United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ventura Fish and Wildlife Office
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Ventura, California 93003

IN REPLY REFER TO:
81440-2011-F-0382

August 2, 2011

Memorandum

To: Barstow Field Manager, Bureau of Land Management, Barstow, California
/s/: Diane K. Noda
From: Field Supervisor, U.S. Fish and Wildlife Service, Ventura, California

Subject: Biological Opinion on Nursery Products, LLC Hawes Composting Facility, San Bernardino County, California (8-8-11-F-29)

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion based on our review of the Bureau of Land Management's (Bureau) issuance of a right-of-way permit to Nursery Products, LLC (Nursery Products) for the Hawes Composting Facility (facility) and its effects on the federally threatened desert tortoise (*Gopherus agassizii*) and its designated critical habitat. This review is in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.). The proposed project involves the construction, operation, maintenance, and decommissioning of an 80-acre composting facility and access road leading to the facility. We received your request for formal consultation on June 16, 2011.

We based this biological opinion on information provided in your biological assessment, information you provided on June 1, 2, and 8, 2011, Nursery Products' revised Raven Monitoring, Management, and Control Plan provided on July 8, 2011, and additional information regarding the proposed project. This information includes the incidental take permit (CDFG 2010); conditional use permit (County of San Bernardino 2010); environmental impact report (URS 2006); supplemental environmental impact report (PBS&J 2009); and waste discharge requirement permit (RWQCB 2010). A complete record of this consultation can be made available at the Ventura Fish and Wildlife Office.

Consultation History

On May 18, 2011, we received the biological assessment for the proposed project. Following receipt of the biological assessment, we requested additional information on the proposed project, via e-mail, from the Bureau. The Bureau responded to our request and provided the necessary information. On June 16, 2011, the Bureau sent us an e-mail requesting initiation of formal consultation.

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On June 27, 2011, we submitted our comments regarding Nursery Products' Raven Monitoring, Management, and Control Plan. We received the revised Raven Monitoring, Management, and Control Plan on July 8, 2011.

We electronically mailed a draft biological opinion to the Bureau on June 15, 2011, and received comments on the draft, via electronic mail from the Bureau on June 22, 2011 (Otahal 2011b). We reviewed the comments, which consisted of minor edits, and incorporated them into the final biological opinion.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

Introduction

We summarized the following description of the proposed action from the biological assessment (Analytical Environmental Services 2011), unless otherwise noted. The proposed site is located west of the City of Barstow, approximately 8 miles west of Hinkley, approximately 12 miles east of Kramer Junction, 1 mile south of State Route 58, and 1 mile west of Helendale Road. The proposed action includes the construction, operation, maintenance, and decommissioning of a composting facility located on approximately 80 acres of private land. Improvements to an existing access road would cover approximately 6.5 acres.

A right-of-way permit is required from the Bureau to access the proposed facility. The issuance of the right-of-way permit is a federal action and is considered an interrelated and interdependent action with the construction, operation, maintenance, and decommissioning of the facility. Consequently, we have analyzed the effects associated with the improvement and use of the existing access road and the construction, operation, maintenance, and decommissioning of the facility as one action.

Construction

Access Road

Prior to improving the existing access road and to reduce injury and mortality of desert tortoises, Nursery Products would fence both sides of the access road, the intersection of the access road and Helendale Road, and the length of Helendale Road north to State Route 58. Nursery Products would install the fence only on lands managed by the Bureau, which would result in unfenced areas at the junction of State Route 58 and Helendale Road and the intersection of the access road, and Helendale Road (Otahal 2011c). In areas where the fence ends and does not connect with another, Nursery Products will install a short fence , perpendicular to the first, to direct desert tortoises away from traffic. Activities associated with the improvement of the existing access road include widening 1.3 miles of the existing access road, adding approximately 6 feet of unpaved shoulder to either side, and applying a non-asphaltic road

treatment. The installation and maintenance of the desert tortoise exclusion fence would require an additional 2 feet of disturbance along the unpaved shoulders. Nursery Products would install three culverts along the access road to reduce habitat fragmentation and facilitate desert tortoise movement (Figure 3, p.7 in Analytical Environmental Services 2011).

Hawes Composting Facility

Prior to construction of the facility, Nursery Products would delineate the boundaries of the work area and conduct a pre-construction clearance survey. Nursery Products would then install a desert tortoise exclusion fence around the 80-acre project site and conduct another clearance survey. All site development and construction activities would occur within the fenced boundary. Construction of the facility would include removing vegetation, grading the eastern half of the project site, and installing a berm (from soil generated on-site) inside and along the fenced boundary. Equipment and structures within the fenced boundary would include an office trailer, parking, truck scale, materials sorting area, aboveground fuel and water storage tanks, two at-grade water retention ponds, and composting windrows. Solar panels and a generator would provide electricity for the facility.

Operations and Maintenance

The proposed facility would have an operating life of up to 30 years and would operate 7 days a week for up to 14 hours a day (County of San Bernardino 2009). The facility would accept biosolids (solid, semi-solid, or liquid residue generated during the treatment of domestic sewage) and green material (plant material) and compost it on-site. Prior to delivery, all customers would provide documentation of the source, description, and characteristics of the biosolids and green waste. The facility would not accept hazardous waste or loads with excessive litter.

Initially, only grading of the eastern half of the project site would occur. Once the project site is operational, grading of new areas would occur until the entire site is developed (URS 2006). The facility would receive an estimated daily average of 1,100 wet tons of biosolids and green waste (approximately 400,000 wet tons per year; URS 2006). At maximum, the facility would receive 2,000 wet tons of biosolids and green waste daily. The majority of traffic to and from the site would consist of commercial vehicles. Depending on the time of year, the facility would, on average, receive approximately 48 to 87 truckloads (or 96 to 174 daily truck trips) of biosolids and green waste each day.

The facility would receive and process green waste on-site using a grinder. Nursery Products would mix biosolids with the processed green material, forming windrows. During the composting process, equipment would mechanically turn the windrows. At the end of the composting process, Nursery Products may temporarily store the finished product on-site or use it for on-site erosion control. Nursery Products would properly dispose of any non-recoverable or non-marketable residues off-site at a permitted solid waste landfill.

In addition to the regular day-to-day operation of the facility, Nursery Products would need to perform a variety of maintenance actions. All of these maintenance activities would occur within the fenced project boundary. These actions include grading new areas to meet composting needs, repairing the access road (patching and filling the non-asphaltic road treatment), grading the access road shoulder, maintaining the desert tortoise exclusion fence, and controlling dust and common ravens (*Corvus corax*). To reduce dust, Nursery Products would install a berm (previously mentioned in the "Construction" section) inside and along the fenced boundary, and would not turn the windrows when wind speed exceeds 20 miles per hour. Additionally, Nursery Products would water windrows and areas receiving vehicle traffic using either groundwater (pumped on-site) or water collected in the retention ponds. To reduce the attractiveness of the facility to common ravens Nursery Products has developed a raven management plan that manages human-provided subsidies such as food (litter, roadkill), water, and nesting substrates (Seney 2011).

Decommissioning

As part of the decommissioning process, Nursery Products would clean the facility grounds, remaining structures, retention ponds, and drainage areas of all residues (compost materials, construction scraps, other materials related to operation of the facility). Nursery Products would then recycle, reuse, or dispose of these residues. Finally, Nursery Products would clean all machinery and remove or securely store it (URS 2006). Decommissioning of the facility does not include habitat restoration.

Minimization Measures

To minimize adverse effects to the desert tortoise, Nursery Products will implement the following protective measures. We have summarized these measures from the biological assessment (Analytical Environmental Services 2011). We have slightly modified the wording of some measures to improve clarity and added information based on our discussions with the Bureau and Nursery Products (Otahal 2011a). These minimization measures are considered part of the proposed action; therefore, their implementation is required under the terms of the consultation.

The following measures will be implemented prior to project construction:

1. All employees, subcontractors, construction personnel, and other individuals who work within the project area will participate in an awareness program addressing desert tortoise. A Bureau- and Service-approved authorized biologist will administer the program, which include, at minimum, distribution of desert tortoise on and around the project area, general behavior and ecology, sensitivity to human activity, legal protection, penalties for violating State or Federal laws, reporting requirements, and project protective and minimization measures. Personnel who have attended training will receive wallet-sized certification cards, and they will carry those cards when working in the project area.

2. A Bureau- and Service-approved authorized biologist will conduct clearance surveys of the project area at 15-foot intervals and as further described in the incidental take permit (CDFG 2011).

3. Nursery Products will install a permanent desert tortoise exclusion fence around the perimeter of the facility, both sides of the access road, and both sides of Helendale Road from its intersection with the access road north to State Route 58. In locations where the fence ends and does not connect with another, the fence will have a short fence (approximately 5 feet) installed perpendicular to the first (Otahal 2011a).

4. All fencing will be erected in accordance with the West Mojave Plan's *General Guidelines for Tortoise-Proof Fencing in Desert Wildlife Management Areas*.

5. All surveys and reporting requirements will adhere to guidelines outlined in the incidental take permit and the West Mojave Plan's Appendix I Sections I.1.4.3 and I.1.5.

6. Nursery Products will install three desert tortoise culverts along the access road to allow for the passage of desert tortoise from one side of the road to the other.

The following measures will be implemented during project construction:

7. To the extent possible, Nursery Products will use previously disturbed areas within the project area for stockpiling excavated materials, storing equipment, locating office trailers, parking vehicles, and other surface-disturbing activities. The authorized biologist will assist the project foreman in locating such areas to avoid desert tortoise mortality and minimize impacts to habitat.

8. Nursery Products will confine the area of disturbance to the smallest practical area within the project area considering topography, placement of facilities, location of desert tortoise burrows, public health and safety, and other limiting factors. Nursery Products will delineate work area boundaries with flagging or other marking to minimize surface disturbance outside the approved work area.

9. Vegetation clearing activities will occur only after the desert tortoise exclusion fence is installed and clearance surveys are completed. An authorized biologist will remain on-site until all vegetation clearing activities are completed.

10. An authorized biologist will monitor the project area during construction activities for any human-provided subsidies of food or water and work with personnel to eliminate and/or minimize these subsidies. Examples would include maintaining all waste receptacles with proper covers and monitoring the watering of the project area to reduce dust so that puddles of water are not produced that remain for over two hours. Nursery Products will also slope the site to prevent the formation of puddles.

11. The authorized biologist will follow the appropriate guidelines outlined in the Desert Tortoise Council's 1999 *Guidelines for Handling Desert Tortoises During Construction Projects* or the most up-to-date guidelines.

12. Before moving vehicles and equipment, all workers will check for the presence of desert tortoise under vehicles and equipment before they are moved.

13. Standard precautions and water quality best management practices, as described in the environmental impact report, supplemental impact report, and the Regional Water Quality Control Board's waste discharge requirement permit will be employed by the construction contractor to prevent the accidental release of fuel, oil, lubricant, or other hazardous materials associated with construction activities.

14. The retention ponds will have steep sides to minimize utilization of the project area by common ravens.

The following measures will be implemented during operation and maintenance of the facility:

15. Within the fire break of the property and a 500-foot buffer outside the fire break, Nursery Products will conduct baseline studies for invasive plant species. For the first five years of monitoring, Nursery Products will conduct annual spring surveys. Absent the detection of invasive species, the frequency of monitoring will change to once every 4 years (County of San Bernardino 2009).

16. Nursery Products will apply an herbicide to exotic or invasive plant species to prevent their dispersal onto Bureau property and adjacent habitat (County of San Bernardino 2009).

17. Nursery Products will maintain the desert tortoise exclusion fence for the life of the project. Nursery Products will inspect the fence quarterly and following any significant rain event when water or debris flows could damage the fence. Nursery Products will repair any fence damage within 7 days. If repairs occur after 7 days, Nursery Products will confer with the Bureau regarding any additional protective measures. This may include the need for a resurvey of some of the fenced area (Otahal 2011a).

18. Nursery Products will post and maintain signs regarding travel and use restrictions (no firearms, off-road vehicle travel, and 20 mile per hour speed limit).

19. During operation of the facility, Nursery Products will ensure that new employees entering the project area, including truck drivers, delivery personnel, and other facility-related personnel, receive desert tortoise awareness training.

20. Nursery Products will implement a raven management plan during the life of the project that includes (but is not limited to) the following measures: proper trash disposal,

monitoring and prompt removal of all sources of standing water, and the removal or destruction of any identified perch or nest locations .

21. To minimize attracting common ravens to the facility, Nursery Products will empty retention ponds of standing water within 30 days of accumulation.

22. To reduce dust, Nursery Products will refrain from turning windrows when wind speeds exceed 20 miles per hour.

Compensation

Nursery Products will compensate for the acres of habitat lost as a result of the development of the facility and improvement of the access road. Nursery Products will purchase and provide for the protection and management of 295.5 acres of desert tortoise habitat consistent with the requirements in the California Fish and Game Incidental Take Permit for the project (CDFG 2010).

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 describes 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 analyzes 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 determine 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 evaluate the effects of future, non-Federal activities in the action area on the desert tortoise.

