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October 1, 2010

Memorandum

To: District Manager, California Desert District, Bureau of Land Management,
Moreno Valley, California

From: *Diane K. Niles*
Field Supervisor, Ventura Fish and Wildlife Office, Ventura, California

Subject: Biological Opinion on BrightSource Energy's Ivanpah Solar Electric Generating System Project, San Bernardino County, California [ACA-48668, 49502, 49503, 49504] (8-8-10-F-24)

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) proposed issuance of a right-of-way grant to Solar Partners I, LLC, Solar Partners II, LLC, and Solar Partners VIII, LLC for the Ivanpah Solar Electric Generating System (ISEGS) and its effects on the federally threatened desert tortoise (*Gopherus agassizii*) in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.). Because BrightSource Energy is a parent company for all Solar Partner Companies, this biological opinion refers to the project proponents collectively as BrightSource. The proposed project involves construction, operation, maintenance, and decommissioning of a 370-megawatt solar thermal power plant and associated infrastructure and facilities on 3,582 acres of public land managed by the Bureau. Your December 7, 2009 request for formal consultation was received on December 8, 2009.

This biological opinion is based on information that accompanied your December 7, 2009 request for consultation and additional information regarding changes in the project description and translocation strategy obtained from Bureau staff during the formal consultation process. This information includes the biological assessment (CH2MHill 2009a), revised biological assessment (CH2MHill 2010a), draft environmental impact statement and final staff assessment (Bureau and California Energy Commission 2009), supplemental draft environmental impact statement (Bureau 2010), desert tortoise survey report for the project site (CH2MHill 2008a), biological survey report for the proposed desert tortoise translocation areas (SNEI 2009), desert tortoise translocation plan (CH2MHill 2009b), the management plan for common ravens (CH2MHill 2008b), project site reclamation plan (CH2MHill 2009c), the site plan for management of weeds (CH2MHill 2008c), and additional correspondences regarding modifications to the desert tortoise translocation strategy and mitigation framework (Fesnock

2010a and 2010b, CH2MHill 2010b). A complete record of this consultation is on file in the Ventura Fish and Wildlife Office.

Construction, operation, maintenance, and decommissioning of the ISEGS facility and translocation of desert tortoises do not require activities that would adversely affect the primary constituent elements of critical habitat for the desert tortoise because the actions will not take place within critical habitat or affect the primary constituent elements. Therefore, we do not address critical habitat in this biological opinion.

Consultation History

On December 7, 2009, the Bureau initiated consultation for construction, operation, maintenance, and decommissioning of the ISEGS facility. Following public comment on the Bureau's draft environmental impact statement and the California Energy Commission's final staff assessment, BrightSource modified its project to reduce adverse effects to desert tortoises and rare plant species. On April 26, 2010, we issued a draft biological opinion to the Bureau (Service 2010c). We revised the draft biological opinion based on comments from the Bureau and BrightSource. On July 21, 2010, the Bureau provided us with a revised translocation strategy that required significant revisions to the draft biological opinion (Fesnock 2010c). On September 21, 2010, the Bureau provided additional changes to the translocation strategy, requiring further revisions of the draft biological opinion (Fesnock 2010a). This biological opinion analyzes the effects associated with the reduced project footprint, the revised translocation strategy, and the comments received from the Bureau and BrightSource.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

Introduction

BrightSource Energy is proposing to construct and operate a solar energy plant approximately 4.5 miles southwest of Primm, Nevada and 1.6 miles west of Ivanpah Dry Lake. The proposed site is 0.5 mile west of the Primm Valley Golf Club. The facility would consist of 3 solar electric generating plants, constructed over a 4-year period as follows: (1) Ivanpah 1 – construction of the Ivanpah 1 plant (southernmost site; 914 acres), construction of shared facilities (i.e., power substation, administrative facilities, water line, power lines, and construction logistics area), and improvement of Colosseum Road ; (2) Ivanpah 2 – construction of the Ivanpah 2 plant (middle site; 1,097 acres); and (3) Ivanpah 3 – construction of the Ivanpah 3 plant (northern site; 1,227 acres). BrightSource Energy would also install a 5.7-mile natural gas distribution line, install a 9.5-mile fiber optic line, and re-route several dirt roads/trails that currently cross the proposed ISEGS site. We summarized the description of the proposed action from your request for consultation, the revised biological assessment (CH2MHill 2010a), and the supplemental environmental impact statement (Bureau 2010).

Construction

Construction of the ISEGS facility would require an average workforce of 474 and a peak workforce of 959. Below, we have provided a detailed description of each stage of project development for the three project sites, the construction logistics area, and other associated infrastructure (i.e., access roads, water wells, water line, gas line and tie-in facility, fiber optic line, etc.). We have described the measures that BrightSource will implement to avoid or minimize adverse effects to the desert tortoise in a later section.

Construction Logistics Area

BrightSource would develop a construction logistics area (CLA) between the Ivanpah 1 and 2 project sites to accommodate construction support facilities (e.g., temporary construction trailers, construction tool sheds, construction lay down areas, and construction parking), the electrical tie-in substation, water wells, permanent facility parking areas, permanent administrative and warehouse facilities, and wheel wash areas. In addition, the CLA would accommodate a segment of Colosseum Road that BrightSource would re-route through the CLA to avoid the Ivanpah 2 project site.

CLA development would begin with surveying and staking the CLA boundaries and grading of a 10-foot-wide perimeter road along the boundary of the CLA to facilitate fence installation. BrightSource would then install an 8-foot high chain-link security fence with desert tortoise exclusion fencing attached to the bottom around the perimeter of the CLA. Alternatively, BrightSource may install desert tortoise exclusion and security fencing separately. Regardless of the method for fence installation, all site development and construction activities described for the CLA would occur within this fenced boundary. This includes grading of selected locations and construction or installation of all construction support facilities and permanent operational facilities.

Ivanpah 1, Ivanpah 2, and Ivanpah 3 Project Sites

Each project site would consist of one heliostat (mirror) array constructed around a 459-foot-tall centralized solar power tower. Ivanpah 1 would contain approximately 53,500 heliostats and Ivanpah 2 and 3 would contain approximately 60,000 heliostats each. Each heliostat consists of two 75.8-square-foot mirrors. All three units (Ivanpah 1, 2, and 3) would have their own individual power block; the biological assessment describes the components of the power blocks.

Prior to site development and construction activities for each phase, BrightSource would install a desert tortoise exclusion fence or a combined exclusion fence and security fence around the entire perimeter of the phase. BrightSource would use the same methods described above for the CLA in installation of this fence. Following fence installation, BrightSource would mow all vegetation on the project sites to within 12 to 18 inches of the ground surface, grade a site for the power block, and grade additional areas within the project site for parking areas, construction lay down areas, building pads, and internal roads. During the construction stage, BrightSource

would improve internal project-site roads, construct the power block, install the heliostat field, install underground piping and wiring, install the generation tie-line, and erect fabrication shops and other construction and administrative buildings. In addition, BrightSource would re-route existing dirt roads/trails around the perimeter of the project site.

Gas Line

In addition to the CLA and the three project sites, BrightSource would construct a 5.7-mile natural gas distribution pipeline. The pipeline would connect to the Kern River Gas Transmission line that traverses Ivanpah Valley 0.5 mile north of the Ivanpah 3 project site. At the point of connection with the Kern River Gas Transmission line, BrightSource would construct a permanent gas metering station (100 feet by 150 feet), requiring a 200-foot by 200-foot temporary construction area. From this metering station, the natural gas line and an 8- to 12-foot-wide access road would head south along the eastern edge of Ivanpah 3 to a metering station (10 feet by 40 feet) near the middle of its western side. From the metering station at Ivanpah 3, the gas line and access road would continue along the eastern edge of Ivanpah 2 to another metering station (20 feet by 40 feet) on the east side of Ivanpah 2. From the Ivanpah 2 metering station, the gas line would continue along the west side of Ivanpah 2 following the asphalt access road to Ivanpah 1. Gas line installation would require a 50-foot-wide construction corridor for access, storage of excavated soil, and pipefitting. In addition, construction of the Ivanpah 3 metering station would require a temporary lay down area within the Ivanpah 3 project site. The Ivanpah 1 and 2 metering stations would use a portion of the Ivanpah 2 solar field for construction lay down.

To allow for gas company access, BrightSource would construct the gas line, access road, and metering stations outside of the fenced project sites for Ivanpah 1, 2, and 3. A portion of the gas line to the Ivanpah 1 project site would be located within the fenced CLA. BrightSource would construct additional spur lines within the fenced project sites to carry gas from the edge of the respective project site to the main power block.

Construction activities related to the metering stations would include grading a pad and installing aboveground and underground gas piping, metering equipment, gas conditioning, pressure regulation, and pigging facilities. The construction contractor would determine which method to use to install the natural gas pipeline. The most common method of pipeline construction includes installation of the pipeline into an open trench approximately 36 inches wide and 3 to 10 feet deep.

Fiber Optic Line

To allow for remote monitoring of the new electrical substation, Southern California Edison (SCE) would construct an 8-mile fiber optic line from the Ivanpah substation to an interface point designated by the local telecommunication carrier in Mountain Pass. SCE would use existing distribution line poles for installation. Installation would require use of a bucket truck, four people, and two pick-up trucks. SCE would string out fiber optic cable between the existing

poles. Every 10,000 to 20,000 feet, SCE would establish a 40-foot by 60-foot line stringing set. Crews would work within this area to raise the cable and string it tight over the existing poles. SCE estimates that approximately 20 poles are not accessible from the existing dirt service roads. Workers on foot would install the fiber optic line on these poles.

Operation

The ISEGS facility would have an operating life of up to 45 years and would operate 7 days a week for up to 14 hours a day. During operation, approximately 90 full-time employees would work at the site. ISEGS would use a maximum of 100 acre-feet of water per year for operational purposes. Heliostat washing is the only identified activity that we have described in this section because it is the only operational activity with the potential to have some effects on desert tortoise.

To keep heliostats clean, BrightSource would wash some portion of the heliostat field on a nightly basis, so that every heliostat within the 3 project sites is washed once every 2 weeks. The application rate per heliostat would be about 2.5 gallons per washing for a total use of 10.97 acre-feet per year for Ivanpah 1 and about 12 acre-feet per year for Ivanpah 2 and 3. However, the application rate on Ivanpah 1 may double during construction of Ivanpah 3 due to increased amounts of construction-related dust. During each washing, approximately 0.17 gallon per linear foot of mirror would run off onto the ground beneath the mirror.

Maintenance

In addition to regular, day-to-day operation of the ISEGS facility, BrightSource would need to perform a variety of maintenance actions. BrightSource has grouped these anticipated maintenance activities into three classes. Any maintenance activities that are outside the approved right-of-way boundary (i.e., the fenced boundary of the project site and the associated perimeter road) for the project will require additional authorizations from the Bureau and additional section 7 consultation.

Class I activities are those maintenance actions that do not result in new surface disturbance. BrightSource would perform these activities by hand or with the use of tools, equipment, and/or vehicles. Class I activities would take place on existing structures or would be staged from existing roads or other disturbed areas. These activities would not include off-road travel. Vehicles used during these activities might include low-boy tractor and trailer, flat bed, utility trucks, forklifts, scissor lifts, cherry pickers, and mechanical hoists. Labor may involve several workers confined to the area in need of maintenance. BrightSource may need to perform these activities on a daily basis.

