011a, 2013d
Stateline Solar	1,685	94	-	Service 2013a
Silver State North – NV	685	14	4	Service 2010a, Cota 2013
Silver State South – NV	2,427[4]	122[4]	-	Service 2013a
Amargosa Farm Road – NV	4,350	4	-	Burroughs 2012
Western Mojave				
Abengoa Harper Lake	Primarily in abandoned agricultural fields	4	-	Service 2011b
Chevron Lucerne Valley	516	10	-	Service 2010b
Northeastern Mojave				
Nevada Solar One - NV	400	[5]	[5]	Burroughs 2012, 2014
Copper Mountain North - NV	1,400	30[5]	30[5]	Burroughs 2012, 2014
Copper Mountain - NV	380	[5]	[5]	Burroughs 2012, 2014
Moapa K Road Solar - NV	2,141	186	157	Service 2012, Burroughs 2013

Colorado				
Genesis	1,774	8	0	Service 2010c, Fraser 2014
Blythe	6,958	30	-	Service 2010d
Desert Sunlight	4,004	56	7	Service 2011c, Fraser 2014
McCoy	4,533	15	-	Service 2013b
Desert Harvest	1,300	5	-	Service 2013c
Rice	1,368	18	1	Service 2011d, Fraser 2014
Total	**37,503**	**1,732**	**372**	

1. The numbers in this column are not necessarily comparable because the methodologies for estimating the numbers of desert tortoises occasionally vary between projects.
2. This column reflects the numbers of desert tortoises observed within project areas. It includes translocated animals and those that were killed by project activities. Project activities may result in the deaths of more desert tortoises than are found.
3. The first citation in this column is for the biological opinion or incidental take permit and is the source of the information for both acreage and the estimate of the number of desert tortoises. The second is for the number of desert tortoises observed during construction of the project; where only one citation is present, construction has not begun or data are unavailable at this time.
4. These numbers include Southern California Edison's Primm Substation and its ancillary facilities.
5. These projects occurred under the Clark County Multi-species Habitat Conservation Plan; the provisions of the habitat conservation plan do not require the removal of desert tortoises. We estimate that all three projects combined will affect fewer than 30 desert tortoises.

The Service completed consultation on the Calico and Palen projects. The applicant for the Calico project, which was located in the Western Mojave Recovery Unit, has abandoned the project and the Bureau of Land Management has withdrawn the request for consultation (Bureau of Land Management 2013). For the Palen project, which is located in the Colorado Desert, BrightSource Energy acquired the project from its former owner and proposed to use power tower technology. The California Energy Commission initially denied the application but is currently evaluating BrightSource Energy's re-application to determine if it can resolve the issues the California Energy Commission raised.

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Appendix 3. Estimating the number of large desert tortoises in the project area.

We used the estimated density derived by range-wide sampling within the Fremont-Kramer Critical Habitat Unit as the density within the project area (Service 2012). Large desert tortoises are those individuals that are greater than 180 millimeters in length.

Average density of large desert tortoises in the Fremont-Kramer Critical habitat Unit
5.72 desert tortoises/square mile

Project area of the proposed State Route 58 Kramer Junction Expressway project
667.7 acres

Acreages within the project area that do not support desert tortoises
Pavement – 143 acres
Area within exclusion fence – 104.9 acres

Suitable and potentially occupied habitat
667.7 – (143 + 104.9) = 419.8 acres = 0.66 square miles

5.72 large desert tortoises/square mile x 0.66 square miles = 3.8 desert tortoises

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