Adverse Modification 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 result in the destruction or adverse modification of the critical habitat of listed species. This biological opinion does not rely on the

regulatory definition of “destruction or adverse modification” of critical habitat at 50 CFR 402.02. Instead, we have relied on the statutory provisions of the ESA 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 describes 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 analyzes 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.

STATUS OF THE SPECIES AND CRITICAL HABITAT

The following summarizes the rangewide status of the desert tortoise and its designated critical habitat, which includes information on its listing history, recovery plan, recovery and critical habitat units (CHUs), species account, reproduction, population distribution and monitoring, and threats.

Listing History

On August 20, 1980, the Service published a final rule listing the Beaver Dam Slope population of the desert tortoise in Utah as threatened (45 FR 55654). In the 1980 listing of the Beaver Dam Slope population, the Service concurrently designated 26 square miles of the BLM -administered land in Utah as critical habitat. The reason for listing was population declines because of habitat deterioration and past over-collection. Major threats to the desert tortoise identified in the rule included habitat destruction through development, overgrazing, and geothermal development, collection for pets, malicious killing, road kills, and competition with grazing or feral animals.

On August 4, 1989, the Service published an emergency rule listing the Mojave population of the desert tortoise as endangered (54 FR 42270). On April 2, 1990, the Service determined the Mojave population of the desert tortoise to be threatened (55 FR 12178). Reasons for the determination included significant population declines, loss of habitat from construction projects such as roads, housing and energy developments, and conversion of native habitat to agriculture. Livestock grazing and off-highway vehicle (OHV) activity have degraded additional habitat. Also cited as threatening the desert tortoise's continuing existence were: illegal collection by humans for pets or consumption; upper respiratory tract disease (URTD); predation on juvenile desert tortoises by common ravens, coyotes (*Canis latrans*), and kit foxes (*Vulpes macrotis*); fire; and collisions with vehicles on paved and unpaved roads.

On February 8, 1994, the Service designated approximately 6.45 million acres of critical habitat for the Mojave population of the desert tortoise in portions of California (4,750,000 acres), Nevada (1,220,000 acres), Arizona (339,000 acres), and Utah (129,000 acres) (59 FR 5820-5846, also see corrections in 59 FR 9032-9036), which became effective on March 10, 1994.

Recovery Plan

On June 28, 1994, the Service approved the final Desert Tortoise (Mojave Population) Recovery Plan (1994 Recovery Plan) (Service 1994). The 1994 Recovery Plan divided the range of the desert tortoise into 6 recovery units and recommended establishment of 14 desert wildlife management areas (DWMAs) throughout the recovery units. Within each DWMA, the 1994 Recovery Plan recommended implementation of reserve-level protection of desert tortoise populations and habitat, while maintaining and protecting other sensitive species and ecosystem functions. The design of DWMAs should follow accepted concepts of reserve design. As part of the actions needed to accomplish recovery, the 1994 Recovery Plan recommended that land management within all DWMAs should restrict human activities that negatively impact desert tortoises (Service 1994). The DWMAs/ACECs have been designated by the BLM through development or modification of their land-use plans in Arizona, Nevada, Utah, and parts of California.

The U.S. General Accounting Office (GAO) Report, *Endangered Species: Research Strategy and Long-Term Monitoring Needed for the Mojave Desert Tortoise Recovery Program* (GAO 2002), directed the Service to periodically reassess the 1994 Recovery Plan to determine whether scientific information developed since its publication could alter implementation actions or allay some of the uncertainties about its recommendations. In response to the GAO report, the Service initiated a review of the 1994 Recovery Plan in 2003. In March 2003, the Service impaneled the Desert Tortoise Recovery Plan Assessment Committee (Committee) to assess the 1994 Recovery Plan. The charge to the Committee was to review the entire 1994 Recovery Plan in relation to contemporary knowledge to determine which parts of the 1994 Recovery Plan needed updating. The recommendations of the Committee were presented to the Service and Desert Tortoise Management Oversight Group on March 24, 2004 (Tracy et al. 2004). The recommendations were used as a guide by a recovery team of scientists and stakeholders to modify the 1994 Recovery Plan.

On November 3, 2004, the Service announced the formation of the DTRO. The DTRO is revising the 1994 Recovery Plan and coordinating with regional recovery implementation work groups to develop 5-year recovery action plans under the umbrella plan. A draft revision of the recovery plan was released to the public on August 4, 2008 (Service 2008). The Service anticipates a final recovery plan in 2011.

The draft recovery plan identifies three recovery objectives:

1. Maintain self-sustaining populations of desert tortoises within each recovery unit into the future.

2. Maintain well-distributed populations of desert tortoises throughout each recovery unit.

3. Ensure that habitat within each recovery unit is protected and managed to support long-term viability of desert tortoise populations.

Recovery objectives and criteria generally will be measured within tortoise conservation areas or other areas identified by Recovery Implementation Teams, and they are not independent of each other but must be evaluated collectively. Recovery does not depend on absolute numbers of tortoises or comparisons to pre-listing estimates of tortoise populations, but rather the reversal of downward population trends and elimination or reduction of threats that initiated the listing.

Recovery Units

Northeastern Mojave Recovery Unit

The 1994 Recovery Plan delineates the Northeastern Mojave Recovery Unit to occur primarily in Nevada, but it also extends into California along the Ivanpah Valley and into extreme southwestern Utah and northwestern Arizona. Vegetation within this unit is characterized by creosote bush scrub, big galleta-scrub steppe, desert needlegrass scrub-steppe, and blackbrush scrub (in higher elevations). Topography is varied, with flats, valleys, alluvial fans, washes, and rocky slopes. Much of the northern portion of the Northeastern Mojave Recovery Unit is characterized as basin and range, with elevations from 2,500 to 12,000 feet. Desert tortoises typically eat summer and winter annuals, cacti, and perennial grasses. Since the northern portion of this recovery unit represents the northernmost distribution of the species, desert tortoises are typically found in low densities (about 10 to 20 adults per square mile). The proposed project would be located in the Northeastern Mojave Recovery Unit.

The Northeastern Mojave Recovery Unit includes the Mormon Mesa, Coyote Spring, Beaver Dam Slope and Gold Butte-Pakoon DWMAs; and a portion of the Piute-Eldorado DWMAs. These areas generally overlap the Mormon Mesa, Piute-Eldorado, Beaver Dam Slope, and Gold Butte-Pakoon CHUs.

Using the U.S. Geological Survey habitat model (Nussear et al. 2009) and a 0.5 probability threshold based on the prevalence approach, the Service estimates that about one half of the Northeastern Mojave Recovery Unit contains potential desert tortoise habitat (approximately 4,853,368 acres). Although this analysis likely omits some marginal desert tortoise habitat, it explains the occurrence of 95 percent of the 938 test points used in the model. This analysis does not consider habitat loss, fragmentation, or degradation associated with human-caused impacts.

Eastern Mojave Recovery Unit

The 1994 Recovery Plan delineates the Eastern Mojave Recovery Unit to occur primarily in California, but also extends into Nevada in the Amargosa, Pahrump, and Piute valleys. The Ivanpah, Piute-Eldorado, and Fenner DWMAs are included in the Eastern Mojave Recovery Unit, which generally overlap the Ivanpah and Piute-Eldorado CHUs in California. In the Eastern Mojave Recovery Unit, desert tortoises are often active in late summer and early autumn in addition to spring because this region receives both winter and summer rains and supports two distinct annual floras on which they can feed. Desert tortoises in the Eastern Mojave Recovery Unit occupy a variety of vegetation types and feed on summer and winter annuals, cacti, perennial grasses, and herbaceous perennials. They den singly in caliche caves, bajadas, and washes. This recovery unit is isolated from the Western Mojave Recovery Unit by the Baker Sink, a low-elevation, extremely hot and arid strip that extends from Death Valley to Bristol Dry Lake. The Baker Sink area is generally not considered suitable for desert tortoises. Desert tortoise densities in the Eastern Mojave Recovery Unit can vary dramatically, ranging from 5 to as much as 350 adults per square mile (Service 1994).

Northern Colorado Recovery Unit

The 1994 Recovery Plan delineates the Northern Colorado Recovery Unit completely in California. The 874,843-acre Chemehuevi DWMA is the sole conservation area for the desert tortoise in this recovery unit. Desert tortoises in this recovery unit are found in the valleys, on bajadas and desert pavements, and to a lesser extent in the broad, well-developed washes. They feed on both summer and winter annuals and den singly in burrows under shrubs, in intershrub spaces, and rarely in washes. The climate is somewhat warmer than in other recovery units, with only 2 to 12 freezing days per year.

Eastern Colorado Recovery Unit

The 1994 Recovery Plan delineates the Eastern Colorado Recovery Unit completely in California. The Chuckwalla DWMA and CHU, and a portion of the Joshua Tree DWMA and Pinto Basin CHU, occur in this recovery unit. This recovery unit occupies well-developed washes, desert pavements, piedmonts, and rocky slopes characterized by relatively species-rich succulent scrub, creosote bush scrub, and Blue Palo Verde-Ironwood-Smoke Tree communities. Winter burrows are generally shorter in length, and activity periods are longer than elsewhere due to mild winters and substantial summer precipitation. The desert tortoises feed on summer and winter annuals and some cacti; they den singly.

Western Mojave Recovery Unit

The 1994 Recovery Plan delineates the Western Mojave Recovery Unit completely in California. It is composed of the Western Mojave, Southern Mojave, and Central Mojave regions which are exceptionally heterogeneous and have broad, indistinct boundaries due to gradational transitions among sub-regions and with surrounding areas. The central Mojave is topographically and climatically transitional between the southwestern and eastern Mojave Desert. The south-central Mojave is a transitional region to the Colorado/Sonoran Desert, and the southern half of this region is similar climatically and floristically to the eastern Mojave. Many of the differences in

vegetation among these regions can be explained by differences in climate, which varies linearly across the range of the desert tortoise. The most pronounced difference between the Western Mojave and other recovery units is in timing of rainfall and the resulting vegetation. Most rainfall occurs in fall and winter and produces winter annuals, which are the primary food source of desert tortoises. Above ground activity occurs primarily in spring, associated with winter annual production. Thus, desert tortoises are adapted to a regime of winter rains and rare summer storms. Here, desert tortoises occur primarily in valleys, on alluvial fans, bajadas, and rolling hills in saltbush, creosote bush, and scrub steppe communities. Desert tortoises dig deep burrows (usually located under shrubs on bajadas) for winter hibernation and summer aestivation. These desert tortoises generally den singly.

Four DWMAs occur wholly or partially within the Western Mojave Recovery Unit: Fremont-Kramer, Ord-Rodman, Superior-Cronese, and Joshua Tree. These areas approximate the Fremont-Kramer, Ord-Rodman, Superior-Cronese, and Pinto Basin CHUs.

Upper Virgin River Recovery Unit

The 1994 Recovery Plan delineates the Upper Virgin River Recovery Unit to encompass all desert tortoise habitat in Washington County, Utah, except the Beaver Dam Slope, Utah population. Only the Upper Virgin River DWMA and CHU occur in this recovery unit. The desert tortoise population in the area of St. George, Utah is at the extreme northeastern edge of the species' range and experiences long, cold winters (about 100 freezing days) and mild summers, during which the desert tortoises are continually active. Here the desert tortoises live in a complex topography consisting of canyons, mesas, sand dunes, and sandstone outcrops where the vegetation is a transitional mixture of sagebrush scrub, creosote bush scrub, blackbush scrub, and a psammophytic community. Desert tortoises use sandstone and lava caves instead of burrows, travel to sand dunes for egg-laying, and use still other habitats for foraging. Two or more desert tortoises often use the same burrow.

Species Account

The desert tortoise is a large, herbivorous reptile that occurs in portions of California, Arizona, Nevada, and Utah. It also occurs in Sonora and Sinaloa, Mexico. The Mojave population of the desert tortoise includes those desert tortoises living north and west of the Colorado River in the Mojave Desert of California, Nevada, Arizona, southwestern Utah, and in the Sonoran Desert in California.

Desert tortoises reach 8 to 15 inches in carapace length and 4 to 6 inches in shell height. Hatchlings emerge from the eggs at about 2 inches in length. Adults have a domed carapace and relatively flat, unhinged plastron. Their shells are high-domed, and greenish-tan to dark brown in color with tan scute centers. Desert tortoises weigh 8 to 15 pounds when fully grown. The forelimbs have heavy, claw-like scales and are flattened for digging, while hind limbs are more stumpy and elephantine.

Optimal habitat for the desert tortoise has been characterized as creosote bush scrub in which precipitation ranges from 2 to 8 inches, where a diversity of perennial plants is relatively high, and production of ephemerals is high (Luckenbach 1982; Turner 1982; Turner and Brown 1982). Soils must be friable enough for digging burrows, but firm enough so that burrows do not collapse. Desert tortoises occur from below sea level to an elevation of 7,300 feet, but the most favorable habitat occurs at elevations of approximately 1,000 to 3,000 feet (Luckenbach 1982). Neonate desert tortoises use abandoned rodent burrows for daily and winter shelter; these burrows are often shallowly excavated and run parallel to the surface of the ground.