Class II activities would result in minimal surface disturbance, but would likely require heavy earth-moving equipment including motor graders, bulldozers, front-end loaders, backhoes, water trucks, asphalt pavers, and dump trucks. Typical Class II activities would include: 1) underground utility (e.g., water, gas, sewage, electrical, communication, etc.) repairs, upgrades

and tie-ins to structures; 2) motor grading and repairs of existing dirt roads, shoulders, and berms; 3) cut or fill of soil surface to re-establish appropriate cover due to soil erosion after rainfall events; 4) maintenance of drainages, fords and culverts for proper flow of water runoff; 5) maintenance of asphalt roads, shoulders and parking lots; 6) security and desert tortoise exclusion fence repairs; and 7) minor natural gas pipeline repairs that require excavation.

Class III includes maintenance activities that result in major surface disturbance. Typical Class III activities would include: 1) installation of a new underground pipeline a distance of 1,000 feet or more and 2) disturbance of an acre or more for construction of new storm water drainage features.

Decommissioning and Restoration

BrightSource would perform restoration work on all sites disturbed during construction, operation, maintenance, and decommissioning of the ISEGS facilities. For short-term disturbances, BrightSource would begin restoration following completion of ground disturbance and would implement the following general steps: 1) decompaction of soils, 2) spreading of topsoil salvaged prior to construction, and 3) seeding of the disturbed area with native plant species. BrightSource would time seeding to avoid drought periods to the extent possible.

Decommissioning of the facility would occur sequentially in the order of construction (i.e., Ivanpah 1, followed by Ivanpah 2, Ivanpah 3, and the shared facilities). Following decommissioning of the ISEGS facility, BrightSource would remove all structures from the project area and begin restoration of all long-term disturbances. Decommissioning and restoration/reclamation would involve the following general activities: 1) rehabilitate access roads by removing asphalt, decompacting soil, and revegetating, 2) remove all structures and foundations less than 6-feet deep from the project area, 3) remove all physical components of the generation facility except for the SCE substation, the diversion structure, and asphalt access road, 4) re-contour and decompact soils associated with disturbed areas, 5) implement revegetation procedures using native species, 6) remove all exclusion and security fencing, and 7) monitor revegetated areas for success and control non-native weeds.

Minimization Measures

General Protective Measures

To minimize adverse effects to the desert tortoise, BrightSource will implement the following protective measures during construction, operation, maintenance, and decommissioning activities. The wording of some measures differs from those proposed by the Bureau and BrightSource. We have changed the wording of some measures to improve clarity, but we have not changed the substance of the measures that BrightSource and the Bureau have proposed.

1. BrightSource will employ authorized biologists, approved by the Service, and desert tortoise monitors to ensure compliance with protective measures for the desert tortoise.

Use of authorized biologists and desert tortoise monitors will be in accordance with the most up-to-date Service guidance and will be required for monitoring of any construction, operation, or maintenance activities that may result in take of the desert tortoise. The current guidance is entitled *Desert Tortoise – Authorized Biologist and Monitor Responsibilities and Qualifications* (Service 2008a).

2. BrightSource will provide the credentials of all individuals seeking approval as authorized biologists to the Bureau. The Bureau will review these and provide the credentials of appropriate individuals to the Service for approval at least 30 days prior to the time they must be in the field.
3. BrightSource will designate a field contact representative who will oversee compliance with protective measures during construction, operation, maintenance, and decommissioning activities that may result in injury or mortality of desert tortoises. If the field contact representative, authorized biologist, or desert tortoise monitor identifies a violation of the desert tortoise protective measures, they will halt work until the violation is corrected.
4. Individuals approved to handle desert tortoises (i.e., authorized biologists and supervised desert tortoise monitors) will do so in compliance with the most up-to-date guidance from the Service. The Service is currently using the *Desert Tortoise Field Manual* (Service 2009a).
5. BrightSource will develop and implement an environmental awareness program for all workers (construction, operation, maintenance, and decommissioning) that will address the following: a) types of construction activities that may affect the desert tortoise, b) the required desert tortoise protective measures, c) desert tortoise life history and threats, d) legal protections and penalties, and e) reporting requirements.
6. Bright Source will fence the boundaries of the Ivanpah 1, 2, and 3 project sites, the CLA, and Colosseum Road and clear these areas of all desert tortoises prior to construction. We have provided a description of the procedures for clearance, translocation, and monitoring of these animals below.
7. Authorized biologists will perform clearance surveys of unfenced work areas outside of the main project sites and CLA (e.g., gas distribution line, utility right-of way, etc.) immediately prior to the onset of construction, operation, or maintenance activities.
8. BrightSource will employ an appropriate number of authorized biologists and desert tortoise monitors to monitor construction, operation, maintenance, and decommissioning activities that occur in any unfenced work areas. Authorized biologists or desert tortoise monitors will flag all desert tortoise burrows for avoidance in areas adjacent to construction work areas.

9. BrightSource will confine all construction activities, project vehicles, and equipment within the delineated boundaries of construction areas that authorized biologists or designated desert tortoise monitors have identified and cleared of desert tortoises. BrightSource will confine all work areas to the smallest practical area, considering topography, placement of facilities, location of burrows, public health and safety, and other limiting factors. BrightSource will use previously disturbed areas to the extent feasible.
10. Any non-emergency expansion of activities into areas outside of the areas considered in this biological opinion will require Bureau approval and desert tortoise clearance surveys. These expanded activities may require re-initiation of consultation with the Service.
11. BrightSource will prohibit project personnel from driving off road or performing ground-disturbing activities outside of designated areas during construction, operation, maintenance, or decommissioning except to deal with emergencies.
12. During operation and maintenance activities at the completed project site, BrightSource will confine all vehicle parking, material stockpiles, and construction-related materials to the permanently fenced project sites and CLA.
13. BrightSource will confine project access to Colosseum Road for construction, operation, maintenance, and decommissioning of the facility. BrightSource will permanently fence this road with desert tortoise exclusion fencing prior to the onset of construction. To reduce the potential for vehicle strikes of desert tortoise on unfenced access roads (i.e., gas line road, fiber optic right-of-way road, etc.), BrightSource will enforce a 20-mile-per-hour speed limit for project related travel (i.e., construction, operation, maintenance, and decommissioning) in these areas. BrightSource will post speed limit signs along all access routes.
14. With the exception of security personnel, BrightSource will prohibit firearms on the project site.
15. Project personnel who are working outside fenced areas will check under vehicles or equipment before moving them. If project personnel encounter a desert tortoise, they will contact an authorized biologist. The desert tortoise will be allowed to move a safe distance away prior to moving the vehicle. Alternatively, an authorized biologist or desert tortoise monitor may move the desert tortoise to a safe location to allow for movement of the vehicle.
16. An authorized biologist or desert tortoise monitor will inspect all excavations that are not within desert tortoise exclusion fencing on a regular basis (several times per day) and immediately prior to filling of the excavation. If project personnel discover a desert tortoise in an open trench, an authorized biologist or desert tortoise monitor will move it to a safe location. BrightSource will cover or temporarily fence excavations that are

outside of the permanently fenced project areas at the end of each day to prevent entrapment of desert tortoises during non-work hours.

17. When outside of the fenced project areas, project personnel will not move construction pipes greater than 3 inches in diameter if they are stored less than 8 inches above the ground until they have inspected the pipes to determine the presence of desert tortoises. As an alternative, BrightSource may cap all such structures before storing them outside of fenced area.

Management of Common Ravens

BrightSource will implement the following project design features and protective measures to reduce the adverse effects associated with predation of desert tortoises by common ravens (*Corvus corax*). The draft management plan for common ravens (CH2MHill 2008b) contains more detailed information on the following actions:

1. BrightSource will contain all trash associated with the project that could provide subsidies to predators in secure, self-closing receptacles to prevent the introduction of subsidized food resources for common ravens.
2. BrightSource will promptly remove and dispose of all road-killed animals on the project site or its access roads.
3. BrightSource will use water for construction, operation, maintenance, and decommissioning (e.g., truck washing, dust suppression, heliostat washing, landscaping, etc.) in a manner that does not result in puddling.
4. BrightSource will use closed tanks to store water for all project site water needs to eliminate an open water source for common ravens.
5. BrightSource will use closed tanks to store water associated with boiler commissioning and emergency outfalls. BrightSource will not use storm-water detention basins in its project design.
6. BrightSource will install generation tie-lines on utility poles designed to be incompatible with nesting of common ravens in accordance with Avian Power Line Interaction Committee guidelines (2006) and will monitor the effectiveness of these deterrence measures. BrightSource will implement alternative measures if the current effort is unsuccessful.
7. All transmission lines associated with the ISEGS facility will be designed in a manner that will reduce the likelihood of nesting by common ravens. BrightSource will monitor all utility lines and other potential nesting structures and remove common raven nests that it identifies following authorization by the Bureau and the Service.

8. BrightSource will monitor the ISEGS facilities to identify frequently used perching locations for common ravens. If it identifies such locations, BrightSource will install bird barrier spikes or other functional equivalent following specific discussion with the Bureau and the Service.
9. BrightSource will coordinate with the Bureau and the Service to implement or fund hazing or lethal removal of problem common ravens. Problem common ravens are individuals that have been shown to prey on desert tortoises through monitoring.
10. BrightSource will monitor the effectiveness of its management plan for common ravens during all 3 phases of construction and for 2 years following completion of the final phase. BrightSource will implement adaptive management measures if monitoring shows that the management plan is not effective in controlling common raven use of the project site. BrightSource will consult with the Bureau and the Service prior to implementing adaptive management changes.

Weed Management

BrightSource will implement the following weed management measures to reduce adverse effects to desert tortoises and their habitat during construction operation and maintenance of the ISEGS facilities:

1. BrightSource will designate an environmental compliance manager to provide oversight of construction practices and ensure compliance with weed management provisions.
2. BrightSource will provide training to all personnel charged with environmental management responsibilities that will include the following: a) weed plant identification, b) impacts of noxious weeds on native vegetation, wildlife, and fire activity, and c) required measures to prevent the spread of noxious weeds on the site.
3. During construction, BrightSource will perform weekly inspections during the growing season of all construction areas, access routes, and equipment cleaning facilities for the presence of noxious weeds and weed seed. Following the completion of construction activities, from March through August, BrightSource will continue monitoring according to the following schedule: 1) once a month during the first 2 years of the revegetation, 2) quarterly for the third and fourth years, and 3) semi-annually for year 5 through 10.
4. During operation of completed facilities, BrightSource will perform general site monitoring according to the schedule described above (Measure 3) and perform weed control at least every other week during the growing season (March through August) and once a month during the remainder of the year. Weed control will consist of physical control methods (e.g., hand pulling, hoeing, etc.) or herbicide application.

5. BrightSource will apply all herbicides used in weed treatments according to a plan approved by the Bureau and in accordance with the herbicide labels. BrightSource will only use qualified individuals for herbicide application and will suspend herbicide use when any of the following conditions are met: a) wind velocity exceeds 6 miles per hour during application of liquids or 15 miles per hour during application of granular herbicides, b) snow or ice covers the foliage of noxious weeds, c) precipitation is occurring or is imminent, or d) air temperatures exceed 90 degrees Fahrenheit.
6. BrightSource will monitor all locations of weed treatment to ensure that treatments are effective.
7. BrightSource will limit disturbance areas during construction to the minimal required to perform work and will only use defined routes when accessing work areas.
8. BrightSource will use vehicle wash and inspection stations and closely monitor all material brought onto the site to minimize the potential for weed introductions.
9. BrightSource will identify and flag all areas of noxious weed infestation and minimize use of these areas by project personnel until weed treatment of the area has occurred.
10. BrightSource will preferentially perform native seed collection for restoration work from areas adjacent to the project site. When it is necessary to use native seeds from commercial vendors, BrightSource will only accept seed that is free of non-native weed seeds.

Desert Tortoise Translocation

The following description of the desert tortoise translocation strategy for the ISEGS project is taken from BrightSource's translocation plan (CH2MHill 2009b) and from modifications made by the Bureau during the formal consultation process (Fesnock 2010a).

Fencing and Clearance Surveys

To minimize adverse effects to the desert tortoise, BrightSource will fence the boundary of the Ivanpah 1, 2, and 3 project sites, the portions of the CLA where ground disturbance would occur, and Colosseum Road from the Primm Golf Club to the CLA with desert tortoise exclusion fencing. BrightSource will install desert tortoise guards, as described in attachment B of the biological assessment (CH2MHill 2009a), at gated entries to prevent desert tortoises from gaining entry to the project sites or CLA. BrightSource will also fence the construction area for the utility right-of-way (e.g., gas distribution line) with temporary desert tortoise fencing prior to clearance surveys and ground disturbance. BrightSource may choose to fence all phases of the ISEGS project and the CLA at one time, or it may fence each phase at the time of construction on a given phase.

Within 24 hours prior to the initiation of construction of the desert tortoise-exclusion fence, BrightSource will conduct 2 complete desert tortoise clearance surveys of the fence line segment and associated disturbance right-of-way that will be fenced that day. During these surveys, an authorized biologist will inspect all burrows to determine occupancy and collapse all unoccupied burrows. To the extent feasible, BrightSource will make modifications in fence line alignment to fence occupied burrows out of the ISEGS project areas. If the fence line cannot avoid a given burrow, an authorized biologist will remove the desert tortoise and place it in a sheltered location outside of the ISEGS project area being fenced. If BrightSource fences a given project phase and does not plan on immediate clearing of that phase, it will leave gaps in the fence in locations where desert tortoise burrows are found in the path of the fence line right-of-way. These gaps will buffer the burrow by a distance of 54.6 yards (i.e., 27.3 yards on each side) and will remain open until the time that BrightSource is ready to commence with clearance surveys. BrightSource will not excavate and clear these burrows until it is ready to perform clearance surveys.

Following construction of the desert tortoise exclusion fence around a given portion of the ISEGS projects site (i.e., Ivanpah 1, 2, and 3 project sites, the CLA, or Colosseum Road), BrightSource will perform a full clearance survey of the fenced area during the spring (i.e., April 1 to May 31) or fall (i.e., September 1 to October 15). For fall clearance surveys, BrightSource may extend this survey window until October 31 for phases in which all desert tortoises will be placed into a quarantine facility (e.g., Ivanpah1 and the CLA) rather than translocated. Regardless of the method used to fence project site boundaries (i.e., at one time versus phased), clearance surveys would proceed according to the schedule described below.

In the fall of 2010, BrightSource intends to clear all desert tortoises from the CLA and Ivanpah 1. In fall 2010, BrightSource also intends to construct temporary desert tortoise exclusion fencing around the Ivanpah 2 power block and the power block access road and clear desert tortoises from these areas. BrightSource would place desert tortoises moved from the Ivanpah 2 power block and power block access route into adjacent habitat on the remainder of Ivanpah 2. BrightSource would not clear desert tortoises from the remainder of Ivanpah 2 or from Ivanpah 3 until construction is ready to commence on those phases.

When performing clearance surveys, authorized biologists and supervised desert tortoise monitors will conduct at least 3 complete clearance sweeps over a given phase with transects no wider than 30 feet. Surveyors will conduct transects for each sweep in different directions to allow for opposing angles of observation. BrightSource will consider the site clear after two complete passes have discovered no new desert tortoises. Authorized biologists will excavate all potential desert tortoise burrows by hand to confirm occupancy status. BrightSource will collect data on all desert tortoises handled and examine all individuals for clinical signs of disease. A detailed list of data that BrightSource will collect on each desert tortoise is provided in its translocation plan.

Disease Testing, Quarantine, and Translocation*CLA and Ivanpah 1*

Desert tortoises that BrightSource locates during clearance surveys will undergo varying levels of disease testing and quarantine, depending on their location within the project site. In fall 2010, BrightSource intends to clear all desert tortoises from Ivanpah 1 and the CLA and quarantine them within a portion of the CLA that would not be disturbed by construction activities. BrightSource will collect blood, perform ELISA testing, and do visual health assessments on all project site desert tortoises quarantined at this facility.

The quarantine facility within the CLA will consist of a series of 65.6-foot by 65.6-foot) pens to allow separate quarantine of each individual cleared from the CLA and Ivanpah 1. BrightSource will construct each pen with permanent desert tortoise exclusion fencing or other materials that will prevent individuals from digging out or coming into direct contact with other quarantined or wild individuals. Each pen will contain at least two natural or artificially constructed burrows and should contain shrub cover that is similar to that found within the project site phases. In addition to the individual pens, BrightSource will construct a security fence around the entire quarantine facility and install netting over the facility or over the individual pens that contain juvenile desert tortoises to prevent access by desert tortoise predators. BrightSource will use a portable irrigation system and water all desert tortoise pens at a sufficient frequency, duration, intensity, and timing to mimic the rainfall patterns of a good rainfall year for this portion of the Mojave Desert. In addition, BrightSource will maintain a sufficient stock of supplemental feed to allow for additional feeding of quarantined animals, if necessary. BrightSource will develop an animal husbandry plan for the quarantine facility that the Service will review and authorize prior to placement of individuals in the quarantine facility.

Prior to release of the CLA and Ivanpah 1 desert tortoises from the quarantine facility, BrightSource will perform surveys of translocation areas west and north of the ISEGS project to determine density and disease prevalence within the resident population. Surveys would include full coverage surveys of a 500-meter buffer along the western and northern boundaries of the project site and full coverage surveys of the 4 translocation sites identified in the BrightSource's translocation plan (i.e., N1, N2, N3, and N4; CH2MHill 2009b). BrightSource will collect blood for ELISA testing and perform visual health assessments on all desert tortoises identified within these areas. In addition, BrightSource will perform sampling transects of a 3.7-mile buffer of contiguous desert tortoise habitat around these areas. All desert tortoises located during this sampling will be tested for disease using visual health assessments and ELISA testing. BrightSource will transmitter a subset (i.e., at least equal to the estimated project-site population) of the individuals located during these surveys to facilitate post-translocation monitoring of the resident population. Surveys of the 3.7-mile buffer will determine population density and disease prevalence. BrightSource will locate and test a sufficient number of individuals to predict, with a confidence interval of 95 percent, that 5 percent or less of the desert tortoises in this buffer are infected with upper respiratory tract disease. If BrightSource determines that this area has an upper respiratory tract disease prevalence of more than 5 percent among the resident

animals, it will not release individuals into the area west or north of the project site. If BrightSource determines through pre-translocation surveys that the post-translocation density in the translocation area would be more than 21 subadult and/or adult desert tortoises per square mile, it will not release individuals into the area west or north of the project site. If either of these scenarios occurs, BrightSource will contact the Service to address necessary changes in its translocation strategy prior to clearance surveys of additional phases.

Following receipt of ELISA testing results and completion of visual health assessments for the resident and quarantined population, BrightSource will contact the Service regarding the proposed release of each quarantined desert tortoise. The Service will work with BrightSource to identify an appropriate facility to house any quarantined desert tortoises that test ELISA-positive. In addition, the Service may require BrightSource to perform additional testing to confirm disease status of any ELISA-positive desert tortoises before final disposition. Prior to release of individuals into the translocation area, BrightSource will fence Interstate 15 between Nipton Road and Yates Well Road with desert tortoise exclusion fencing to prevent translocated desert tortoises from entering the roadway during long-distance, post-translocation movements.

BrightSource intends to translocate all ELISA-negative desert tortoises from quarantine to the translocation area in spring 2011, but timing of disease testing may push the translocation to the fall 2011. For Ivanpah 1 and the CLA, BrightSource will release all desert tortoises, originally located within 500 meters of the western fence, in areas adjacent to the western fence line. This release will be done in a manner that does not place a translocated individual more than 500 meters from its original capture location. In addition, BrightSource will not translocate a desert tortoise in this category within 1500 meters of a resident individual that has tested positive for disease through ELISA testing or visual health assessments. If BrightSource cannot comply with this buffer without moving the individual more than 500 meters from its original capture location, it will translocate the individual to the translocation area it has identified for Ivanpah 1 and CLA (i.e., N4; CH2MHill 2009b).

BrightSource will release all other desert tortoises into the translocation area that it identified for Ivanpah 1 and the CLA in its translocation plan (i.e., N4; CH2MHill 2009b). BrightSource will attach transmitters to all translocated desert tortoises to facilitate post-translocation monitoring. BrightSource will not translocate a desert tortoise in this category within 3.7 miles of a resident individual that has tested positive for disease through ELISA testing or visual health assessments.

Ivanpah 2

In fall 2010, BrightSource intends to construct a temporary desert tortoise exclusion fence around the Ivanpah 2 power block and the power block access. It will then move all desert tortoises that occupy this enclosure into adjacent habitat on the remainder of Ivanpah 2. BrightSource will ensure that it does not move these desert tortoises more than 500 meters during this clearance.

In spring 2010, BrightSource intends to clear all desert tortoises from Ivanpah 2 that are more than 500 meters from the western fence line and quarantine them within the facility described above for Ivanpah 1 and the CLA. If necessary, BrightSource will construct additional pens to facilitate the quarantine of these animals. BrightSource will collect blood, perform ELISA testing, and do visual health assessments on all project site desert tortoises quarantined at this facility.

Following visual health assessments, BrightSource will translocate all desert tortoises located within 500 meters of the western boundary fence of Ivanpah 2 to areas immediately outside the fence. BrightSource will not translocate a desert tortoise in this category within 1500 meters of a resident individual that has tested positive for disease through ELISA testing or visual health assessments. If BrightSource cannot comply with this buffer without moving the individual more than 500 meters from its original capture location, it will quarantine this individual. Following receipt of ELISA testing results and completion of visual health assessments for the quarantined population, BrightSource will contact the Service regarding the proposed release of each quarantined desert tortoise. The Service will work with BrightSource to identify an appropriate facility to house any quarantined desert tortoises that tests ELISA-positive. In addition, the Service may require BrightSource to perform additional testing to confirm disease status of any ELISA-positive desert tortoises before final disposition.

BrightSource will translocate all ELISA-negative, healthy desert tortoises from quarantine to the translocation area in spring or fall 2011 depending on the timing of ELISA test results. For Ivanpah 2, BrightSource will release all quarantined individuals in the translocation area it has identified for that phase of the project (i.e., N2 or N3; CH2MHill 2009b). BrightSource will attach transmitters to all translocated desert tortoises to facilitate post-translocation monitoring. BrightSource will not translocate a desert tortoise in this category within 3.7 miles of a resident individual that has tested positive for disease through ELISA testing or visual health assessments:

Ivanpah 3

Following or concurrent with clearance of desert tortoises from Ivanpah 2, BrightSource will perform a clearance level survey of Ivanpah 3 and attach transmitters to all desert tortoises that it locates to facilitate post-translocation monitoring and to allow easy location of individuals prior to translocation. In addition, BrightSource will perform visual health assessments of all desert tortoises on Ivanpah 3. During this survey, BrightSource will translocate all healthy desert tortoises located within 500 meters of the western or northern boundary fences of Ivanpah 3 to areas immediately outside of these fence lines. It will collect blood from all desert tortoises that are more than 500 meters from the western or northern fence line for ELISA testing. BrightSource will quarantine desert tortoises that are more than 500 meters from the western or northern fence line at the CLA quarantine facility. Alternatively, BrightSource may choose to perform *in situ* quarantine with these individuals. If *in situ* quarantine is chosen, BrightSource would attach transmitters to the quarantined animals and leave them at the location of their initial capture to await ELISA test results.