Desert tortoises are most commonly found within the desert scrub vegetation type, primarily in creosote bush scrub. In addition, they occur in succulent scrub, cheesebush scrub, blackbrush scrub, hopsage scrub, shadscale scrub, microphyll woodland, Mojave saltbush-allscale scrub and scrub-steppe vegetation types of the desert and semidesert grassland complex (Service 1994). Within these vegetation types, desert tortoises potentially can survive and reproduce where their basic habitat requirements are met. These requirements include a sufficient amount and quality of forage species; shelter sites for protection from predators and environmental extremes; suitable substrates for burrowing, nesting, and overwintering; various plants for shelter; and adequate area for movement, dispersal, and gene flow. Throughout most of the Mojave Desert region, desert tortoises occur most commonly on gently sloping terrain with soils ranging from sandy-gravel and with scattered shrubs, and where there is abundant inter-shrub space for growth of herbaceous plants. Throughout their range, however, desert tortoises can be found in steeper, rockier areas (Gardner and Brodie 2000).

The size of desert tortoise home ranges varies with respect to location and year. Desert tortoise activities are concentrated in overlapping core areas, known as home ranges. In the western Mojave Desert, Harless et al. (2007) estimated mean home ranges for desert tortoises to be 111 acres for males and 40 acres for females. Over its lifetime, each desert tortoise may require more than 1.5 square miles of habitat and make forays of more than 7 miles at a time (Berry 1986). In drought years, the ability of desert tortoises to drink while surface water is available following rains may be crucial for desert tortoise survival. During droughts, desert tortoises forage over larger areas, increasing the likelihood of encounters with sources of injury or mortality including humans and other predators.

Desert tortoises spend most of the year in subterranean burrows or caliche caves (Nagy and Medica 1986). Desert tortoises in the west Mojave are primarily active in May and June, with a secondary activity period from September through October. In Nevada and Arizona, desert tortoises are considered to be most active from approximately March 1 through October 31. Their activity patterns are primarily controlled by ambient temperature and precipitation (Nagy and Medica 1986; Zimmerman *et al*. 1994). In the east Mojave and Colorado Deserts, annual precipitation occurs in both summer and winter, providing food and water to desert tortoises throughout much of the summer and fall. Most precipitation occurs in winter in the West Mojave Desert, resulting in an abundance of annual spring vegetation, which dries up by late May or June. Neonate desert tortoises emerge from their winter burrows as early as late January to take advantage of freshly germinating annual plants through the spring. Under certain

conditions desert tortoises may be aboveground any month of the year, particularly during periods of mild or rainy weather in summer and winter.

During active periods, they usually spend nights and the hotter part of the day in their burrow; they may also rest under shrubs or in shallow burrows (pallets). Desert tortoises may use an average of 7 to 12 burrows at any given time (Bulova 1994; TRW Environmental Safety Systems Inc. 1997). Walde et al. (2003) observed that desert tortoises retreated into burrows when air temperature reached 91.0˚ Fahrenheit (F) ± 3.55˚ F and ground temperatures reached 94.6˚ F ± 6.05˚ F; 95 percent of observations of desert tortoises aboveground occurred at air temperatures less than 91˚ F. The body temperature at which desert tortoises become incapacitated ranges from 101.5˚ F to 113.2˚ F (Naegle 1976; Zimmerman et al. 1994).

Although desert tortoises eat non-native plants, they generally prefer native forbs when available (Jennings 1993; Avery 1998). Consumption of non-native plants may cause desert tortoises to have a nitrogen and water deficit (Henen 1997). Droughts frequently occur in the desert, resulting in extended periods of low water availability. Periods of extended drought place desert tortoises at even greater water and nitrogen deficit than during moderate or high rainfall years (Peterson 1996; Henen 1997). During a drought, more nitrogen than normal is required to excrete nitrogenous wastes, thus more rapidly depleting nitrogen stored in body tissues. Plants also play important roles in stabilizing soil and providing cover for protection of desert tortoises from predators and heat.

The U.S. Geological Survey modeled desert tortoise habitat across the range of the desert tortoise (Nussear et al. 2009). This model, which is based on 3,753 desert tortoise locations, uses 16 environmental variables, such as precipitation, geology, vegetation, and slope. In addition, Nussear et al. used 938 additional occurrence locations to test the model's accuracy. Using this model and a 0.5 probability threshold based on the prevalence approach, the Service estimates that there are approximately 20,542,646 acres of potential desert tortoise habitat rangewide. This analysis likely omits some marginal desert tortoise habitat, and it does not consider habitat loss, fragmentation, or degradation associated with human-caused impacts; however, it provides a reference point relative to the amount of desert tortoise habitat.

Further information on the range, biology, habitat, and ecology of the desert tortoise is available in: Bury (1982); Bury and Germano (1994); Ernst et al. (1994); Jennings (1997); Service (2008); Tracy et al. 2004; Van Devender (2002); and collected papers in Chelonian Conservation and Biology (2002, Vol. 4, No. 2), Herpetological Monographs (1994, No. 8), and the Desert Tortoise Council Proceedings.

Reproduction

Desert tortoises possess a combination of life history and reproductive characteristics that affect the ability of populations to survive external threats. Desert tortoises grow slowly, require 15 to 20 years to reach sexual maturity, and have low reproductive rates during a long period of reproductive potential (Turner et al. 1984; Bury 1987; Tracy et al. 2004).

Choice of mate is mediated by aggressive male-male interactions and possibly by female choice (Niblick et al. 1994). Desert tortoises in the West Mojave Desert may exhibit pre-breeding dispersal movements, typical of other vertebrates, ranging from 1 to 10 miles in a single season (Sazaki et al. 1995). The advantage of pre-breeding dispersal may be to find a more favorable environment in which to reproduce. However, risks include increased mortality from predation, exposure, starvation, or anthropogenic factors (e.g., motor vehicle mortality).

The average clutch size is 4.5 eggs (range 1 to 8; on rare occasions, clutches can contain up to 15 eggs), with 0-3 clutches deposited per year (Turner et al. 1986). Clutch size and number probably depend on female size, water, and annual productivity of forage plants in the current and previous year (Turner et al. 1984, 1986; Henen 1997). The eggs typically hatch from late August through early October. The ability to alter reproductive output in response to resource availability may allow individuals more options to ensure higher lifetime reproductive success. The interaction of longevity, late maturation, and relatively low annual reproductive output causes desert tortoise populations to recover slowly from natural or anthropogenic decreases in density. To ensure stability or increased populations, these factors also require relatively high juvenile survivorship (75 to 98 percent per year), particularly when adult mortality is elevated (Congdon et al. 1993). Bjurlin and Bissonette (2004) determined that 74 percent of desert tortoise nests survived and, over 2 years, 84 and 91 percent of the neonates survived the initial period of post-hatching dispersal. They predicted that 40 percent of eggs produce hatchlings that survive to hibernation at their study site. Desert tortoises generally lay eggs from mid-May to early July, but occasionally as late as October (Ernst et al. 1994). Eggs are laid in sandy or friable soil, often at the entrance to burrows. Hatching occurs 90 to 120 days later, mostly in late summer and fall (mid-August to October). Eggs and young are untended by the parents.

Desert tortoise sex determination is environmentally controlled during incubation (Spotila et al. 1994). Hatchlings develop into females when the incubation (i.e., soil) temperature is greater than 88.7° F and males when the temperature is below that (Spotila et al. 1994). Mortality is higher when incubation temperatures are greater than 95.5° F or less than 78.8° F. The sensitivity of embryonic desert tortoises to incubation temperature may make populations vulnerable to unusual changes in soil temperature (e.g., from changes in vegetation cover).

At Yucca Mountain in Nye County, Nevada (Northeastern Mojave Recovery Unit), Mueller et al. (1998) estimated that the mean age of first reproduction was 19 to 20 years; clutch size (1 to 10 eggs) and annual fecundity (0 to 16 eggs) were related to female size but annual clutch frequency (0 to 2) was not. Further, Mueller suggested that body condition during July to October may determine the number of eggs a desert tortoise can produce the following spring. McLuckie and Fridell (2002) determined that the Beaver Dam Slope desert tortoise population, within the Northeastern Mojave Recovery Unit, had a lower clutch frequency (1.33 ± 0.14) per reproductive female and fewer reproductive females (14 out of 21) when compared with other Mojave desert tortoise populations. In the 1990s, Beaver Dam Slope experienced dramatic population declines due primarily to disease, and habitat degradation and alteration (Service 1994). 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 (Henen 1997; McLuckie and Fridell 2002).

Population Distribution and Monitoring

Patterns of desert tortoise distribution are available from preliminary spatial analyses in Tracy et al. (2004). Their analyses revealed areas with higher probabilities of encountering both live and dead desert tortoises. In the western Mojave Desert, areas with concentrations of dead desert tortoises without corresponding concentrations of live desert tortoises were generally the same areas where declines have been observed in the past, namely the northern portion of the Fremont-Kramer CHU and the northwestern part of the Superior-Cronese CHU. Limited data revealed large areas where dead desert tortoises, but no live desert tortoises, were observed in the Piute-Eldorado Valley and northern Coyote Spring Valley, Nevada, and the western and southern portions of the Ivanpah Valley CHU in California. Most other recently sampled areas (mostly within critical habitat) reveal continued desert tortoise presence, although local population declines are known within some of these areas, such as the Beaver Dam Slope, Arizona.

Rangewide desert tortoise population monitoring began in 2001 and is conducted annually. The status and trends of desert tortoise populations are difficult to determine based only upon assessment of desert tortoise density due largely to their overall low abundance, subterranean sheltering behavior, and cryptic nature of the species. Thus, monitoring and recovery should include a comprehensive assessment of the status and trends of threats and habitats as well as population distribution and abundance. Studies during early research on desert tortoises focused on basic biology and demography and were largely centered in areas with high densities of desert tortoises. These high-density areas were used to establish permanent (long-term) study plots that have been studied at various intervals from 1979 through the present, while some low-density plots were discontinued (Berry and Burge 1984; K. Berry, U.S. Geological Survey, pers. comm. 2003, as reported in Tracy et al. 2004). However, historic estimates of desert tortoise density or abundance do not exist at the range-wide or regional level for use as a baseline. While a substantial body of data has been collected from long-term study plots and other survey efforts over the years, plot placement is generally regarded as a factor limiting demographic and trend conclusions only to those specific areas. Tracy et al. (2004) concluded that estimating accurate long-term trends of desert tortoise populations, habitat, and/or threats across the range was not feasible based on the combined suite of existing data and analyses. Instead, these data provide general insight into the rangewide status of the species and show appreciable declines at the local level in many areas (Luke et al. 1991; Berry 2003; Tracy et al. 2004).

In an attempt to refine the long-term monitoring program for the desert tortoise, annual rangewide population monitoring using line distance transects began in 2001 (1999 in the Upper Virgin River Recovery Unit; McLuckie et al. 2006) and is the first comprehensive effort undertaken to date to estimate densities across the range of the species (Service 2006). Rangewide sampling was initiated during a severe drought that intensified in 2002 and 2003, particularly in the western Mojave Desert in California. At the time the 1994 Recovery Plan was written, there was less consideration of the potentially important role of drought in the

desert ecosystem, particularly regarding desert tortoises. In the meantime, studies have documented vulnerability of juvenile (Wilson et al. 2001) and adult desert tortoises (Peterson 1994, Peterson 1996, Henen 1997, Longshore et al. 2003) to drought.

The monitoring program is designed to detect long-term population trends, so density estimates from any brief time period (e.g., 2001 to 2005) would be expected to detect only catastrophic declines or remarkable population increases. Therefore, following the first 5 years of the long-term monitoring project, the goal was not to document trends within this time period, but to gather information on baseline densities and annual and regional (between recovery unit) variability (Service 2006). Density estimates of adult desert tortoises varied among recovery units and years. Only if this variability is associated with consistent changes between years will monitoring less than 25 years describe important trends. For instance, considerable decreases in density were reported in 2003 in the Eastern Colorado and Western Mojave recovery units, with no correspondingly large rebound in subsequent estimates (Service 2006). Until the underlying variability that may affect our interpretation of these first years of data can be identified, inferences as to the meaning of these data should not be made. Over the first 5 years of monitoring, desert tortoises were least abundant in the Northeast Mojave Recovery Unit (0.68 to 8.30 desert tortoises per square kilometer [1.7 to 21.5 desert tortoises per square mile] (Service 2009).

There are many natural causes of mortality, but their extents are difficult to evaluate and vary from location to location. Native predators known to prey on desert tortoise eggs, hatchlings, juveniles, and adults include: coyote, kit fox, badger (*Taxidea taxus*), skunks (*Spilogale putorius*), common ravens, golden eagles (*Aquila chrysaetos*), and Gila monsters (*Heloderma suspectum*). Additional natural sources of mortality to eggs, juvenile, and adults may include desiccation, starvation, being crushed (including in burrows), internal parasites, disease, and being turned over onto their backs during fights or courtship (Luckenbach 1982, Turner et al. 1987). Free-roaming dogs cause mortality, injury, and harassment of desert tortoises (Evans 2001). Population models indicate that for a stable population to maintain its stability, on average, no more than 25 percent of the juveniles and 2 percent of the adults can die each year (Congdon et al. 1993, Service 1994). However, adult mortality at one site in the western Mojave Desert was 90 percent over a 13-year period (Berry 1997). Morafka et al. (1997) reported 32 percent mortality over five years among free-ranging and semi-captive hatchling and juvenile desert tortoises (up to five years old) in the western Mojave Desert. When the 26 that were known to have been preyed on by ravens were removed from the analysis, mortality dropped to 24 percent. Turner et al. (1987) reported an average annual mortality rate of 19 to 22 percent among juveniles over a nine-year period in the eastern Mojave Desert.

Declines in desert tortoise abundance appear to correspond with increased incidence of disease in some desert tortoise populations. The Goffs permanent study plot in Ivanpah Valley, California, suffered 92 to 96 percent decreases in desert tortoise density between 1994 and 2000 (Berry 2003). The high prevalence of disease in Goffs desert tortoises likely contributed to this decline (Christopher et al. 2003). Upper respiratory tract disease has not yet been detected at permanent study plots in the Colorado Desert of California, but is prevalent at study plots across the rest of

the species' range (Berry 2003) and has been shown to be a contributing factor in population declines in the western Mojave Desert (Brown et al. 2002; Christopher et al. 2003). High mortality rates at permanent study plots in the northeastern and eastern Mojave Desert appear to be associated with incidence of shell diseases in desert tortoises (Jacobson et al. 1994). Low levels of shell diseases were detected in many populations when the plots were first established, but were found to increase during the 1980s and 1990s (Jacobson et al. 1994; Christopher et al. 2003). A herpesvirus has recently been discovered in desert tortoises, but little is known about its effects on desert tortoise populations at this time (Berry et al. 2002; Origgi et al. 2002).

The general trend for desert tortoises within the California Desert is one of decline. Tracy et al. (2004) concluded that the apparent downward trend in desert tortoise populations in the western portion of the range that was identified at the time of listing is valid and ongoing. Results from other portions of the range were inconclusive, but recent surveys of some populations found too few desert tortoises to produce population estimates (e.g., 2000 survey of the Beaver Dam Slope, Arizona), suggesting that declines may have occurred more broadly. Transects surveyed in the Western Mojave Recovery Unit that did not detect any sign over large areas of previously-occupied habitat, and the numerous carcasses found on permanent study plots provide evidence of a decline. During line distance sampling conducted in 8 DWMAs in California in 2003, 930 carcasses and 438 live desert tortoises were detected; more carcasses than live desert tortoises were detected in every study area (Woodman 2004). In 2004, workers conducting line distance sampling in California detected 1,796 carcasses and 534 live desert tortoises; more carcasses were detected than live desert tortoises in every study area (Woodman 2005). Below, we elaborate on patterns within each recovery unit.

Northeastern Mojave Recovery Unit

A kernel analysis was conducted in 2003-2004 for the desert tortoise (Tracy et al. 2004) as part of the reassessment of the 1994 Recovery Plan. The kernel analyses revealed several areas in which the kernel estimations for live desert tortoises and carcasses did not overlap. The pattern of non-overlapping kernels that is of greatest concern is those in which there were large areas where the kernels encompassed carcasses but not live animals. These regions represent areas within DWMAs where there were likely recent die-offs or declines in desert tortoise populations. The kernel analysis indicated large areas in the Piute-Eldorado Valley where there were carcasses but no live desert tortoises. For this entire area in 2001, there were 103 miles of transects walked, and a total of 6 live and 15 dead desert tortoises found, resulting in a live encounter rate of 0.06 desert tortoises per mile of transect for this area. This encounter rate was among the lowest that year for any of the areas sampled in the range of the Mojave desert tortoise (Tracy et al. 2004).

Results of desert tortoise surveys at three survey plots in Arizona indicate that all three sites have experienced significant die-offs. Six live desert tortoises were located in a 2001 survey of the Beaver Dam Slope Exclosure Plot (Walker and Woodman 2002). Three had definitive signs of URTD, and two of those also had lesions indicative of cutaneous dyskeratosis. Previous surveys of this plot detected 31 live desert tortoises in 1996, 20 live desert tortoises in 1989, and 19 live desert tortoises in 1980. The 2001 survey report indicated that it is likely that there is no longer a

reproductively viable population of desert tortoises on this study plot. Thirty-seven live desert tortoises were located in a 2002 survey of the Littlefield Plot (Young et al. 2002). None had definitive signs of URTD. Twenty-three desert tortoises had lesions indicative of cutaneous dyskeratosis. Previous surveys of this plot detected 80 live desert tortoises in 1998 and 46 live desert tortoises in 1993. The survey report indicated that the site might be in the middle of a die-off due to the high number of carcasses found since the site was last surveyed in 1998. Nine live desert tortoises were located during the mark phase of a 2003 survey of the Virgin Slope Plot (Goodlett and Woodman 2003). The surveyors determined that the confidence intervals of the population estimate would be excessively wide and not lead to an accurate population estimate, so the recapture phase was not conducted. One desert tortoise had definitive signs of URTD. Seven desert tortoises had lesions indicative of cutaneous dyskeratosis. Previous surveys of this plot detected 41 live desert tortoises in 1997 and 15 live desert tortoises in 1992. The survey report indicated that the site may be at the end of a die-off that began around 1996-1997.

Eastern Mojave Recovery Unit

The permanent study plot in the Ivanpah Valley is the only such plot in this DWMA; consequently, we cite information from that plot herein, although it is located within the Mojave National Preserve. Data on desert tortoises on a permanent study plot in this area were collected in 1980, 1986, 1990, and 1994; the densities of desert tortoises of all sizes per square mile were 386, 393, 249, and 164, respectively (Berry 1996).

The Shadow Valley DWMA lies north of the Mojave National Preserve and west of the Clark Mountains. It occupies approximately 101,355 acres. Data on desert tortoises on a permanent study plot in this area were collected in 1988 and 1992; the densities of desert tortoises of all sizes per square mile were 50 and 58, respectively (Berry 1996).

The Piute-Fenner DWMA lies to the east of the southeast portion of the Mojave National Preserve. It occupies approximately 173,850 acres. The permanent study plot at Goffs is the only such plot in this DWMA; consequently, we cite information from that plot herein, although it is located within the Mojave National Preserve. Data on desert tortoises on the permanent study plot were collected in 1980, 1990, and 1994; Berry (1996) estimated the densities of desert tortoises of all sizes at approximately 440, 362, and 447 individuals per square mile, respectively. As Berry (1996) noted, these data seem to indicate that this area supported “one of the more stable, high density populations” of desert tortoises within the United States. Berry (1996) also noted that “a high proportion of the desert tortoises (had) shell lesions.” In 2000, only 30 live desert tortoises were found; Berry (2003) estimated the density of desert tortoises at approximately 88 desert tortoises per square mile. The shell and skeletal remains of approximately 393 desert tortoises were collected; most of these desert tortoises died between 1994 and 2000. Most of the desert tortoises exhibited signs of shell lesions; three salvaged desert tortoises showed abnormalities in the liver and other organs and signs of shell lesions. None of the three salvaged desert tortoises tested positive for upper respiratory tract disease.

Ivanpah and Piute-Eldorado valleys contained study plots that were analyzed in the Eastern Mojave Recovery Unit analysis. While there was no overall statistical trend in adult density over

time, the 2000 survey at Goffs and the 2002 survey at Shadow Valley indicate low densities of adult desert tortoises relative to earlier years. Unfortunately, there are no data in the latter years for all five study plots within this recovery unit, and therefore, while there is no statistical trend in adult densities, we cannot conclude that desert tortoises have not experienced recent declines in this area. The probability of finding a carcass on a distance sampling transect was considerably higher for Ivanpah, Chemehuevi, Fenner, and Piute-Eldorado, which make up the Eastern Mojave Recovery Unit.

Northern Colorado Recovery Unit

Two permanent study plots are located within the Chemehuevi DWMA. At the Chemehuevi Valley and Wash plot, 257 and 235 desert tortoises were registered in 1988 and 1992, respectively (Berry 1999). During the 1999 spring survey, only 38 live desert tortoises were found. The shell and skeletal remains of at least 327 desert tortoises were collected; most, if not all, of these desert tortoises died between 1992 and 1999. The frequency of shell lesions and nutritional deficiencies appeared to be increasing and may be related to the mortalities.

The Upper Ward Valley permanent study plot was surveyed in 1980, 1987, 1991, and 1995; Berry (1996) estimated the densities of desert tortoises of all sizes at approximately 437, 199, 273, and 447 individuals per square mile, respectively.

Eastern Colorado Recovery Unit

Two permanent study plots are located within this DWMA. At the Chuckwalla Bench plot, Berry (1996) calculated approximate densities of 578, 396, 167, 160, and 182 desert tortoises per square mile in 1979, 1982, 1988, 1990, and 1992, respectively. At the Chuckwalla Valley plot, Berry (1996) calculated approximate densities of 163, 181, and 73 desert tortoises per square mile in 1980, 1987, and 1991, respectively. Tracy et al. (2004) concluded that these data show a statistically significant decline in the number of adult desert tortoises over time; they further postulate that the decline on the Chuckwalla Bench plot seemed to be responsible for the overall significant decline within the recovery unit.

The kernel analysis of the Eastern Colorado Recovery Unit shows that the distributions of the living desert tortoises and carcasses overlap for most of the region. The Chuckwalla Bench study plot occurs outside the study area, which creates a problem in evaluating what may be occurring in that area of the recovery unit. However, the few transects walked in that portion of the DWMA yielded no observations of live or dead desert tortoises. This illustrates our concern for drawing conclusions from areas represented by too few study plots and leaves us with guarded concern for this region. The percentage of transects with live desert tortoises was relatively high for most DWMAs within the Eastern Colorado Recovery Unit. In addition, the ratio of carcasses to live desert tortoises was low within this recovery unit relative to others.

Western Mojave Recovery Unit

This recovery unit includes the Pinto Mountains, Ord-Rodman, Superior-Cronese, and Fremont-Kramer DWMAs. Based on areas sampled within the Western Mojave Recovery Unit (Service

2009), we estimate 43,701 desert tortoises (with a 95 percent confident interval of 24,361 to 79,126 tortoises) occur in this recovery unit.

The 117,016-acre Pinto Mountains DWMA is located in the southeastern portion of the Western Mojave Recovery Unit. No permanent study plots are located in this proposed DWMA. Little information exists on the densities of desert tortoises in this area. Tracy et al. (2004) noted that the distribution of carcasses and live desert tortoises appeared to be what one would expect in a "normal" population of desert tortoises; that is, carcasses occurred in the same areas as live desert tortoises and were not found in extensive areas in the absence of live desert tortoises.

The Ord-Rodman DWMA is located to the southeast of the city of Barstow and covers approximately 247,080 acres. The 1994 Recovery Plan notes that the estimated density of desert tortoises in this area is 5 to 150 desert tortoises per square mile (Service 1994). Three permanent study plots are located within and near this proposed DWMA.

The Superior-Cronese DWMA is located north of the Ord-Rodman DWMA; two interstate freeways and rural, urban, and agricultural development separate them. This DWMA covers 629,389 acres. No permanent study plots have been established in this area; the density of desert tortoises has been estimated through numerous triangular transects and line distance sampling efforts. This DWMA supports densities of approximately 20 to 250 desert tortoises per square mile (Service 1994).

The Fremont-Kramer DWMA is located west of the Superior-Cronese DWMA; the two DWMAs are contiguous and cover approximately 511,901 acres. The 1994 Recovery Plan notes that the estimated density of desert tortoises in this area was 5 to 100 desert tortoises per square mile (Service 1994). Berry (1996) notes that the overall trend in this proposed DWMA is "a steep, downward decline" and identifies predation by common ravens and domestic dogs, off-road vehicle activity, illegal collecting, upper respiratory tract disease, and environmental contaminants as contributing factors.

During the summers of 1998 and 1999, the BLM funded surveys of over 1,200 transects over a large area of the western Mojave Desert. These transects failed to detect sign of desert tortoises in areas where they were previously considered to be common. Although these data have not been fully analyzed and compared with previously existing information, they strongly suggest that the number of desert tortoises has declined substantially over large areas of the western Mojave Desert. The Desert Tortoise Recovery Plan Assessment Committee also noted that the Western Mojave Recovery Unit has experienced declines in the number of desert tortoises (Tracy et al. 2004).

The Western Mojave Recovery Unit has experienced marked population declines as indicated in the 1994 Recovery Plan and continues today. Spatial analyses of this Recovery Unit show areas with increased probabilities of encountering dead rather than live animals, areas where kernel estimates for carcasses exist in the absence of live animals, and extensive regions where there are clusters of carcasses where there are no clusters of live animals. Collectively, these analyses

point generally toward the same areas within the Western Mojave Recovery Unit, namely the northern portion of the Fremont-Kramer DWMA and the northwestern part of the Superior-Cronese DWMA. Together, these independent analyses, based on different combinations of data, all suggest the same conclusion for the Western Mojave. Data are not currently available with sufficient detail for most of the range of the desert tortoise with the exception of the Western Mojave Recovery Unit (Tracy et al. 2004).