Following receipt of ELISA testing results for the quarantined desert tortoises on Ivanpah 3, BrightSource will contact the Service regarding the proposed disposition of each desert tortoise. If BrightSource chooses to quarantine the individuals in the CLA quarantine facility, it would translocate all ELISA-negative individuals into the translocation area it has identified for this phase of the project (i.e., N1; CH2MHill 2009b) or into the solar exclusion zone north of the Ivanpah 3 project site according to the procedures discussed with the Service. If BrightSource chooses *in situ* quarantine, all desert tortoises that test ELISA negative and are not within 500 meters of an ELISA-positive individual at the time of final clearance will be released into the translocation area it has identified (i.e., N1; CH2MHill 2009b) or into the solar exclusion zone (i.e., portion of the right-of-way excluded from future solar development for rare plant concerns) north of the Ivanpah 3 project site. The Service will work with BrightSource to identify an appropriate facility to house any desert tortoises that test ELISA positive. The Service may require BrightSource to perform or fund additional testing to confirm disease status of any ELISA- positive desert tortoises before final disposition. In addition, BrightSource will quarantine any individual that is located within 500 meters of an ELISA-positive desert tortoise on the Ivanpah 3 project site. This quarantine would occur at the CLA quarantine facility. While in quarantine, BrightSource will conduct an additional ELISA test to confirm disease status prior to translocation. If these individuals test negative on the second ELISA test, BrightSource will release these animals into one of the translocation areas described above.

Monitoring

BrightSource will provide for the monitoring of desert tortoises cleared from a given phase of the IESGS project site for a period of 3 years following its initial clearance. As discussed above, BrightSource will attach transmitters to all desert tortoises translocated from the project site and to an equal number of resident desert tortoises to facilitate monitoring. Following the completion of the first 3 years of monitoring, BrightSource will perform an additional 2 years of monitoring if directed by the Service.

BrightSource will also attach transmitters to and monitor desert tortoises in a population that will serve as a control group for translocation monitoring. BrightSource would establish the control group prior to release of translocated individuals. When establishing this control group, BrightSource will collect blood samples from all desert tortoises that it transmitters in the control population for ELISA testing. The number of desert tortoises monitored in this population will be equal to the number of desert tortoises translocated from the project site. The location of the control population will be within the Bureau's Ivanpah Desert Wildlife Management Area. The final boundaries of the control population monitoring area will depend on the number of desert tortoises that BrightSource has to transmitter to match the translocated population. BrightSource will ensure that only qualified biologists, authorized by the Service, perform monitoring of these populations.

During monitoring, BrightSource will collect information on survivorship, mortality rates, health status, body condition, movement of individuals, and predation in all three populations (i.e.,

resident, translocated, and control) to inform adaptive management of the translocation effort on future phases. If monitoring shows a mortality rate of 10 percent or higher among the desert tortoises moved from the project site, BrightSource will review all data collected to develop a remedial action plan in coordination with the Bureau and the Service prior to further phased translocation activities.

To minimize adverse effects to the desert tortoise, BrightSource will implement the following protective measures when implementing clearance surveys and desert tortoise translocation:

1. BrightSource will design all permanent desert tortoise exclusion fencing in accordance with the most up-to-date Service guidance. The Service is currently using guidance provided in the *Desert Tortoise Field Manual* (Service 2009a).
2. BrightSource will comply with the most up-to-date guidance for performing clearance surveys and handling desert tortoises. The Service is currently using the *Desert Tortoise Field Manual* (Service 2009a).
3. BrightSource will use authorized biologists for the performance of clearance surveys and for any other activities that require the handling of desert tortoises. If BrightSource uses desert tortoise monitors during clearance surveys or for other activities that require identification of sign or handling of desert tortoises, they will do so under the direct supervision of an authorized biologist.
4. BrightSource will ensure that health assessments and blood collection for disease testing of desert tortoises are conducted by individuals authorized by the Service to perform these tasks.
5. Following clearance of desert tortoises from the fenced project sites, CLA, and utility right-of-way, an authorized biologist will be onsite during initial clearing and grading to move any desert tortoises missed during the initial clearance surveys. If a desert tortoise is identified and found to have clinical signs of disease, BrightSource will contact the Service to determine appropriate disposition of the animal.
6. BrightSource will not perform any clearance surveys or translocation activities when the ambient air temperature is above 95 degrees Fahrenheit or is anticipated to exceed 95 degrees Fahrenheit before handling or processing can be completed. BrightSource will not perform any clearance surveys or translocation activities when ambient air temperature are below 65 degrees Fahrenheit or are anticipated to go below 50 degrees Fahrenheit during the week after release. BrightSource will not release any desert tortoises at translocation sites if the ambient air temperature is above or are expected to reach 90 degrees Fahrenheit within 3 hours of release. Ambient air temperature will be measured in the shade, protected from wind, at a height of 2 inches above the ground surface.

7. An authorized biologist will hydrate all desert tortoises scheduled for translocation within 12 hours prior to release.
8. An authorized biologist will assess all desert tortoises on the project site for clinical signs of disease prior to translocation regardless of whether these animals will receive additional ELISA testing. The authorized biologist will remove and temporarily quarantine any desert tortoises with clinical signs of disease that are encountered on the ISEGS project sites. Authorized biologists will use the descriptions of clinical signs of disease described in the available scientific literature (Berry and Cristopher 2001, Origgi et al. 2004, Ritchie 2006; all in CH2MHill 2009a), unless the Service provides more appropriate guidance. BrightSource will contact the Ventura Fish and Wildlife Office within 24 hours of collection of an animal to determine the appropriate disposition of animals showing clinical signs of disease. These animals may require more extensive disease testing (e.g., ELISA, Western Blot) prior to determination of their final disposition.
9. BrightSource will only perform clearance surveys during the spring (April 1 to May 31) and fall (September 1 to October 15). If all desert tortoises from a given phase would be placed in a quarantine facility, BrightSource may extend its fall clearance window until October 31 if conditions (i.e., air temperatures) allow. BrightSource will only perform release of cleared desert tortoises into a translocation area during the spring (April 1 to May 31) or early-fall (September 1 and October 1).
10. BrightSource will consider ELISA testing results valid for a period of 1 year on any individual desert tortoise. BrightSource will coordinate with the Service to determine the necessity for re-testing of individuals based on the circumstances of their quarantine and their proposed plan for disposition of the individual. BrightSource will only draw blood for ELISA testing between May 15 and October 31 to ensure accurate ELISA testing results.
11. BrightSource will maintain a record of all desert tortoises encountered and translocated during project surveys and monitoring. The record will include the following information for each desert tortoise: the location (narrative, vegetation type, and maps) and dates of observations, burrow data, general conditions and health, measurements, any apparent injuries and state of healing, the location from which it was captured and the location in which it was released, whether animals voided their bladders, diagnostic markings (i.e., identification numbers), results of health assessments, and ELISA-test results.
12. During temporary quarantine (i.e., desert tortoises held for less than one week), an authorized biologist will provide adequate food and water and a temperature-controlled holding area away from other desert tortoises.

13. BrightSource will only use Service-authorized individuals that have experience identifying the clinical signs of upper respiratory tract disease, herpes virus, and cutaneous dyskeratosis for the performance of health assessments. BrightSource will provide the Service with the qualifications of any authorized biologists that it will use to perform health assessments or blood collection on desert tortoises during clearance and translocation activities. The Service should receive these qualifications at least 30 days prior to the need for the health assessment and blood collection.
14. BrightSource will send all samples for ELISA to a laboratory qualified to perform these tests.
15. For monitoring activities, an authorized biologist will attach radio transmitters to adult desert tortoises using methods described in Boarman et al. (1998).
16. BrightSource will develop an animal husbandry plan for management of the CLA quarantine facility for the Service's review and approval prior to release of individuals into this facility.
17. BrightSource will not release project-site desert tortoises into the translocation area if it determines that post-translocation density will exceed 21 subadult or adult desert tortoises per square mile.
18. BrightSource will not release desert tortoises moved more than 500 meters from their point of capture within 3.7 miles of a resident desert tortoise that has tested ELISA-positive or has shown clinical signs of disease.
19. BrightSource will not release desert tortoises moved less than 500 meters from their point of capture within 1500 meters of a resident desert tortoise that has tested ELISA-positive or has shown clinical signs of disease.

Compensation

The following information was briefly discussed in the revised biological assessment (CH2MHill 2010a) and clarified with more detail in follow up communications with the Bureau (Fesnock 2010a and 2010b). The Bureau will require BrightSource to compensate for loss of desert tortoise habitat in accordance with the Northern and Eastern Mojave amendment to the California Desert Conservation Area (CDCA) Plan (Bureau 2002). The Bureau will apply a compensation ratio of 1:1, as described in this plan. This compensation will provide for acquisition of up to 3,582 acres of land in the Northeastern Mojave Recovery Unit, or desert tortoise habitat enhancement or rehabilitation activities on existing public land, or some combination of the two. The following is a list of potential habitat enhancement and rehabilitation actions, identified by the Bureau, that could be implemented solely or in combination with land acquisition to fulfill the Bureau's compensation requirements:

1. Install at least 50 miles of desert tortoise exclusion fencing along the following road segments: a) Interstate 15 between Nipton Road and Ivanpah Dry Lake, b) U.S. Highway 95 through Piute Valley from the California-Nevada state line to Goffs Road, c) Nipton Road, between the California-Nevada border and Interstate 15, and d) Ivanpah Road, from Nipton Road through portions of the Mojave National Preserve.
2. Restore habitat, including vertical mulching, of at least 50 routes that the Bureau has designated as closed in the Shadow Valley, Piute Valley, and Ivanpah Valley Desert Wildlife Management Areas.
3. Install three-strand fencing or other suitable fencing around the boundary of the towns of Nipton and Goffs.
4. Remove exotic plant species from areas important to desert tortoises.
5. Identify and clean up destroyed or damaged habitat areas, such as illegal dumpsites and illegal routes, in Shadow Valley, Piute Valley, Ivanpah Valley, and the critical habitat portions of Mojave National Preserve.
6. Fund desert tortoise head start research, if approved by the Service's Desert Tortoise Recovery Office.

The California Energy Commission has already approved the proposed action. In addition to the required compensation described above, the California Energy Commission will require compensation for loss of desert tortoise habitat at a ratio of 2:1. Lands acquired to meet the California Energy Commissions requirements would meet the following criteria:

1. must be as close as possible to the project site,
2. provide good quality habitat for desert tortoises with capacity to regenerate naturally when disturbances are removed,
3. be near larger blocks of lands that are either already protected or planned for protection, or which could feasibly be protected long-term by a public resource agency or a non-governmental organization dedicated to habitat preservation,
4. be connected to lands currently occupied by desert tortoise, ideally with populations that are stable, recovering, or likely to recover,
5. not have a history of intensive recreational use or other disturbance that might make habitat recovery and restoration infeasible,
6. not be characterized by high densities of invasive species, whether on or immediately adjacent to the parcels under consideration, that might jeopardize habitat recovery and restoration, and
7. not contain hazardous wastes.

To meet land acquisition requirements, BrightSource will either directly purchase lands, or it will deposit funds with the National Fish and Wildlife Foundation (NFWF). If BrightSource chooses to deposit funds with NFWF, a compensation fee will be assessed based on current fair market appraised value for the specific geographic area in which the acquisition occurs. If BrightSource chooses to provide funds to NFWF, the following conditions will be met: 1) funds will be provided prior to project construction, 2) lands will be acquired prior to completion of project

construction, and 3) lands will be conserved in perpetuity by a legal mechanism agreed to by the Bureau and California Department of Fish and Game. If BrightSource directly acquires the lands rather than providing funds to NFWF, it will acquire the lands prior to completion of project construction and will conserve these lands in perpetuity through a legal mechanism approved by the Bureau and California Department of Fish and Game.