Upper Virgin River Recovery Unit

The 1994 Recovery Plan states that desert tortoises occur in densities of up to 250 adult desert tortoises per square mile within small areas of this recovery unit; overall, the area supports a mosaic of areas supporting high and low densities of desert tortoises (Service 1994). The Utah Division of Wildlife Resources (UDWR) has intensively monitored desert tortoises, using a distance sampling technique, since 1998. Monitoring in 2003 indicated that the density of desert tortoises was approximately 44 per square mile throughout the reserve. This density represents a 41 percent decline since monitoring began in 1998 (McLuckie et al. 2006). The report notes that the majority of desert tortoises that died within one year (n=64) were found in areas with relatively high densities; the remains showed no evidence of predation.

In the summer of 2005, approximately 10,446 acres of desert tortoise habitat burned in the Red Cliffs Desert Reserve. The UDWR estimated that as many as 37.5 percent of adult desert tortoises may have died as a direct result of the fires (McLuckie et al. 2006).

Summary

Density estimates of adult tortoises varied among recovery units and years. Over the first six years of range-wide monitoring (2001-2005, 2007), tortoises were least abundant in the Northeast Mojave Recovery Unit (1 to 3.7 tortoises per square kilometer [2 to 10 tortoises per square mile]; Service 2009), and the highest reported densities occurred in the Upper Virgin River Recovery Unit (15 to 27 tortoises per square kilometer [38 to 69 tortoises per square mile]; McLuckie et al. 2008). Considerable decreases in density were reported in 2003 in the Eastern Colorado and Western Mojave recovery units (Service 2006). However, the variability between annual estimates among all years is consistent with variability due to sampling between years; only after several years of consistent patterns will the range-wide approach distinguish population trends from the variability due to sampling. Beyond noting that no range-wide population losses or gains were detected, inferences as to the meaning of these first years of data would be premature.

Please refer to *The Status of the Desert Tortoise (Gopherus agassizii) in the United States* (Berry 1984) and the *Desert Tortoise Recovery Plan Assessment* (Tracy et al. 2004) for a detailed description of the methods and population trend and distribution analyses described above. In addition, *Range-wide Monitoring of the Mojave Population of the Desert Tortoise: 2007 Annual Report* (Service 2009) provides information regarding the current monitoring effort.

Based on information in the draft recovery plan (Service 2008), desert tortoise (Mojave population) is classified as a) at a moderate degree of threat, which, although increased since 1994, does not place the species at imminent risk of extinction; b) has a low potential for recovery, adjusted based on current uncertainties about various threats and our ability to manage them; c) is a listed population below the species level; and d) is in potential conflict with development or other forms of economic activity. We anticipate that implementation of the revised recovery plan will resolve key uncertainties about threats and management, thereby improving recovery potential.

Threats

The Service identified key threats when the Mojave population of the desert tortoise was emergency listed as endangered and subsequently listed as a threatened species, which remains valid today. The 1994 Recovery Plan discusses threats and developed recovery objectives to minimize their effects on the desert tortoise and allow the desert tortoise to recover. Since becoming listed under the Act, more information is available on threats to the desert tortoise with some threats such as wildfires and non-native plants affecting large areas occupied by desert tortoises.

Non-native plants continue to contribute towards overall degradation or habitat quality for the desert tortoise. Land managers and field scientists identified 116 species of non-native plants in the Mojave and Colorado deserts (Brooks and Esque 2002). The proliferation of non-native plant species has also contributed to an increase in fire frequency in desert tortoise habitat by providing sufficient fuel to carry fires, especially in the intershrub spaces that are mostly devoid of native vegetation (Service 1994; Brooks 1998; Brown and Minnich 1986). Changes in plant communities caused by non-native plants and recurrent fire may negatively affect the desert tortoise by altering habitat structure and species composition of their food plants (Brooks and Esque 2002).

Changing ecological conditions as a result of natural events or human-caused activities may stress individual desert tortoises and result in a more severe clinical expression of URTD (Brown et al. 2002). For example, the proliferation of non-native plants within the range of the desert tortoise has had far-reaching impacts on desert tortoise populations. Desert tortoises have been documented to prefer native vegetation over non-natives (Tracy et al. 2004). Non-native, annual plants in desert tortoise critical habitat in the western Mojave Desert were identified to compose over 60 percent of the annual biomass (Brooks 1998). The reduction in quantity and quality of forage may stress desert tortoises and make them more susceptible to drought- and disease-related mortality (Brown et al. 1994). Malnutrition has been associated with several disease outbreaks in other chelonians (Borysenko and Lewis 1979).

Numerous wildfires occurred in desert tortoise habitat across the range of the desert tortoise in 2005 due to abundant fuel from the proliferation of non-native plant species after a very wet winter. These wildfires heavily impacted two of the six desert tortoise recovery units, burning almost 19 percent of desert tortoise habitat in the Upper Virgin River and 10 percent in the

Northeastern Mojave (Table 1). There were no significant fires from 2007 to 2009 in this area. In the Upper Virgin River Recovery Unit, 19 percent of the Upper Virgin River CHU burned. In the Northeastern Mojave Recovery Unit, three CHUs were impacted: approximately 23 percent of the Beaver Dam Slope CHU burned, 13 percent of the Gold Butte-Pakoon CHU, and 4 percent of the Mormon Mesa CHU. Although it is known that desert tortoises were burned and killed by the wildfires, desert tortoise mortality estimates are not available. Recovery of these burned areas is likely to require decades.

Table 1. Area (hectares) of desert tortoise Critical Habitat burned in the Northeastern Mojave and Upper Virgin River recovery units unit during 2005*.

Recovery Unit	Critical Habitat Unit	Total Area Burned	Percent Burned
Northeastern Mojave			
	Beaver Dam Slope	53,528	26
	Gold-Butte Pakoon	65,339	13
	Mormon Mesa	12,952	3
	non-Critical Habitat	404,685	-
Upper Virgin River			
	Upper Virgin River	10,557	19

*Complete data sources: NV fire data from the BLM as a single 2005 file: *http://www.BLM.gov/nv/st/en/prog/more_programs/geographic_sciences/gis/geospatial_data.html*; AZ fire data from Forest Service, part of historic files [cross referenced against the BLM ADSO fire data]: *http://www.fs.fed.us/r3/gis/datasets.shtml*; UT fire data from the BLM, as part of historic fires file: *http://www.BLM.gov/ut/st/en/prog/more/geographic_information/gis_data_and_maps.print.html*.

Disease and raven predation have been considered important threats to the desert tortoise since its emergency listing in 1989. What is currently known with certainty about disease in the desert tortoise relates entirely to individual desert tortoises and not populations; virtually nothing is known about the demographic consequences of disease (Tracy et al. 2004). Disease was identified in the 1994 Recovery Plan as an important threat to the desert tortoise. Disease is a natural phenomenon in wild populations of desert tortoises and can contribute to population declines by increasing mortality and reducing reproduction. However, URTD appears to be a complex, multi-factorial disease interacting with other stressors to affect desert tortoises (Brown et al. 2002; Tracy et al. 2004). The disease probably occurs mostly in relatively dense desert tortoise populations, as mycoplasmal infections are dependent upon higher densities of the host (Tracy et al. 2004).

From 1969 to 2004 the numbers of common ravens in the West Mojave Desert increased approximately 700 percent (Boarman and Kristan 2006). Population increases have also been noted at other locations particularly in the California Desert. This many-fold increase above historic levels and a shift from a migratory species to a resident species is due in large part to recent human subsidies of food, water, and nest sites (Knight et al. 1993, Boarman 1993, Boarman and Berry 1995). While not all ravens may include desert tortoises as significant

components of their diets, these birds are highly opportunistic in their feeding patterns and concentrate on easily available seasonal food sources, such as juvenile desert tortoises.

Boarman (2002) identified the following major categories of threats: Agriculture, collection by humans, construction activities, disease, drought, energy and mineral development, fire, garbage and litter, handling and deliberate manipulation of desert tortoises, invasive or non-native plants, landfills, livestock grazing, military operations, noise and vibration, OHV activities, predation, non-off-road vehicle recreation, roads, highways and railroads, utility corridors, vandalism, and wild horses and burros. For additional information on threats to the desert tortoise refer to Boarman (2002), Tracy et al. (2004), and Service (2008).

Desert Tortoise Critical Habitat – Rangewide Status

Desert tortoise critical habitat was designated by the Service to identify the key biological and physical needs of the desert tortoise and key areas for recovery, and focuses conservation actions on those areas. Desert tortoise critical habitat is composed of specific geographic areas that contain the primary constituent elements of critical habitat, consisting of the biological and physical attributes essential to the species' conservation within those areas, such as space, food, water, nutrition, cover, shelter, reproductive sites, and special habitats. The specific primary constituent elements of desert tortoise critical habitat are:

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

b. sufficient quality and quantity of forage species and the proper soil conditions to provide for the growth of these species;

c. suitable substrates for burrowing, nesting, and overwintering; burrows, caliche caves, and other shelter sites;

d. sufficient vegetation for shelter from temperature extremes and predators; and

e. habitat protected from disturbance and human-caused mortality.

The CHUs were based on recommendations for DWMAs outlined in the *Draft Recovery Plan for the Desert Tortoise (Mojave Population)* (Service 1993). These DWMAs are also identified as desert tortoise ACECs by BLM. Because the critical habitat boundaries were drawn to optimize reserve design, the critical habitat unit may contain both "suitable" and "unsuitable" habitat. Suitable habitat can be generally defined as areas that provide the primary constituent elements.

Although recovery of the desert tortoise will focus on DWMAs/ACECs, section II.A.6. of the 1994 Recovery Plan and section 2(b) of the Act provide for protection and conservation of ecosystems on which federally-listed threatened and endangered species depend, which includes both recovery and non-recovery areas. The Mojave Desert ecosystem, of which the desert tortoise and its habitat are an integral part, consists of a dynamic complex of plant, animal,

fungal, and microorganism communities and their associated nonliving environment interacting as an ecological unit (Noss and Cooperrider 1994). Actions that adversely affect components of the Mojave Desert ecosystem may directly or indirectly affect the desert tortoise. The 1994 Recovery Plan further states that desert tortoises and habitat outside recovery areas may be important in recovery of the tortoise. Healthy, isolated desert tortoise populations outside recovery areas may have a better chance of surviving catastrophic effects such as disease, than large, contiguous populations (Service 1994).

The 1994 Recovery Plan recommended DWMAs and subsequently the Service designated CHUs based on these proposed DWMAs (Service 1993). When designated, desert tortoise critical habitat contained all the primary constituent elements of desert tortoise critical habitat. The following seven principles of conservation biology serve as the standards by which the Service determines whether or not the CHUs are functioning properly:

a. *Reserves should be well-distributed across the species' range*. The entire range of the Mojave desert tortoise occurs within one of the six recovery units identified in the 1994 Recovery Plan and at least one DWMA and CHU occurs within each recovery unit. The reserves remain well-distributed across the range of the desert tortoise.

b. *Reserves should contain large blocks of habitat with large populations of target species*. The desert tortoise requires large, contiguous areas of habitat to meet its life requisites. Each DWMA and its associated CHUs that were designated to conserve contiguous blocks of habitat that exceed 500,000 acres, with the exception of the Upper Virgin River Recovery Unit (Table 2). The Upper Virgin River Recovery Unit does not meet the minimum size requirement identified in the 1994 Recovery Plan; however, the Service anticipates that reserve-level management will adequately conserve the desert tortoise within this recovery unit. Designation of CHUs were based largely on transect data and included areas with the largest populations of desert tortoises.

c. *Blocks of habitat should be close together*. This principle was met when CHUs were designated and remains valid.

d. *Reserves should contain contiguous rather than fragmented habitat.* This principle was met when CHUs were designated and generally continue to be met. Desert tortoise-proof fencing has been constructed along major roads and highways that traverse critical habitat including Interstate 15 in Nevada and California (Ivanpah Valley DWMA/CHU), U.S. Highway 95 (US 95) in Nevada (Piute-Eldorado DWMA/CHU), and Highway 58 in California (Fremont-Kramer DWMA/CHU). Major roads and highways alone constitute a barrier to desert tortoise movements without fencing; however, the fencing minimized take of desert tortoises and culverts or underpasses allow for limited desert tortoise movement across the road or highway.

e. *Habitat patches should contain minimal edge-to-area ratios*. This principle was met when CHUs were designated and generally continue to be valid. Notable exceptions include the northern Gold Butte-Pakoon CHU, and the southern termini of the Mormon

Mesa, Ivanpah Valley, and Chuckwalla CHUs which have large edge-to-area ratios and further compromised by highways that traverse these relatively narrow areas within the CHUs.

f. *Blocks should be interconnected by corridors or linkages connecting protected, preferred habitat for the target species.* Most CHUs are contiguous with another CHU with the exception of Ord-Rodman, Ivanpah Valley, Gold Butte Pakoon, and Upper Virgin River CHUs. Interstate 15 and the Virgin River separate the Gold Butte-Pakoon CHU from other CHUs in the Northeastern Mojave Recovery Unit. Similarly, Interstate 40 separates the Piute-Eldorado and Chemehuevi CHUs, and Ord Rodman and Superior-Cronese CHUs.

g. *Blocks of habitat should be roadless or otherwise inaccessible to humans*. Achieving this principle is the most problematic. A 2001 inventory of roads in the western Mojave Desert suggests that road density increased from the mid-1980s. Further evaluation should be conducted as some of the recently mapped roads were actually historical roads especially with the advent of effective mapping capabilities (Tracy et al. 2004). Roads are abundant in desert tortoise habitat rangewide and may be increasing in density (Tracy et al. 2004).

The 1994 Recovery Plan contains conservation recommendations for desert tortoise critical habitat. The recommendations include the elimination of grazing by livestock, feral burros and horses on desert tortoise critical habitat. Since approval of the 1994 Recovery Plan, livestock grazing in desert tortoise critical habitat has been substantially reduced. BLM and the National Park Service (NPS) manage for zero burros in Nevada in critical habitat and the California Desert Managers Group developed a burro management plan in 2004.

The status of the desert tortoise and its critical habitat has been impacted by decades of human activities. In their 1991 report, the GAO found that livestock grazing practices of the late 1880s and early 1990s badly damaged desert lands in the southwest. Domestic livestock grazing on BLM's hot desert allotments continue to pose the greatest risk of long-term environmental damage to a highly fragile resource. The GAO offered several options for consideration by Congress including the discontinuation of livestock grazing in hot desert areas. They concluded that BLM did not have the resources to properly manage the intensity of livestock grazing in hot deserts. Without sufficient monitoring data, BLM will not have the necessary data to change active preference levels and overgrazing may occur (GAO 1991).

Many of the threats to the desert tortoise exist across broad portions of the species' range. We have developed a prototype decision support system that uses the best data that could be obtained within the planning process and provides a guide as to what additional data are most needed. The initial datasets provide a structure and way to prioritize the next round of data gathering, particularly including impacts to critical habitat. These data, including future updates, will be made publicly available through the Recovery Implementation Team (RIT) process. Data are not readily available to quantify the number of acres of critical habitat that have been degraded; however, we are currently in the process of assembling various spatial data layers, such as aerial

photography and satellite-derived land cover data, to complete these sorts of analyses as part of the RITs' prioritization and evaluation of recovery actions. To date, protection of these lands has not been sufficient to recover the species and lands outside critical habitat have become more important for recovery.

Table 2. Desert Tortoise CHUs, DWMAs, and Recovery Units—Size and Location

CHU	SIZE (ac.)	STATE	DWMA	RECOVERY UNIT
Chemehuevi	937,400	CA	Chemehuevi	Northern Colorado
Chuckwalla	1,020,600	CA	Chuckwalla	Eastern Colorado
Fremont-Kramer	518,000	CA	Fremont-Kramer	Western Mojave
Ivanpah Valley	632,400	CA	Ivanpah Valley	Eastern Mojave
Pinto Mtns.	171,700	CA	Joshua Tree	Western Mojave/ Eastern Colorado
Ord-Rodman	253,200	CA	Ord-Rodman	Western Mojave
Piute-Eldorado- CA Piute-Eldorado- NV	453,800 516,800	CA NV	Fenner Piute-Eldorado	Eastern Mojave Northeastern & Eastern Mojave
Superior-Cronese	766,900	CA	Superior-Cronese Lakes	Western Mojave
Beaver Dam:	87,400 74,500 42,700	NV UT AZ	Beaver Dam Beaver Dam Beaver Dam	Northeastern Mojave (all)
Gold Butte-Pakoon	192,300 296,000	NV AZ	Gold Butte-Pakoon Gold Butte-Pakoon	Northeastern Mojave (all)
Mormon Mesa	427,900	NV	Mormon Mesa Coyote Spring	Northeastern Mojave
Upper Virgin River	54,600	UT	Upper Virgin River	Upper Virgin River

Further information on desert tortoise critical habitat can be found in the following documents:

- Desert Tortoise Recovery Plan Assessment Report (Tracy et al. 2004)—all CHUs
- Final Environmental Impact Report and Statement for the West Mojave Plan (BLM 2005)— Fremont-Kramer CHU, Superior-Cronese CHU, Ord-Rodman CHU, and Pinto Mountains CHU
- Mojave National Preserve General Management Plan (NPS 2002)—Ivanpah Valley CHU and Piute-Eldorado CHU
- Northern and Eastern Colorado Coordinated Management Plan (BLM 2002a)—Chemehuevi CHU, Pinto Mountains CHU, and Chuckwalla CHU
- Northern and Eastern Mojave Desert Management Plan (BLM 2002b)—Ivanpah Valley CHU, Piute-Eldorado CHU, and Chemehuevi CHU
- Clark County Multiple Species HCP (RECON 2000)—Beaver Dam Slope CHU, Mormon Mesa CHU, Gold Butte-Pakoon CHU, and Piute-Eldorado CHU
- Washington County HCP (Washington County Commission 1995)—Upper Virgin River CHU
- Desert Tortoise (Mojave Population) Recovery Plan and Proposed Desert Wildlife Management Areas for Recovery of the Mojave Population of the Desert Tortoise (companion document to the Desert Tortoise Recovery Plan) (Service 1994)—all CHUs

ENVIRONMENTAL BASELINE

Description of the Action Area

The implementing regulations for section 7(a)(2) of the 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 CFR § 402.02). The analyses of the environmental baseline, effects of the action, and cumulative effects in this biological opinion are based upon the action area. For this proposed action, we define the action area as the approximately 86.5 acres subject to surface and subsurface disturbance, Helendale Road where it provides access to the proposed facility, any areas subject to surface and subsurface disturbance from the installation of the desert tortoise exclusion fence, and any additional areas to which desert tortoises may be moved to protect them from the effects of the proposed project.

Status of the Desert Tortoise in the Action Area

According to the Service's range-wide monitoring program, the Fremont-Kramer CHU (where the proposed project is located), desert tortoise density is 2.5 per square kilometer [6.5 per square mile] (Service 2010). This estimate is based on the number of adult desert tortoises (mean carapace length greater than 180 millimeters [7.1 inches]) observed during sampling. In 2008, surveyors conducted a protocol-level survey of the 80-acre project site and surveyed the zone-of-influence. Surveyors found burrows, bone and shell fragments, and scat throughout the project site. Beyond the zone-of-influence, surveyors found two live desert tortoises.

Based on this estimate of desert tortoise density within the Fremont-Kramer CHU, the small size of the action area, and the survey results described above, we conclude that there are few adult desert tortoises within the action area. We do not know how many juvenile desert tortoises may be present within the action area because they are hard to detect during pre-project surveys and range-wide monitoring. However, we conclude the number of juveniles within the action area will be relatively small given we conclude there are few adult animals and the small size of the action area.

Status of Critical Habitat in the Action Area

The action area is located within the Fremont-Kramer CHU of the Western Mojave Recovery Unit. The biological assessment describes the action area as occurring in "gently rolling open terrain dominated by desert scrub vegetation" with limited disturbance within and adjacent to the project site from off-road vehicle activity (Analytical Environmental Services 2011). The elevation of the action area ranges between 2,310 to 2,340 feet above mean sea level. The vegetation is largely dominated by one shrub species, *Atriplex polycarpa* (desert saltbush), and to a lesser extent, *Larrea tridentata* (creosote), and *Tetradymia spinosa* (cotton-thorn). The herbaceous understory consists of *Schismus barbatus* (Meditteranean grass), *Erodium* spp. (Storksbill), and *Chorizanthe rigida* (desert herb).

The primary constituent elements for the desert tortoise are those physical and biological attributes considered necessary for the long-term survival of the species. These elements include sufficient space to support viable populations and 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; and sufficient vegetation for shelter from temperature extremes and predators. We conclude that these primary constituent elements are still functioning as critical habitat within the action area.

Effects to Desert Tortoise

Capture and Relocation of Desert Tortoises

Prior to ground disturbing activities, qualified biologists, approved by the Service, will conduct clearance surveys of the project area. During these surveys, qualified biologists will capture and relocate desert tortoises to suitable habitat outside of the project area. Handling desert tortoises sometimes causes them to void the contents of their bladder, which may represent loss of important fluids and this loss 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. Desert tortoises stressed from handling and movements are more susceptible to disease. Additionally, relocated desert tortoises occasionally try to return to their original capture site and thus spend relatively greater amounts of time above ground. This increased exposure could be particularly hazardous during hot, dry weather or late in the afternoon when the body temperatures of stressed desert tortoises could reach fatal levels. However, because Service-authorized biologists (individuals that are aware of the most current protocols and guidelines and that demonstrate substantial field experience and training to safely and successfully conduct their required duties) will capture and relocate desert tortoises the potential for injury or mortality due to increased stress and disease transmission is low. Moreover, relocated individuals would likely remain within their home range containing known shelter sites, which could reduce the level of increased exposure for these animals after release. Finally, because of the small number of desert tortoises within the action area, we conclude that the capture and relocation of individuals will kill or injure few, if any, desert tortoises.

The relocation of desert tortoises has the potential to disrupt the behavior and social structure of resident animals. Such disruption may impair their breeding, feeding, and sheltering by elevating the frequency and intensity of aggressive interactions between individuals. However, we conclude that desert tortoises moved from the project area would remain within their own home range; therefore, behavior and social interactions of other resident individuals in adjacent home ranges would be affected minimally, if at all. Consequently, we conclude that the capture and relocation of individuals from the project area will not result in the injury or mortality of desert tortoises residing within the vicinity of the project area.

We cannot determine the number of desert tortoises captured and relocated during project implementation. Surveyors found no live desert tortoises on the project site; however, the presence of burrows, scat, and bone fragments indicate that desert tortoises may utilize habitat within the project site. Therefore, project implementation will likely require the capture and relocation of a small number of desert tortoises. However, we conclude that capture and relocation will result in injury or mortality of few, if any individuals. We have reached this determination because we expect few desert tortoises occupy the action area, Service-authorized biologists would perform all handling and relocation activities, and individuals moved from the project area would likely remain within their existing home ranges.

Potential Injury or Mortality from Construction Activities

Nursery Products will install a permanent desert tortoise exclusion fence along the perimeter of the 80-acre project site, along both sides of the access road, and along both sides of Helendale Road on lands managed by the Bureau from the intersection of the access road at Helendale Road to State Route 58. Following the installation of the desert tortoise exclusion fence, qualified biologists will survey the fenced area and relocate any remaining individuals. For these reasons, we conclude that construction, including vehicle traffic to and from the project site, is unlikely to kill larger desert tortoises. Some potential always exists that surveyors may miss some adult individuals during clearance surveys. Construction activities would subsequently kill or injure these desert tortoises. However, because few desert tortoises are likely to occupy the project area and qualified biologists, authorized by the Service, will conduct all clearance surveys, we conclude that construction activities will injure or kill few, if any, adult desert tortoises.

We conclude that clearance surveys will find most, if not all, of the adult desert tortoises in the project area. However, juvenile desert tortoises and eggs are difficult to detect and surveyors may miss many of them. Construction activities, such as grading and trenching, may crush desert tortoises and eggs missed during clearance surveys or bury eggs so deep that they may not hatch. We cannot predict how many juvenile desert tortoises or eggs surveyors may miss because we cannot predict how many would be in the project area at the time of project implementation. Desert tortoise eggs are not present throughout the entire year; consequently, construction that occurs after eggs have been laid and before they have hatched could destroy a relatively larger number of eggs. Nursery Products has not proposed to restrict construction to the period when eggs are less likely to be encountered. In addition, the size class distribution of the desert tortoise population on the project site will affect the ability of surveyors to find juveniles. For example, if the juvenile population is composed primarily of individuals that are close to adult age, they will be larger and easier to see, but if it is composed of juveniles that are closer to hatchling size, surveyors are likely to miss a larger portion of the population. Although construction activities may injure or kill juvenile desert tortoises, given the small size of the project site and the few adults expected on the project site, we conclude construction activities will injure or kill relatively few juveniles. Finally, because qualified biologists, authorized by the Service, will conduct clearance surveys, and we expect few juvenile desert tortoises occupy the project area, we conclude that few, if any individuals, will remain after the clearance surveys.

Nursery Products will install a fence to exclude desert tortoises from the roads used to access the facility and prevent desert tortoises from entering the project area. In areas where fencing does not completely exclude desert tortoises, Nursery Products will install a short fence, perpendicular to the first, to direct desert tortoises away from traffic. However, because Nursery Products cannot completely fence the intersection of State Route 58 and Helendale Road, or the intersection of Helendale Road and the access road, project vehicles may strike and injure or kill desert tortoises. Additional measures such as a worker education program and a speed limit on all roads accessing the facility will likely improve the ability of workers to stop and avoid striking a desert tortoise. Considering these measures and the low density of desert tortoise in the area, we conclude project vehicles will injure or kill few, if any, desert tortoises.