Regardless of the acquisition method (i.e., directly or through NFWF), BrightSource will establish a management fund for the acquired lands to comply with requirements of the California Endangered Species Act. The management fund will consist of an interest-bearing account (as described in the memorandum of agreement between the Renewable Energy Action Team Agencies and NFWF) with the amount of capital commensurate to generate sufficient interest to fund all monitoring, management, and protection of the acquired lands, including reasonable administrative overhead, biological monitoring, improvements to carrying capacity, law enforcement measures, and other actions designed to protect or improve the habitat values of the acquired lands. A Property Analysis Record (PAR) analysis, or comparable method, will be conducted by BrightSource, the Bureau, and the California Department of Fish and Game to determine the management needs and costs described above, which then will be used to calculate the amount of capital needed for the management fund. The management fund will be held and managed by NFWF or another entity approved by the Bureau, Service, and California Department of Fish and Game.

To mitigate this project's portion of the cumulative effect of increasing the number of common ravens in the desert region, the California Energy Commission will also require BrightSource to contribute \$105.00 per acre for the 3,582 acres associated with the project site. These funds will contribute to an account established by the NFWF to carry out a regional management for the common raven. This account was established under a memorandum of agreement between Renewable Energy Action Team agencies (i.e., the Bureau, Service, the California Energy Commission, and the California Department of Fish and Game) and NFWF to manage funds to implement regional common raven management. Activities that would be carried out to reduce common raven predation on desert tortoises include reduction of human-provided subsidies (e.g., food, water, sheltering and nesting sites), education and outreach, removal of common ravens and their nests, and evaluation of effectiveness and adaptive management. The total fee for this project of \$376,110 will fund the project's portion of the regional raven management. BrightSource will make the payment within six months of final project approval.

Implementing control of common ravens and habitat enhancement and rehabilitation to fulfill some of the Bureau's compensation requirements may result in adverse effects to desert tortoises. These actions will require future site-specific Bureau authorizations and future project-specific consultation. Consequently, we will analyze the adverse effects of these actions in a general way, but cannot provide any site-specific analysis for these future actions in this biological opinion.

ANALYTICAL FRAMEWORK FOR THE JEOPARDY DETERMINATION

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 determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the desert tortoise; and (4) the cumulative effects, which evaluates the effects of future, non-Federal activities in the action area on the desert tortoise.

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

The jeopardy analysis in this biological opinion places an emphasis on consideration of the range-wide survival and recovery needs of the desert tortoise and the role of the action area in the survival and recovery of the desert tortoise as the context for evaluation of the significance of the effects of the proposed federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

STATUS OF THE SPECIES

Basic Ecology of the Desert Tortoise

The desert tortoise is a large, herbivorous reptile found in portions of the California, Arizona, Nevada, and Utah deserts. It also occurs in Sonora and Sinaloa, Mexico. In California, the desert tortoise occurs primarily within the Creosote, Shadscale, and Joshua Tree Series of Mojave Desert Scrub, and the Lower Colorado River Valley subdivision of Sonoran Desert Scrub. Optimal habitat has been characterized as creosote bush scrub in areas where precipitation ranges from 2 to 8 inches, diversity of perennial plants is relatively high, and production of ephemerals is high (Luckenbach 1982, Turner and Brown 1982, Schamberger and Turner 1986). Soils must be friable enough for digging of burrows, but firm enough so that burrows do not collapse. In California, desert tortoises are typically associated with gravelly flats or sandy soils with some clay, but are occasionally occur in windblown sand or in rocky terrain (Luckenbach 1982). Desert tortoises occur in the California desert 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, Schamberger and Turner 1986). Recent range-wide monitoring efforts have consistently documented desert tortoises above 3,000 feet (Service 2006).

Desert tortoises may spend more time in washes than in flat areas outside of washes; Jennings (1997) notes that, between March 1 and April 30, desert tortoises "spent a disproportionately longer time within hill and washlet strata" and, from May 1 through May 31, hills, washlets, and washes "continued to be important." Jennings' paper does not differentiate between the time desert tortoises spent in hilly areas versus washes and washlets; however, he notes that, although washes and washlets comprised only 10.3 percent of the study area, more than 25 percent of the plant species on which desert tortoises fed were located in these areas. Luckenbach (1982) states that the "banks and berms of washes are preferred places for burrows;" he also recounts an incident in which 15 desert tortoises along 0.12 mile of wash were killed by a flash flood. Desert tortoises are most active in California during the spring and early summer when annual plants are most common. Additional activity occurs during warmer fall months and occasionally after summer rain storms. Desert tortoises spend most of their time during the remainder of the year in burrows, escaping the extreme conditions of the desert; however, recent work has demonstrated that they can be active at any time of the year. Further information on the range, biology, and ecology of the desert tortoise can be found in Burge (1978), Burge and Bradley (1976), Hovik and Hardenbrook (1989), Luckenbach (1982), Weinstein et al. (1987), and Service (1994a).

Food resources for desert tortoises are dependent on the availability and nutritional quality of annual and perennial vegetation, which is greatly influenced by climatic factors, such as the timing and amount of rainfall, temperatures, and wind (Beatley 1969, 1974, Congdon 1989, Karasov 1989, Polis 1991; all in Avery 1998). In the Mojave Desert, these climatic factors are typically highly variable; this variability can limit the desert tortoise's food resources.

Desert tortoises will eat many species of plants. However, at any time, most of their diet consists of a few species (Nagy and Medica 1986 and Jennings 1993 in Avery 1998). Additionally, their preferences can change during the course of a season (Avery 1998) and over several seasons (Esque 1994 in Avery 1998). Possible reasons for desert tortoises to alter their preferences may include changes in nutrient concentrations in plant species, the availability of plants, and the nutrient requirements of individual animals (Avery 1998). In Avery's (1998) study in the Ivanpah Valley, desert tortoises consumed primarily green annual plants in spring; they ate cacti and herbaceous perennials once the winter annuals began to disappear. Medica et al. (1982 in Avery 1998) found that desert tortoises ate increased amounts of green perennial grass when winter annuals were sparse or unavailable; Avery (1998) found that desert tortoises rarely ate perennial grasses.

Desert tortoise females typically produce one to two clutches of 1 to 7 eggs per year (Turner et al. 1986). On rare occasions, clutches can contain up to 15 eggs; most clutches contain 3 to 7 eggs. Multi-decade studies of the Blanding's turtle (*Emydoidea blandingii*), which, like the desert tortoise, is long lived and matures late, indicate that approximately 70 percent of the young animals survive each year until they reach adult size; after this time, annual survivorship exceeds 90 percent (Congdon et al. 1993). Research has indicated that 50 to 60 percent of young desert tortoises typically survive from year to year, even in the first and most vulnerable year of life. We do not have sufficient information on the demography of the desert tortoise to

determine whether this rate is sufficient to maintain viable populations; however, it does indicate that maintaining favorable habitat conditions for small desert tortoises is crucial for the continued viability of the species.

Desert tortoises typically hatch from late August through early October. At the time of hatching, the desert tortoise has a substantial yolk sac; the yolk can sustain them through the fall and winter months until forage is available in the late winter or early spring. However, neonates will eat if food is available to them at the time of hatching; when food is available, they can reduce their reliance on the yolk sac to conserve this source of nutrition. 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.

Neonate desert tortoises emerge from their winter burrows as early as late January to take advantage of freshly germinating annual plants; if appropriate temperatures and rainfall are present, at least some plants will continue to germinate later in the spring. Freshly germinating plants and plant species that remain small throughout their phenological development are important to neonate desert tortoises because their size prohibits access to taller plants. As plants grow taller during the spring, some species become inaccessible to small desert tortoises.

Neonate and juvenile desert tortoises require approximately 12 to 16 percent protein content in their diet for proper growth. Desert tortoises, both juveniles and adults, seem to selectively forage for particular species of plants with favorable ratios of water, nitrogen (protein), and potassium. The potassium excretion potential model (Ofstedal 2001) predicts that, at favorable ratios, the water and nitrogen allow desert tortoises to excrete high concentrations of potentially toxic potassium, which is abundant in many desert plants. Ofstedal (2001) also reports that variation in rainfall and temperatures cause the potassium excretion potential index to change annually and during the course of a plant's growing season. Therefore, the changing nutritive quality of plants, combined with their increase in size, further limits the forage available to small desert tortoises to sustain their survival and growth.

In summary, the ecological requirements and behavior of neonate and juvenile desert tortoises are substantially different from those of subadults and adults. Smaller desert tortoises use abandoned rodent burrows, which are typically more fragile than the larger ones constructed by adults. They are active earlier in the season. Finally, small desert tortoises rely on smaller annual plants with greater protein content; the smaller plant size allows them to gain access to food and the higher protein content promotes growth.

Status of the Desert Tortoise

The Mojave population of the desert tortoise includes those animals living north and west of the Colorado River in the Mojave Desert of California, Nevada, Arizona, southwestern Utah, and in the Colorado Desert in California. On August 4, 1989, the Service published an emergency rule listing the Mojave population of the desert tortoise as endangered (54 *Federal Register* 32326).

In its final rule, dated April 2, 1990, the Service determined the Mojave population of the desert tortoise to be threatened (55 *Federal Register* 12178).

The Service listed the desert tortoise in response to loss and degradation of habitat caused by numerous human activities including urbanization, agricultural development, military training, recreational use, mining, and livestock grazing. The loss of individual desert tortoises to increased predation by common ravens, collection by humans for pets or consumption, collisions with vehicles on paved and unpaved roads, and mortality resulting from diseases also contributed to the Service's listing of this species.

Before entering into a discussion of the status and trends of the desert tortoise in the Northeastern Mojave Recovery Unit where the proposed action is located, a brief discussion of the methods of estimating the numbers of desert tortoises would be useful. Three primary methods have been widely used: permanent study plots, triangular transects, and line distance sampling.

Generally, permanent study plots are defined areas that are visited at roughly 4-year intervals to determine the numbers of desert tortoises present. Desert tortoises found on these plots during the spring surveys were registered; that is, they were marked so they could be identified individually during subsequent surveys. Between 1971 and 1980, 27 plots were established in California to study the desert tortoise; 15 of these plots were used by the Bureau to monitor desert tortoises on a long-term basis (Berry 1999). Range-wide, 49 plots have been used at one time or another to attempt to monitor desert tortoises (Tracy et al. 2004).

Triangular transects are used to detect sign (i.e., scat, burrows, footprints, etc.) of desert tortoises. The number of sign is then correlated with standard reference sites, such as permanent study plots, to allow the determination of density estimates.

Finally, line distance sampling involves walking transects while trying to detect live desert tortoises. Based on the distance of the desert tortoise from the centerline of the transect, the length of the transect, and a calculation of what percentage of the animals in the area were likely to have been above ground and visible to surveyors during the time the transect was walked, an estimation of the density can be made. This density only represents an estimation of the number of desert tortoises that are greater than 180 millimeters in size. Desert tortoises that are larger than this size are typically classified as subadult or adult desert tortoises.

Each of these methods has various strengths and weaknesses. In general, permanent study plots have been used to estimate the status of desert tortoises across large areas over time. Triangular transects were used to assess the density of desert tortoises on specific sites at a point in time; this method was commonly used to determine how many desert tortoises may be affected by a specific proposed action. In 2001, the Service initiated line-distance sampling to estimate the density of desert tortoises in desert wildlife management areas and critical habitat throughout the range.

Note that, when reviewing the information presented in the following sections, determining the number of desert tortoises over large areas is extremely difficult. The report prepared by the Desert Tortoise Recovery Plan Assessment Committee (Tracy et al. 2004) acknowledges as much. Desert tortoises spend much of their lives underground or concealed under shrubs, are not very active in years of low rainfall, and are distributed over a wide area in several different types of habitat. Other factors, such as the inability to sample on private lands and rugged terrain, further complicate sampling efforts. Consequently, the topic of determining the best way to estimate the abundance of desert tortoises has generated many discussions over the years. As a result of this difficulty, we cannot provide concise estimations of the density of desert tortoises in each recovery unit or desert wildlife management area that have been made in a consistent manner.

Given the difficulty in determining the density of desert tortoises over large areas, the reader needs to understand fully that the differences in density estimates in the recovery plan and those derived from subsequent sampling efforts may not accurately reflect on-the-ground conditions. Despite this statement, the reader should also be aware that the absence of live desert tortoises and the presence of carcasses over large areas of some desert wildlife management areas provide at least some evidence that desert tortoise populations seem to be in a downward trend in some regions.

The following paragraphs provide general information on the status and trends of the desert tortoise population in the Northeastern Mojave Recovery Unit, where the proposed action is located. We have not included detailed information on the status of the desert tortoise in the other recovery units throughout the range of the species in this biological opinion. This omission will not compromise the analysis in the biological opinion because our determination regarding whether a proposed action is likely to jeopardize the continued existence of a species must be conducted at the level of the listed taxon. When the range of the listed taxon is divided into recovery units, our level of analysis begins with the recovery unit; if the effects of the proposed action have the potential to compromise the ability of the species to survive and recover within the recovery unit, the next level of analysis considers how the compromised recovery unit would affect the listed taxon throughout its range (Service 2005a). Our analysis can therefore be conducted in a comprehensive manner through an iterative process. The Northeastern Mojave Recovery Unit comprises one of six recovery units for the desert tortoise; consequently, our level of analysis in this biological opinion will begin at this level.

The Northeastern Mojave Recovery Unit is located to the southwest of the Upper Virgin River Recovery Unit and extends through Nevada and into California in Ivanpah Valley. Several critical habitat units and four desert wildlife management areas are located within this recovery unit. Tracy et al. (2004) note that densities of adult desert tortoises for the overall region do not show a statistical trend over time.

The Beaver Dam Slope Desert Wildlife Management Area covers portions of Nevada, Utah, and Arizona. Based on various methods, the recovery plan estimates the density of desert tortoises in this desert wildlife management area as being from 5 to 56 animals per square mile (Service

1994). In 2007, the Desert Tortoise Recovery Office estimated a density for the Beaver Dam Slope Desert Wildlife Management Area of 3.11 desert tortoises per square mile based on line distance sampling transects (Service 2009b).

The Gold Butte-Pakoon Desert Wildlife Management Area covers portions of Nevada and Arizona, generally south of the Beaver Dam Slope Desert Wildlife Management Area. The recovery plan states that densities of desert tortoises in this recovery unit vary from 5 to 56 animals per square mile (Service 1994a). In 2007, the Desert Tortoise Recovery Office estimated a density for the Gold Butte-Pakoon Desert Wildlife Management Area of 3.11 desert tortoises per square mile based on line distance sampling transects (Service 2009b).

The Mormon Mesa Desert Wildlife Management Area is located entirely in Nevada, generally west and northwest of the Beaver Dam Slope and Gold Butte-Pakoon desert wildlife management areas, respectively. The recovery plan states that densities of desert tortoises in this recovery unit vary from 41 to 87 subadult and adult animals per square mile (Service 1994a). In 2007, the Desert Tortoise Recovery Office estimated a density for the Mormon Mesa Desert Wildlife Management Area of 8.55 desert tortoises per square mile based on line distance sampling transects (Service 2009b).

The Coyote Springs Desert Wildlife Management Area is located entirely in Nevada, generally west of the Mormon Mesa Desert Wildlife Management Area and east of the Desert National Wildlife Refuge. The recovery plan states that densities of desert tortoises in this recovery unit vary from 0 to 90 adult animals per square mile (Service 1994a). Kernel analysis for the Coyote Springs Desert Wildlife Management Area showed areas where the distributions of carcasses and living desert tortoises do not overlap (Tracy et al. 2004); this scenario is indicative of a higher than average rate of mortality. The Desert Tortoise Recovery Plan Assessment Committee used a kernel analysis to examine the distribution of live desert tortoises and carcasses over large areas of the range of the species (Tracy et al. 2004). The intent of this analysis is to determine where large areas with numerous carcasses do not overlap large areas with live animals. Regions where the areas of carcasses do not overlap areas of live animals likely represent recent die-offs or declines in desert tortoise populations. Because permanent study plots for this region were discontinued after 1996, recent declines in numbers would not be reflected in the kernel analysis if they had occurred. In 2007, the Desert Tortoise Recovery Office estimated a density for the Coyote Springs Desert Wildlife Management Area of 3.6 desert tortoises per square mile based on line distance sampling transects (Service 2009b).

The Ivanpah Desert Wildlife Management Area lies east of the Mojave National Preserve and covers approximately 36,795 acres. It is contiguous with National Park Service lands; note that the National Park Service did not designate desert wildlife management areas within the Mojave National Preserve because it considers that all of its lands are managed in a manner that is conducive to the recovery of the desert tortoise. The permanent study plot in the Ivanpah Valley is located within the Mojave National Preserve and provides information on the status of desert tortoises in this general region. Data on desert tortoises on this permanent study plot were collected in 1980, 1986, 1990, and 1994; the densities of desert tortoises of all sizes per square

mile were 368, 393, 249, and 164, respectively (Berry 1996). Numerous data sets are collected from the study plots and various statistical analyses conducted to provide information on various aspects of trends. We cannot, in this biological opinion, provide all of this information; therefore, we have selected the density of desert tortoises of all sizes per square mile to attempt to indicate trends. The number of juvenile and immature desert tortoises on the study plot declined, although the number of adult animals remained fairly constant. The notes accompanying this report indicated that the "ill juvenile and dead adult male (desert) tortoises salvaged for necropsy contained contaminants;" it also cited predation by common ravens and the effects of cattle grazing as causative factors in the decline in the number of juvenile and immature desert tortoises on the study plot (Berry 1996). In 2002, workers found 55 desert tortoises on this plot; this number does not represent a density estimate (Berry 2005). In 2007, the Desert Tortoise Recovery Office estimated a density for the Ivanpah Desert Wildlife Management Area of 16.84 desert tortoises per square mile based on line distance sampling transects (Service 2009b). However, the area sampled to determine this estimate includes all portions of the Ivanpah Critical Habitat Unit, which is primarily within the Eastern Mojave Recovery Unit. Only a small portion of the sample area for this estimate is located within the Northeastern Mojave Recovery Unit.

In 2007, the Desert Tortoise Recovery Office estimated an average density of desert tortoises in this recovery unit of 4.4 desert tortoises per square mile, which was a 9 percent decrease from previous estimates in 2005 (Service 2009b). However, this decrease was expected based on a change in sampling design and may not represent a true decline in density for the Northeastern Mojave Recovery Unit.

Recovery Plan for the Desert Tortoise

The recovery plan for the desert tortoise is the basis and key strategy for recovery and delisting of the desert tortoise. The recovery plan divides the range of the desert tortoise into 6 distinct population segments or recovery units and recommends the establishment of 14 desert wildlife management areas throughout the recovery units. Within each desert wildlife management area, the recovery plan recommends implementation of reserve-level protection of desert tortoise populations and habitat, while maintaining and protecting other sensitive species and ecosystem functions. The recovery plan also recommends that desert wildlife management areas be designed to follow the accepted concepts of reserve design and be managed to restrict human activities that negatively affect desert tortoises (Service 1994a). The delisting criteria established by the recovery plan are:

1. The population within a recovery unit must exhibit a statistically significant upward trend or remain stationary for at least 25 years;
2. Enough habitat must be protected within a recovery unit or the habitat and desert tortoises must be managed intensively enough to ensure long-term viability;

3. Populations of desert tortoises within each recovery unit must be managed so discrete population growth rates (λ s) are maintained at or above 1.0;
4. Regulatory mechanisms or land management commitments that provide for long-term protection of desert tortoises and their habitat must be implemented; and
5. The population of the recovery unit is unlikely to need protection under the Endangered Species Act in the foreseeable future.

The recovery plan based its descriptions of the six recovery units on differences in genetics, morphology, behavior, ecology, and habitat use over the range of the Mojave population of the desert tortoise. The recovery plan contains generalized descriptions of the variations in habitat parameters of the recovery units and the behavior and ecology of the desert tortoises that reside in these areas (pages 20 to 22 in Service 1994a). The recovery plan (pages 24 to 26 from Service 1994) describes the characteristics of desert tortoises and variances in their habitat, foods, burrow sites, and phenotypes across the range of the listed taxon. Consequently, to capture the full range of phenotypes, use of habitat, and range of behavior of the desert tortoise as a species, conservation of the species across its entire range is essential.

The Service has released a revised recovery plan for public review (Service 2008c). The revised recovery plan includes a discussion of reducing the number of recovery units to four, based on information that has been generated since the release of the original document.

Relationship of Recovery Units, Distinct Population Segments, Desert Wildlife Management Areas, and Critical Habitat Units

The recovery plan (Service 1994a) recognized six recovery units or evolutionarily significant units across the range of the listed taxon, based on differences in genetics, morphology, behavior, ecology, and habitat use of the desert tortoises found in these areas. The boundaries between these areas are vaguely defined. In some cases, such as where the Western Mojave Recovery Unit borders the Eastern Mojave Recovery Unit, a long, low-lying, arid valley provides a fairly substantial separation of recovery units. In other areas, such as where the Eastern Mojave Recovery Unit borders the Northern Colorado Recovery Unit, little natural separation exists. Because of the vague boundaries, the acreage of these areas has not been quantified. Over the years, the Service has commonly referred to the areas as "recovery units;" the term "distinct population segment" has not been in common use.

The recovery plan recommended that land management agencies establish one or more desert wildlife management areas within each recovery unit. As mentioned previously in the Recovery Plan for the Desert Tortoise section of this biological opinion, the recovery plan recommended that these areas receive reserve-level management to remove or mitigate the effects of the human activities responsible for declines in the number of desert tortoises. As was the case for the recovery units, the recovery plan did not determine precise boundaries for the desert wildlife management areas; the recovery team intended for land management agencies to establish these

boundaries, based on the site-specific needs of the desert tortoise. At this time, desert wildlife management areas have been established throughout the range of the desert tortoise.

Based on the recommendations contained in the draft recovery plan for the desert tortoise, the Service designated critical habitat units throughout the range of the desert tortoise (59 *Federal Register* 5820). The 14 critical habitat units have defined boundaries and cover specific areas throughout the 6 recovery units.

The Bureau used the boundaries of the critical habitat units and other considerations, such as conflicts in management objectives and more current information, to propose and designate desert wildlife management areas through its land use planning processes. In California, the Bureau also classified these desert wildlife management areas as areas of critical environmental concern, which allows the Bureau to establish management goals for specific resources in defined areas. Through the land use planning process, the Bureau established firm boundaries for the desert wildlife management areas.