Operation, Maintenance, and Decommissioning Activities

Operation, maintenance, and decommissioning activities within the fenced project area are unlikely to injure or kill any desert tortoises because the fencing will exclude desert tortoises. However, if the fence becomes damaged, desert tortoises could gain access to the project area. In this case, operation, maintenance, and decommissioning activities such as traffic traveling to and from the facility or grading may kill or injure individuals. Regular inspections and maintenance of the fence will reduce the likelihood that desert tortoises gain access to the project area. As discussed in the previous section, the installation of fencing in areas where desert tortoises may access that project area (along Helendale Road) will reduce the likelihood that desert tortoises are injured or killed by vehicles traveling to and from the facility. Considering these measures and the low density of desert tortoise in the area, we conclude that operation, maintenance, and decommissioning activities will injure or kill few, if any, desert tortoises.

During the operation and maintenance of the facility, delivery trucks, equipment, and other vehicles will generate noise and vibration throughout the action area. The recovery plan for the desert tortoise (Service 1994) notes that noise can mask the approach of predators and disrupt communication between individuals; loud noises may damage a desert tortoise's hearing permanently. In a laboratory study, Bowles et al. (1999) demonstrated that most of the subject desert tortoises responded to noise (such as jet noise and sonic booms) by ceasing activities, such as foraging or digging, for periods of time. We cannot determine how noise and vibrations may change the behavior of individuals within the action area. Because we expect a low desert tortoise density within the action area, we conclude the noise and vibration caused during the operation and maintenance of the facility will affect few, if any, desert tortoises.

Increased Predation by Common Ravens and Coyotes

Common ravens and coyotes are attracted to human activity in the desert. Over the past 30 to 40 years, the number of common ravens in the Mojave Desert has increased (Boarman and Kristian 2007). Human development within the desert provides subsidies (food, water, nesting substrates) that are otherwise not present, allowing common raven populations to persist and increase (Restani et al. 2001 in Kristian et al. 2007). Common ravens would likely use newly constructed structures, equipment, and fences for perching, roosting, and nesting. Water in the retention ponds and food subsidies in the form of litter and roadkill may also attract common

ravens and coyotes. Increased use of the area by common ravens and coyotes is likely to lead to increased predation of desert tortoises.

Nursery Products has proposed measures to address subsidies provided by the project and to reduce the attractiveness of the project area to common ravens. Although these measures specifically address common ravens, the measures may also reduce the attractiveness of the project area to coyotes. These measures include a litter-control program, monitoring and prompt removal of sources of standing water, and removal and destruction of perch or nesting locations before nest initiation. Additionally, a raven management plan has been developed to reduce the human-provided subsidies on-site. As part of the raven management plan, Nursery Products will conduct bimonthly surveys to monitor the effectiveness of these measures over the life of the project. As part of an adaptive management component within the raven management plan, Nursery Products has proposed additional measures to reduce the attractiveness of the project site to common ravens including a roadkill removal program, use of bird aversion techniques (auditory or visual devices), and lethal removal of common ravens that are known to prey on desert tortoises.

We cannot assess the degree to which the number of common ravens and coyotes would increase or reasonably predict the amount of predation by common ravens and coyotes that construction, operation, and maintenance of this project is likely to add to baseline levels within the action area. Although, we cannot measure the effectiveness of the predator deterrence measures, we conclude that the measures proposed by Nursery Products are likely to minimize the predation of desert tortoises that may result from the project.

Increased Risk of Disease

Environmental contaminants have been identified as a potential factor causing disease or increasing susceptibility to disease that can result in mortality of desert tortoises (Service 2008). Necropsies performed on desert tortoises exhibiting signs of URTD and shell disease showed elevated levels of arsenic and mercury. Jacobsen et al. (1991) found that the livers of desert tortoises with URTD had eleven times the levels of mercury than those of healthy tortoises. Additionally, the tissues of desert tortoises exhibiting shell disease have had elevated levels of toxic elements such as arsenic (Jacobsen et al. 1994; Homer et al. 1998; Berry et al. 2001). While heavy metals are naturally found in the desert, human-related activities can remobilize or increase the amount of heavy metals in the air, on the soil, and on vegetation (Chaffee and Berry 2006). Desert tortoises that come into contact with contaminated dust, soil, and vegetation may inhale or ingest these toxic metals, potentially increasing their susceptibility to disease.

Nursery Products has proposed measures to reduce the amount of dust and runoff, which may contain heavy metals, from construction, operation, and maintenance activities within the project area. During construction, water trucks will spray areas receiving vehicle traffic to limit the amount of dust. During operation and maintenance activities, Nursery Products will implement several measures to reduce dust including watering windrows and areas receiving vehicle traffic, turning windrows when wind speeds are less than 20 miles per hour, and covering vehicles

transporting material to the facility. In addition, retention ponds will collect any runoff from the windrows, keeping it from dispersing off-site. Although we have no information to indicate at what level heavy metals may result in injury or death of desert tortoises, analysis of compost similar to the type the facility will produce contained levels of heavy metals below threshold limits established to protect human health. Because Nursery Products will implement measures to reduce dust and runoff containing heavy metals, and few desert tortoises occupy the action area, we conclude disease caused by increased exposure to heavy metals will injure or kill few, if any, desert tortoises.

Effects to Critical Habitat

As mentioned previously in the "Status of the Critical Habitat in the Action Area" section, we discussed the primary constituent elements for the desert tortoise. The following paragraphs discuss the effects of the proposed action on the primary constituent elements of critical habitat.

Reduction of Space

With regard to the first primary constituent element, the proposed action would result in the reduction of the space available to support viable populations and to provide for movement, dispersal, and gene flow. The degree to which a reduction in space would affect desert tortoises is a function of the location and quality of the lost habitat. Generally, habitat that is of lower quality is not as important for supporting viable populations. Nursery Products has not proposed to restore the habitat when the operation is decommissioned; therefore, we conclude that the proposed action will result in the permanent loss of 86.5 acres of desert tortoise critical habitat, an approximate loss of 0.0167 percent of critical habitat within the Fremont-Kramer CHU. To compensate for the loss of 86.5 acres of critical habitat, Nursery Products will protect and maintain, in perpetuity, approximately 260 acres of desert tortoise habitat. Because the loss of 86.5 acres of critical habitat represents a small percentage of the available critical habitat within the CHU, we conclude that its loss would not reduce the amount of space available within the Fremont-Kramer CHU to the point that the CHU could no longer function and support viable populations or provide for movement, dispersal, and gene flow.

The loss of habitat associated with the construction of the proposed project and the installation of a desert tortoise exclusion fence along the access road and from the intersection of Helendale Road north to State Route 58 could create a barrier within the species' range and impede movement, dispersal, and gene flow within the Fremont-Kramer CHU. The location of the lost habitat determines to what degree movement, dispersal, and gene flow are affected. For example, the loss of habitat connectivity at the center of the species' range would have a more pronounced effect on movement, dispersal, and gene flow. The proposed action is near the eastern edge of the Fremont-Kramer CHU; therefore, a reduction in habitat connectivity will likely have a minimal effect on movement, dispersal, and gene flow. Furthermore, the loss of this habitat is small when compared to the large portions of intact habitat that remain within the CHU. Consequently, we conclude that the loss of habitat connectivity associated with the installation of fencing along Helendale Road would not have a meaningful effect on the ability of the Fremont-Kramer CHU to provide for movement, dispersal, and gene flow.

Reduction in Food and Shelter

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.

Activities associated with the construction, operation, and maintenance of the facility, would result in temporary and permanent disturbance of habitat providing those features necessary for food and shelter. Nursery Products will have a qualified biologist, authorized by the Service, on-site during construction to work with construction personnel in limiting the amount of disturbance and siting equipment and materials within previously disturbed areas. During construction of the facility, we conclude that activities, such as those associated with the installation of the desert tortoise exclusion fence, may disturb an area slightly greater than the footprint of the project site and improved access road. Although the effects associated with the installation of the fence are temporary, the recovery of these disturbed areas would depend on the type of substrate, degree of compaction resulting from work activities, and future weather conditions. Conversely, the proposed action would result in the permanent loss of 86.5 acres of critical habitat containing the features necessary for food and shelter. As mentioned previously, this amounts to a loss of approximately 0.0167 percent of critical habitat within the Fremont-Kramer CHU. We conclude that the temporary and permanent loss of a small percentage of critical habitat would not affect the ability of the CHU to function and provide food and shelter for desert tortoises.

Non-native plant species currently occur on the project site and are likely to occur in other portions of the action area at varying densities. Construction, operation, and maintenance activities also have the potential to increase the distribution and abundance of non-native species within the action area due to ground-disturbing activities that favor the establishment of non-native species. The increased abundance in non-native species associated with this project may result in an increased fire risk, which may result in the future loss of habitat containing the features that provide food and shelter for desert tortoises. Before beginning operation of the facility, Nursery Products will survey the project site and establish baseline conditions by documenting all plant species. For at least five years, Nursery Products will conduct annual invasive and exotic plant surveys of the project site and will use an herbicide to remove any invasive or exotic plant species found on the project site. Additionally, during operation of the facility, Nursery Products will require that drivers cover material transported to the facility to reduce the dispersal of non-native plant species into the action area. Measures to reduce dust (watering windrows and not turning windrows when wind speed exceeds 20 miles per hour) could also reduce the introduction and spread of invasive non-native species. We cannot reasonably predict how the abundance of invasive non-native plant species will change within the action area. However, we conclude that the measures described above will reduce the introduction and spread of invasive non-native plants and the related increased risk of fire into the action area.

Nursery Products will pump and store groundwater on-site for use during operation and maintenance activities and for fire protection. In arid and semiarid regions, where precipitation is scarce, groundwater can be important source of water for vegetation. However, shallowly rooted plant species such as those found within the project area likely rely more on precipitation than groundwater as a water source. Furthermore, the depth of the groundwater level at the project site (approximately 300 feet) probably exceeds the depth at which even deep-rooted plant species in the action area could use it. Consequently, we conclude that groundwater pumping would not affect the features within the action area that provide food and shelter for desert tortoises.

Reduction in Protected Habitat

The sixth primary constituent element is habitat protected from disturbance and human-caused mortality. In the previous sections, we discussed the direct effect (loss of habitat) and indirect effects (loss of habitat due to fire from the introduction and spread of non-native plant species and the loss of habitat due to groundwater pumping) associated with the construction, operation, maintenance, and decommissioning of the proposed facility. The direct and indirect effects associated with the proposed action would reduce the amount of habitat protected from disturbance and, as described in the "Effects to the Species" section, introduce human caused mortality into a protected area. However, the amount of critical habitat lost because of the proposed action is small when compared to what would remain within the Fremont-Kramer CHU. Consequently, because the proposed action would result in the loss of a small percentage of the CHU and Nursery Products has proposed measures to reduce human caused mortality, we conclude that the proposed action would not substantially affect the Fremont-Kramer CHU's ability to provide habitat protected from disturbance and human caused mortality.

Summary

Based on the line distance sampling information, pre-project survey information, and the small size of the project, we expect that the number of desert tortoise within the action area is low. Consequently, the activities associated with the construction of the proposed project are unlikely to affect many desert tortoises. We expect that any desert tortoises found within the action area would be moved a short distance from their point of capture out of harm's way. These individuals are unlikely to experience elevated levels of stress or disease exposure because Nursery Products will use Service-approved biologists that have training and experience in handling and moving desert tortoises. Finally, given the size of the project, we do not expect that desert tortoises will be moved outside of their home range. Therefore, the relocation of desert tortoises into surrounding habitat would not affect the behavior and social interactions of other resident desert tortoises.

We expect that activities associated with the construction of the proposed project will injure or kill few desert tortoises because we expect few individuals occupy the action area and Service-approved biologists will conduct clearance surveys to remove desert tortoises from the project area. Nursery Products has also proposed measures to reduce human caused mortality including

the installation of a desert tortoise exclusion fence around the project area, establish a speed limit on roads accessing the facility, and conducting a worker education program. We acknowledge that the ability of surveyors to detect desert tortoises depends on the class size distribution of the population within the action area and time of year. Surveyors may miss smaller juvenile desert tortoises and, depending on the time of year, any eggs present within the project area. Consequently, construction activities may crush and injure or kill those individuals or eggs remaining within the project area. However, given the small size of the project site and the few adults expected within the action area, we conclude that construction activities will crush and injure or kill few juveniles or eggs. Furthermore, the installation and maintenance of fencing will exclude desert tortoises from the project area and activities that could injure or kill them. Desert tortoises may gain access to the project through areas that remain unfenced. In these instances, a speed limit and worker education program will likely improve the ability of workers to stop and avoid striking a desert tortoise. Therefore, we conclude that project vehicles will injure or kill few, if any, individuals.

We expect that activities associated with the operation, maintenance, and decommissioning of the facility will injure or kill few desert tortoises because fencing will exclude individuals from the project area. Increased vibration and noise generated by operation, maintenance, and decommissioning activities may change the behavior of individuals within the action area; however, we conclude that noise and vibration will affect few individuals because desert tortoise density within the action area is low.