Finally, we note that the Department of Defense installations and National Park Service units in the California desert did not establish desert wildlife management areas on their lands. Where the military mission is compatible with management of desert tortoises and their habitat, the Department of Defense has worked with the Service to conserve desert tortoises and their habitat. Examples of such overlap include the bombing ranges on the Navy's Mojave B and the Chocolate Mountains Aerial Gunnery Ranges; although the target areas are heavily disturbed, most of the surrounding land remains undisturbed. Additionally, the Army has established several areas along the boundaries of Fort Irwin where training with vehicles is prohibited; desert tortoises persist in these areas, which are contiguous with lands off-base. The National Park Service did not establish desert wildlife management areas within the Mojave National Preserve, because the entire preserve is managed at a level that is generally consistent with the spirit and intent of the recovery plan for the desert tortoise.

The following table depicts the relationship among recovery units, desert wildlife management areas, and critical habitat units through the range of the desert tortoise.

Critical Habitat Unit	Desert Wildlife Management Area	Recovery Unit	State	Size of Critical Habitat Unit (acres)
Chemehuevi	Chemehuevi	Northern Colorado	CA	937,400
Chuckwalla	Chuckwalla	Eastern Colorado	CA	1,020,600
Fremont-Kramer	Fremont-Kramer	Western Mojave	CA	518,000
Ivanpah Valley	Ivanpah Valley	Eastern Mojave/Northeastern Mojave	CA	632,400
Pinto Mountain	Joshua Tree	Western Mojave/	CA	171,700

Critical Habitat Unit	Desert Wildlife Management Area	Recovery Unit	State	Size of Critical Habitat Unit (acres)
		Eastern Colorado		
Ord-Rodman	Ord-Rodman	Western Mojave	CA	253,200
Piute-Eldorado- CA Piute-Eldorado- NV	Fenner Piute-Eldorado	Eastern Mojave Northeastern Mojave/ Eastern Mojave	CA NV	453,800 516,800
Superior-Cronese	Superior-Cronese Lakes	Western Mojave	CA	766,900
Beaver Dam: NV UT AZ	Beaver Dam Beaver Dam Beaver Dam	Northeastern Mojave (all)	NV UT AZ	87,400 74,500 42,700
Gold Butte-Pakoon NV AZ	Gold Butte-Pakoon Gold Butte-Pakoon	Northeastern Mojave (all)	NV AZ	192,300 296,000
Mormon Mesa	Mormon Mesa Coyote Spring	Northeastern Mojave	NV	427,900
Upper Virgin River	Upper Virgin River	Upper Virgin River	UT	54,600

Nussear et al. (2009) modeled desert tortoise habitat across the range of the desert tortoise. 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, we estimate that the Northern and Eastern Mojave Recovery Unit contains approximately 4,853,368 acres of potential desert tortoise habitat (Darst 2010). 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 Nussear et al. (2009) model. This modeling and mapping analysis 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 within the Northeastern Mojave Recovery Unit.

Fire and Drought

Since December 2004, numerous wildfires have occurred in desert tortoise habitat across its range. Although we know that some desert tortoises were killed by the wildfires, mortality estimates are not available. We estimate that approximately 300,000 acres of potential desert tortoise habitat burned in the Northeastern Mojave Recovery Unit in 2005 (Burroughs 2005). This acreage includes approximately 109,000 acres of critical habitat (Clayton 2005). In total, approximately 136,447 acres of critical habitat in the Northeastern Mojave Recovery Unit burned in the 2005 fires (Clayton 2005). This loss of habitat has adversely affected the status of

the desert tortoise by reducing available habitat and likely reducing the distribution of individuals by eliminating them or greatly reducing their numbers in burned area.

In addition, drought has been implicated as a factor in reduced survival rates on desert tortoises in local areas (Longshore et al. 2003). In this 9-year study, researchers compared 2 "closely situated, but physiographically different, sites" in the Lake Mead National Recreation Area, Nevada. After a period during which survival rates were stable, the survival rate decreased on one of the sites that experienced drought conditions in 3 out of 4 years. The authors postulate that if such local incidents occur on a regular basis, "source-sink population dynamics may be an important factor" in determining the density of desert tortoise populations.

ENVIRONMENTAL BASELINE

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). For the purposes of this biological opinion, we consider the action area to include all areas of the proposed project, described in the Description of the Proposed Action, BrightSource's proposed translocation and control areas, and all contiguous desert tortoise habitat north and west of Interstate 15, east of the Clark Mountains, and south of Primm, Nevada (Croft 2010). By including all contiguous desert tortoise habitat west of Interstate 15, we are accounting for all areas that desert tortoises could move to following translocation based on the presence of movement barriers and the post-translocation distances observed in previous studies (Berry 1986, Field et al. 2007, Nussear 2004). The action area defined for this biological opinion is approximately 66,688 acres (Croft 2010).

Within this action area, adverse effects will occur primarily in the following areas:

- 1) Project Site – this portion of the action area consists of Ivanpah 1 and the CLA (913.5 acres), Ivanpah 2 (1,097 acres), and Ivanpah 3 (1,227 acres) (CH2MHill 2009a).
- 2) Solar Exclusion Zone Translocation Area (SEZ translocation area) – this portion of the action area consists of the 433-acre solar exclusion zone immediately north of Ivanpah 3 (Croft 2010).
- 3) Long-distance Translocation Sites (i.e., N1, N2, N3, and N4) – this portion of the action area consists of the four translocation areas identified by BrightSource in their translocation plan (i.e., N1, N2, N3, and N4; CH2MHill 2009b) and will accommodate all desert tortoises translocated more than 500 meters. The combined area of these translocation sites is approximately 495 acres (Croft 2010).
- 4) Control Area – this portion of the action area comprises all desert tortoises habitat within the Bureau's Ivanpah Desert Wildlife Management Area and is approximately 28,594 acres in size (Croft 2010). We have identified the entire Desert Wildlife Management Area within the action area because we do not know the precise size or location of the control population within this area. However, the final control area is likely to comprise

a small fraction of the total acreage identified here.

- 5) Short-distance Translocation Area – this portion of the action area consists of a 500-yard buffer strip, immediately west and north of the project site that will accommodate all short-distance translocations (i.e., less than 500 meters from capture site to release location). This portion of the action area is approximately 1,461 acres in size (Croft 2010).

In addition, some adverse effects are likely to occur along Colosseum Road and along the route of the fiber optic line. Of the approximately 66,688-acre action area, 4,741.5 acres would consist of areas that would be directly associated with aspects of the project or translocation release sites. The remaining 61,946.5 acres of the action area is composed of areas that have the potential for effects associated with desert tortoises that make long distance movements following translocation or effects associated with monitoring of the control population.

Past Consultations in the Action Area

The Service has issued numerous biological opinions for actions that have occurred or will occur within the action area for this consultation. In all cases, the Service determined that the proposed action was not likely to jeopardize the continued existence of the desert tortoise.

On December 2, 1992, the Service issued a biological opinion to the Bureau for leasing of oil and gas minerals at three sites in the Ivanpah Valley (1-6-92-F-58, Service 1992a). This biological opinion anticipated that project activities would kill or injure one desert tortoise due to use of access roads. One of the lease areas analyzed in the biological opinion is located within the action area covered in this biological opinion.

On July 13, 1993, the Service issued a biological opinion to the Bureau for cattle grazing on allotments in the Mojave Desert (1-6-92-F-19, Service 1993). This biological opinion anticipated the mortality of 3 desert tortoises and the harassment of 10 desert tortoises each year due to the development of range improvements on 25 cattle grazing allotments in the Mojave Desert. On March 19, 1994, the Service issued a new biological opinion on these allotments, in which it anticipated that 3 desert tortoises would be killed as a result of activities associated with cattle grazing on these allotments; the biological opinion also anticipated that range improvements would harass 10 desert tortoises (1-8-94-F-17, Service 1994b). This biological opinion superseded the 1993 biological opinion. The proposed project is located within the boundaries of the Clark Mountain Allotment, which was included in these consultations.

On February 9, 2001, the Service issued a biological opinion to the Bureau for issuance of a right-of-way for construction of the Level 3 fiber-optic line from Victorville to the California-Nevada state line (1-8-00-F-60, Service 2001). This biological opinion did not anticipate the amount of mortality associated with project activities, but it did require the Bureau to reinstate consultation if project implementation killed or injured any desert tortoises. A portion of the project passed through the action area considered in this biological opinion.

On January 17, 2002, the Service issued a biological opinion to the Bureau regarding the effects to the desert tortoise of the implementation of the CDCA Plan (1-8-01-F-16, Service 2002). The biological opinion contained an analysis of the general management direction described in the CDCA Plan and deferred more detailed analysis to the future when the Bureau proposed specific projects. The biological opinion also contained an incidental take statement for ongoing actions, such as management of burros, entrapment of desert tortoises in managed waters and guzzlers, and casual use associated with recreation and mining. Although the biological opinion did not anticipate a specific level of injury or mortality that would likely occur due to these activities, it required the Bureau to reinitiate consultation if more than 5 desert tortoises were killed or injured during any 12-month period. Due to a court challenge, the Service issued another biological opinion on the CDCA Plan on March 31, 2005 (1-8-04-F-43R, Service 2005b). The new biological opinion did not change the threshold for reinitiation of consultation identified in the 2002 biological opinion. The entire action area for the ISEGS project is located within the planning area considered in both CDCA consultations.

On December 21, 1990, the Service issued a biological opinion for the Kern River and Mojave Pipeline projects (1-1-87-F-36R, Service 1990 in Service 2002b). The biological opinion anticipated that pipeline installation would kill or injure 45 desert tortoises in several states. A portion of the Kern River pipeline crosses the northern edge of the ISEGS action area. On July 9, 2002, the Service issued a biological opinion for expansion of the Kern River pipeline (1-5-02-F-476, Service 2002b). This biological opinion did not anticipate the number of desert tortoises that project activities would kill or injure, but it directed the Bureau to reinitiate consultation if more than 2 desert tortoises were killed on any 25-mile section of the pipeline. The Kern River expansion project also crossed the northern portion of the ISEGS action area.

On March 31, 2006, the Service issued a biological opinion to the Federal Highway Administration for construction of a joint port of entry along Interstate 15 between Nipton Road and Yates Well Road (1-8-06-F-20, Service 2006c). This biological opinion did not quantify the anticipated level of injury or mortality associated with project implementation, but it indicated that the number was likely to be small. As of this date, construction of this project has not moved forward.

Cumulatively the biological opinions listed above have authorized a very small amount of take within the areas that they cover. In addition, the take associated with all but one of these biological opinions is associated with projects that have action areas many times the size of the ISEGS action area. Therefore, it is unlikely that all take associated with these larger projects would happen to occur entirely within the ISEGS action area. Consequently, we conclude that take associated with these projects has not substantially affected the environmental baseline within the ISEGS action area.

Habitat Characteristics of the Action Area

We used the U.S. Geological Survey's model of desert tortoise habitat potential (Nussear et al. 2009) to define desert tortoise habitat within the action area. Within the action area,

BrightSource provided specific information on vegetation types for the project site, natural gas distribution line, fiber optic line, Colosseum Road, SEZ translocation area, and long-distance translocation sites. We summarized the information in this paragraph from the biological assessment (CH2MHill 2009a). All features for which we have specific vegetation or habitat survey information are located on a large, alluvial fan that slopes eastward from the Clark Mountains to Ivanpah Dry Lake at a 3 to 5 percent grade. Numerous ephemeral washes dissect the ISEGS project site with active channels that range in width from 1 to 15 feet. Elevations within the ISEGS project site range from 2,850 to 3,150 feet above sea level. Elevations along the route of the fiber optic line range from 2,850 feet to 5,320 feet. Creosote bush scrub is the dominant vegetation type on the ISEGS project site, western translocation area, SEZ translocation area, natural gas distribution line, Colosseum Road, and the lower elevation portions of the fiber-optic line. Mojave wash scrub also occurs on the ISEGS project site. Vegetation at higher elevations along the fiber optic line is characterized by blackbrush (*Coleogyne ramosissima*), Joshua trees (*Yucca brevifolia*), Utah juniper (*Juniperus osteosperma*), single-leaf pinyon (*Pinus monophylla*), and Mormon tea (*Ephedra* sp.). We do not have specific vegetation survey information for the remaining portions of the action area. However, all portions of the action area contain habitat features that the U.S. Geological Survey has mapped as conducive to desert tortoise occupancy (Nussear et al. 2009).