The proposed action may attract common ravens and coyotes because of human provided subsidies (water, food, nesting substrates). The increased use of the area by common ravens and coyotes could increase predation of desert tortoises. Nursery Products has developed a Raven Monitoring, Management, and Control Plan and included measures to reduce the availability of water, food, and nesting substrates. Nursery Products will review the effectiveness of these measures and employ different measures, as needed, to reduce the attractiveness of the project site to common ravens. These measures could also reduce the attractiveness of the project area to coyotes. We conclude that the measures proposed by Nursery Products to reduce human provide subsidies will likely minimize predation on desert tortoises by common ravens and coyotes.

The compost produced at the facility may contain heavy metals that have the potential to cause disease or increase susceptibility to disease in desert tortoises. During construction, operation, and maintenance activities, Nursery Products will employ measures to reduce the generation of dust and runoff containing heavy metals. These measures include watering windrows and areas receiving vehicle traffic, covering vehicles transporting material to the facility, and collecting runoff in retention ponds. Because Nursery Products will reduce dust and runoff containing heavy metals, and few desert tortoises occupy the action area, we conclude that disease caused by increased exposure to heavy metals will injure or kill few, if any, individuals.

Finally, we conclude that the loss of habitat associated with the proposed project would not appreciably diminish the distribution, reproduction, or numbers of desert tortoises in the wild.

Fencing has the potential to reduce habitat connectivity but we conclude that this effect would be minimal because of the small size of the proposed project and we expect few individuals reside within the action area.

Critical Habitat

The proposed action would result in the permanent and temporary loss of critical habitat that contains the primary constituent elements. The proposed action would result in an approximate loss of 0.0167 percent of the critical habitat within the Fremont-Kramer CHU. However, this is a small percentage of the Fremont-Kramer CHU, and the remaining habitat surrounding the action area contains all of the primary constituent elements. Moreover, Nursery Products has proposed measures to reduce human caused mortality within the CHU. Consequently, we conclude that the reduction in space, food and shelter, and protected habitat would not appreciably reduce the conservation value and function of the Fremont-Kramer CHU for the desert tortoise.

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 to have cumulative effects because they require separate consultation pursuant to section 7 of the Act. The proposed action is located on 80 acres of private property. The proposed right-of-way is managed by the Bureau and any activities undertaken in association with this area would require Federal approval. We are unaware of any future non-federal projects that are reasonably certain to occur in the action area that lies outside of Bureau's right-of-way.

CONCLUSION

After reviewing its status, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the desert tortoise. We have reached this conclusion because:

1. Project activities would kill or injure few desert tortoises because Nursery Products will fence work areas to prevent entry by desert tortoises, remove individuals from these areas, and use qualified biologists, among other measures to protect desert tortoises.

2. Nursery Products will implement measures to reduce the potential for increased predation by common ravens, spread of non-native plants species, and increased risk of disease from dust and runoff containing heavy metals.

3. This proposed action would not result in a substantial loss of desert tortoise habitat.

4. Compensation requirements by the California Department of Fish and Game may result in an increase in the amount of existing habitat that is managed for the conservation of the desert tortoise.

5. The proposed action would not substantially disrupt habitat connectivity.

After reviewing its status, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the proposed action is not likely to adversely modify the critical habitat of the desert tortoise. We have reached this conclusion because:

1. The amount of critical habitat that would be lost comprises a small portion of the total amount of critical habitat; this loss would not compromise the conservation function and value of critical habitat for the desert tortoise.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the 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 intentional or negligent actions that create the likelihood of injury to listed species by annoying it to such an extent as to significantly disrupt normal behavior 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 Act provided that such taking is in compliance with the terms and conditions of an incidental take statement.

The measures described in this document are non-discretionary. The Bureau has a continuing duty to regulate the activities covered by the incidental take statement in this biological opinion, which are applicable to that agency's action. If the Bureau fails to include the terms and conditions of this incidental take statement as enforceable conditions of its right-of-way permit, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, the Bureau must report the progress of its action and its impact on the desert tortoise to the Service as specified in the incidental take statement [50 Code of Federal Regulations 402.14(i)(3)].
The proposed action will result in the take of all desert tortoises in the project area (project site, access road, and in areas where exclusion fencing would be installed). The following paragraphs define the form of take and the number of individuals we anticipate the proposed action will take.

Construction of the Hawes Composting Facility

We cannot reasonably predict how many adult desert tortoises the construction of the Hawes Composting Facility project site is likely to take, in the form of mortality or injury, as a result of the direct effects of construction or due to loss of 86.5 acres of habitat. We anticipate that the majority of adult and subadult desert tortoises found during pre-construction surveys and construction monitoring will be taken, in the form of capture, and relocated a short distance out of harm's way. We anticipate that some individuals may remain within the project area. Because we cannot quantify (predict) the amount of take associated with the construction of the project, we will include a threshold for re-initiation of formal consultation for this form of take in the terms and conditions of this biological opinion based upon past surveys of the project site

We cannot reasonably predict how many juvenile desert tortoises or eggs the construction of the Hawes Composting Facility project site is likely to take (mortality or injury). Pre-project survey and line distance sampling information is based on desert tortoises greater than 160 millimeters; therefore, we cannot determine how many juveniles reside within the action area. Because we do not know the time of year when activities would occur, we anticipate that the construction activities would destroy any eggs present. We anticipate that some juvenile desert tortoises will be taken, in the form of capture; however, clearance surveys may miss the majority of juveniles and construction activities would kill or injure those individuals remaining within the project area.

We anticipate that the installation of desert tortoise exclusion fencing for the access road, Helendale Road, and project site has eliminated and will continue to eliminate portions of the home ranges of some desert tortoises. To the extent that desert tortoises with divided home ranges exhibit behavior that would result in injury or death, this would constitute take in the form of harm. We cannot quantify the take associated with this habitat loss with any certainty because we have no information on home range configurations for individuals affected by the project, including the fences.

Operation and Maintenance of the Hawes Composting Facility

We anticipate that operation and maintenance activities, including site access, within permanently fenced areas are likely to take (mortality or injury) few desert tortoises. A limited potential exists that a very small number of desert tortoises may find their way into a fenced area. Most of these individuals are likely to be taken in the form of capture as they are removed to offsite habitat; a small fraction of these individuals may be taken, in the form of injury or mortality, if they are exposed to adverse weather conditions or crushed by vehicles before they are detected.

Decommissioning of the Hawes Composting Facility

We do not have sufficient information regarding the activities associated with the decommissioning of the Hawes Composting Facility; therefore, we cannot reasonably predict

how many desert tortoises will be taken. We expect activities associated with decommissioning of the facility will occur within the fenced project area. For this reason, we anticipate that decommissioning activities will not kill or injure any desert tortoises.

The exemption to the prohibition against take provided by this incidental take statement applies only to activities authorized by the Bureau and conducted by Nursery Products within the action area defined in this biological opinion.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of desert tortoises during the implementation (construction, operation, maintenance, and decommissioning) of Nursery Products, LLC Hawes Composting Facility:

1. The Bureau and Nursery Products must ensure that the amount of incidental take that occurs is commensurate with the analysis contained herein.

2. The Bureau and Nursery Products must ensure that culverts remain clear of debris for the life of the project and are constructed and maintained to ensure desert tortoises may safely use them.

3. The Bureau and Nursery Products must ensure that the facility and access routes do not provide subsidies to common ravens.

Our evaluation of the proposed action includes consideration of the protective measures proposed by the Bureau and Nursery Products in the biological assessment and re-iterated in the "Description of the Proposed Action" section of this biological opinion. Consequently, any changes in these protective measures may constitute a modification of the proposed action that causes an effect to the desert tortoise that was not considered in the biological opinion and require re-initiation of consultation, pursuant to the implementing regulations of the section 7(a)(2) of the Act (50 Code of Federal Regulations 402.16). The reasonable and prudent measures and terms and conditions are intended to complement the protective measures proposed by the Bureau and Nursery Products.

TERMS AND CONDITIONS

To be exempt from the prohibitions of section 9 of the Act, the Bureau and Nursery Products must comply with the following terms and conditions, which implement the reasonable and prudent measures, described above and outline reporting and monitoring requirements. These terms and conditions are non-discretionary.

1. The following terms and conditions implement reasonable and prudent measure 1:

    a. To ensure that the measures proposed by the Bureau and Nursery Products are effective and properly implemented, the Bureau and Nursery Products must contact the Service immediately if it becomes aware that a desert tortoise has been killed or injured by project activities. At that time, the Bureau and Nursery Products must review the circumstances surrounding the incident with the Service to determine whether additional protective measures are required. Project activities may continue during the review, provided that the proposed protective measures in the project description and any appropriate terms and conditions of this biological opinion have been and continue to be fully implemented.

    b. If two desert tortoises are injured or killed as a result of the construction of the facility, consultation must be re-initiated on the proposed action, pursuant to the implementing regulations for section 7(a)(2) of the Endangered Species Act at 50 Code of Federal Regulations 402.16. Any activities resulting in such take should cease at that time because the exemption provided pursuant to section 7(o)(2) will have lapsed and any further take would be a violation of section 9 of the Act.

    c. If two desert tortoises are injured or killed as a result of operation and maintenance of the facility in any calendar year, consultation must be re-initiated on the proposed action, pursuant to the implementing regulations for section 7(a)(2) of the Endangered Species Act at 50 Code of Federal Regulations 402.16. Any activities resulting in such take should cease at that time because the exemption provided pursuant to section 7(o)(2) will have lapsed and any further take would be a violation of section 9 of the Act. We have not established a re-initiation threshold for moving desert tortoises from harm's way during operation and maintenance because we cannot predict, with any accuracy, how many desert tortoises may be encountered over the life of the proposed facility; additionally, the short-distance movement of these animals from harm's way by authorized biologists is unlikely to kill or injure these individuals.

2. The following terms and conditions implement reasonable and prudent measure 2:

    a. The Bureau must ensure that Nursery Products uses culverts that allow effective passage of desert tortoises and are large enough that desert tortoises are unlikely to use the culverts as burrows. At this time, we estimate that any box culvert must be 3 feet on a side and pipe culverts 3 feet in diameter; we strongly recommend that Nursery Products install box culverts because desert tortoises are less likely to use them as burrows.

    b. The Bureau must ensure regular maintenance of the culverts so desert tortoises do not use accumulated debris to construct burrows.

3. The following terms and conditions implements reasonable and prudent measure 3:

> The Bureau must meet with the Service to review data and reports associated with Nursery Products' monitoring and adaptive management program for common ravens. If the agencies mutually determine that further monitoring and adaptive management are warranted, the Bureau must ensure that Nursery Products incorporates any additional requirements into their raven management plan.

REPORTING REQUIREMENTS

Within 30 days of the completion of construction, the Bureau must provide a summary report that provides, in addition to the following information, a complete overview of the amount of habitat disturbed and the number of desert tortoises that were taken. These reports 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 instances from re-occurring. Within 30 days of decommissioning, the Bureau must provide a summary report that describes that activities associated with site restoration.

We recommend that the Bureau provide us with any recommendations that would facilitate the implementation of the protective measures while maintaining protection of the desert tortoise. We also request that the Bureau provide us with the names of any monitors who assisted the authorized biologist and an evaluation of the experience they gained on the project. The qualifications form on our website (http://www.fws.gov/ventura/sppinfo/protocols/deserttortoise_monitor-qualifications-statement.pdf), 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 Ventura Fish and Wildlife Office by telephone (805 644-1766) and by facsimile (805 644-3958) or electronic mail. The report must include the date, time, and location of the carcass, a photograph, cause of death, if known, and any other pertinent information.

Injured desert tortoises must be taken to a qualified veterinarian for treatment. If any injured desert tortoises survive, the Bureau or Nursery Products must contact the Service regarding their final disposition. Nursery Products must develop and maintain, for the duration of the project, a list of veterinarians qualified to work with desert tortoises.

The Bureau or Nursery Products must take care in handling dead desert tortoises to preserve biological material in the best possible state for later analysis. If desert tortoises are killed by project activities, the Service will instruct the Bureau or Nursery Products regarding the final disposition of the carcass.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the 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 recommend that the Bureau and Nursery Products develop a habitat restoration plan that Nursery Products will implement following decommissioning of the facility. The plan should include measures that restore the project site to or near to pre-project conditions.

We recommend that Nursery Products contribute a portion of their profit to the Regional Raven Management Plan. If Nursery Products is agreeable to this recommendation, we suggest that Nursery Products work the Bureau and the Service to determine the exact amount of the contribution.

We recommend that Nursery Products monitor coyote activity in the action area to determine if predation by coyotes has increased as a result of the proposed action. Should predation by coyotes increase, we recommend working with the Bureau and the Service to identify the appropriate measures to reduce the attractiveness of the project to coyotes.

The Service requests notification of the implementation of any conservation recommendations so we may be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats.

REINITIATION NOTICE

This concludes formal consultation on the Bureau's proposal to issue a right-of-way permit to Nursery Products LLC for the 80-acre Hawes Composting Facility project. 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 the amount or extent of taking specified in the incidental take statement is exceeded; if new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; if the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion; or if a new species is listed or critical habitat designated that may be affected by the identified action (50 Code of Federal Regulations 402.16). 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 reinitiation.

If you have any questions regarding this biological opinion, please contact Erin Nordin of my staff at (909) 382-2959.

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