The portion of the action area west of Interstate 15 is within a Bureau-managed cattle grazing allotment (Clark Mountain) and a wild burro herd management area (Bureau and CEC 2009, Bureau 2002). In 2007, the Bureau removed most wild burros from the herd management area (Bureau and CEC 2009). However, given the recent nature of this removal and the persistence of some burros within the action area, adverse effects to habitat are likely to persist. The biological opinion for the CDCA Plan amendment for this area discussed the potential effects of cattle grazing on desert tortoises (Service 2005b). The remaining portions of the action area, south and east of Interstate 15, are within a desert wildlife management area managed for conservation of the desert tortoises.

During surveys of the project site, BrightSource identified numerous non-native plant species, such as Sahara mustard (*Brassica tournefortii*), salt cedar (*Tamarix ramosissima*), red brome (*Bromus madritensis*), Mediterranean grass (*Schismus* spp.), London rocket (*Sisymbrium irio*), and red-stemmed filaree (*Erodium cicutarium*) (CH2MHill 2009a, CH2MHill 2008c). Surveyors observed only one Sahara mustard and a few London rockets during assessment of the project site (CH2MHill 2008c). Surveyors located red brome, red-stemmed filaree, and Mediterranean grass throughout the project site with Mediterranean grass having a patchy distribution (CH2MHill 2008c). These species likely occur throughout the remainder of the action area. However, we expect the abundance of these species to be lower in portions of the action area that have not experienced cattle grazing in recent years (i.e., the Ivanpah DWMA).

In addition to cattle grazing, wild burro use, and non-native species, the habitat within the action area has also been affected by indirect effects associated with mining, a 640-acre golf course, various highways, electrical transmission lines, a natural gas transmission line, a fiber optic line, a railroad line, and private development along Nipton Road (CH2MHill 2009a, Bureau 1998,

1999, 2002). The remainder of the action area is crisscrossed by unpaved vehicle routes (Bureau 2002).

Status of the Desert Tortoise in the Action Area

From April 9 to June 5, 2007, CH2MHill conducted desert tortoise surveys over a 3,870-acre area that included the 3 project sites, CLA, natural gas distribution line, and the zone of influence (CH2MHill 2009a, CH2MHill 2008a). Because of a change in the project description, they surveyed an additional 726 acres from May 20 to May 25, 2008. The 2008 surveys also covered the proposed access route for the ISEGS facility. During the 2007 and 2008 surveys, CH2MHill located 25 live desert tortoises, 97 carcasses, and 214 burrows, with the greatest density of sign occurring on the Ivanpah 1 project site. Of the 25 desert tortoises identified, 7 were within Ivanpah 1 and the CLA, 3 were within Ivanpah 2, 6 were within Ivanpah 3, 4 were within the SEZ translocation area, and 2 were in the area of the natural gas distribution line. The remaining desert tortoises were found on zone-of-influence transects that were outside of the proposed project footprint. The surveys were 100 percent coverage surveys in accordance with the pre-project survey protocols developed by the Service (1992b). BrightSource did not perform protocol level surveys of the fiber-optic line for desert tortoises, but it confirmed the presence of desert tortoise habitat along the entire route and incidentally found three individuals along the line (CH2MHill 2009a).

Based on the survey results and the Service's revised pre-project survey protocol (Service 2010), we estimate that Ivanpah 1 and the CLA, Ivanpah 2, and Ivanpah 3 contain approximately 14, 6, and 12 subadult and/or adult desert tortoises, respectively. In addition, we estimate that the SEZ translocation area contains approximately 8 adult/subadult desert tortoises. We emphasize that, although our estimate of the number of subadult and adult desert tortoises on the project site is based on the best available information, these numbers represent only an estimate; the overall number of individuals on site may be different. For example, based on the desert tortoise densities estimated through line-distance sampling for other portions of Ivanpah Valley (16.84 per square mile, Service 2009b), the actual number of subadult and/or adult desert tortoises on Ivanpah 1 and the CLA, Ivanpah 2, Ivanpah 3, and the SEZ translocation area could be as high as 24, 29, 33, and 12, respectively. Because the pre-project survey data represents the best available data and because the data collected through line-distance sampling were collected in areas that are currently managed for desert tortoise conservation (i.e., Bureau-designated desert wildlife management areas and the Mojave National Preserve), we do not expect that the actual number of subadult and adult desert tortoises will be as high in these portions of the action area.

In addition to subadult and adult desert tortoises, the ISEGS project site is likely to contain juvenile desert tortoises and desert tortoise eggs. Based on studies performed in Ivanpah Valley and the Goffs study site that identified a sex ratio of 1:1 (Turner et al. 1984, Turner et al. 1987) and the anticipated number of adult desert tortoises on the site, we estimate that Ivanpah 1 and the CLA, Ivanpah 2, Ivanpah 3, and the SEZ translocation area contain approximately 7, 3, 6, and 4 female desert tortoises of reproductive age, respectively. Based on a mean number of clutches of 1.6 per female per year, observed in a 2-year study in Ivanpah Valley (Turner et al.

1984), and a mean clutch size of 5.38 eggs per clutch observed at the Goffs study site (Turner et al. 1986 in Service 1994), we estimate that reproductive females on Ivanpah 1 and the CLA, Ivanpah 2, Ivanpah 3, and the SEZ translocation area produce approximately 61, 26, 52, and 35 eggs per year, respectively. Turner et al. (1987) observed that the proportion of the population composed of juvenile desert tortoises at the Goffs study site ranged as high as 51.2 percent over the course of 4 years. Based on this information and the anticipated population of subadults and adults on the project site, we estimate that Ivanpah 1 and the CLA, Ivanpah 2, Ivanpah 3, and the SEZ translocation area may contain as many as 15, 7, 13, and 9 juvenile desert tortoises, respectively.

We do not have desert tortoise survey information for the remainder of the action area described in this biological opinion. Given the proximity of the short-distance translocation area and the long-distance translocation sites to the surveyed areas, described above, the density of desert tortoises is likely similar (i.e., approximately 7 subadult and/or adult desert tortoises per square mile). This estimate is supported by a survey immediately east of the ISEGS project site that found 27 desert tortoises on a 5.75 square mile survey area (Ironwood 2009). Using these data and the Service's revised pre-project survey protocol (Service 2010b), we estimate a population density of approximately 6 desert tortoises per square mile for that survey area. Applying the higher of these density estimates to BrightSource's translocation sites, we estimate a population size of 15 desert tortoises within the combined area of the proposed translocation sites (i.e., short-distance, long-distance, and SEZ translocation areas). Using the same method described above for estimation of eggs and juveniles, we estimate that the reproductive females in the western translocation area produce approximately 65 desert tortoise eggs per year and the western translocation area population contains approximately 17 juvenile desert tortoises at any given time.

Because the Service has estimated the density of desert tortoises within the Ivanpah Desert Wildlife Management Area through line-distance sampling (i.e., 16.84 per square mile; Service 2009b), we have applied that density estimate to the control population areas. Using this density, we estimate that this 28,594-acre portion of the action area contains 753 subadult and/or adult desert tortoises. Using the same method described previously for estimation of eggs and juveniles, we estimate that the reproductive females in the control population area produce approximately 3,239 desert tortoise eggs per year and the population within this area may contain as many as 816 juvenile desert tortoises at any given time.

For the remaining portions of the action area (i.e., areas west of Interstate 15 that desert tortoises may move to following translocation), we estimate that densities are likely similar to those identified for the three phases of the project site and the translocation areas (i.e., seven desert tortoises per square mile). Consequently, we estimate that this portion of the action area, which include the project site areas and translocation areas discussed above, contain approximately 330 subadult and/or adult desert tortoises. We also estimate that these areas contain approximately 358 juveniles and produce approximately 1,421 eggs per year.

We emphasize that, although our estimates of the number of subadult and adult desert tortoises, eggs, and juveniles on the project site phases, translocation areas, control area, and remainder of the action area are based on the best available information, these numbers represent only an estimate; the overall number of animals and eggs on site may be different. We recognize that the survey data used for these estimates represents a single point in time and the number of individuals in these areas may change by the onset of construction. For example, some desert tortoises may leave or die. Alternatively, the number of desert tortoises present on the site may increase or decrease by the time construction commences. For example, one or more desert tortoises may not have been detected during the initial survey; other desert tortoises may have moved on to the site since the time of the surveys. Desert tortoises may have emerged from a nest on the site; this scenario could increase the overall number of individuals. For example, if a clutch of seven eggs (i.e., the number of eggs in a clutch that would be considered large) hatched, this increase would be much more than we would expect from individuals moving on to the site. In addition, the studies used to estimate juveniles and eggs are based on a single study site that may or may not have similar productivity and juvenile survival rates to that of our action area.

EFFECTS OF THE ACTION

The estimates of the number of desert tortoises and eggs derived from the pre-project survey data constitute the best available information regarding the number of desert tortoises in the action area. For this reason, we have used the estimates from the Environmental Baseline section of this biological opinion, which are based on these surveys, in the following analysis.

Effects of the Translocation Strategy

The primary effects of the proposed action on desert tortoise will result from the capture and translocation of desert tortoises prior to all ground disturbance associated with the proposed construction activities. We anticipate that BrightSource will capture and translocate all subadult and adult desert tortoises from the fenced project areas, and any other portion of the action area that is in harm's way due to project-related activities. Because of the difficulty in locating juvenile desert tortoises, BrightSource is likely to move some but not all juvenile desert tortoises from the project site.

Prior to translocation of individuals, BrightSource will perform surveys of the resident populations in each translocation area (i.e., short-distance, long-distance, and SEZ translocation areas). Within all portions of the translocation areas that are more than 500 meters from the western or northern fence lines of the project site, BrightSource will only perform visual health assessments. It will perform visual health assessments and ELISA testing in all other portions of the translocation areas and disease sampling (i.e., ELISA testing and visual health assessments) in the remaining portions of the action area north and west of Interstate 15 to assess population density and disease prevalence prior to translocation. In addition, BrightSource will perform surveys of the control area to identify and attach transmitters to control desert tortoises and to assess disease prevalence of the population to be monitored. During these surveys, BrightSource

will attach transmitters to an equal number of individuals in the resident and control areas to the estimated number that they will clear from the project site. We have analyzed the effects associated with attaching transmitters to these animals in a later section of this document. We cannot precisely predict how many desert tortoises that BrightSource would draw blood from in these areas, but we know that it would be at least 32 each in the resident, control, and project-site populations. However, BrightSource will need to draw blood from additional resident animals that are located in portions of the action area west and north of Interstate 15 to assess whether this area has disease prevalence above five percent. To determine whether this threshold has been reached, with a sufficient level of confidence (i.e., 95 percent confidence), we estimate that BrightSource may have to draw blood from as many as 98 desert tortoises (Averil-Murray 2010). Some potential exists that a subset of the animals tested could suffer mortality as a result of improper blood collection techniques. Because BrightSource will use experienced biologists, authorized by the Service, we expect that this number will be a small fraction of the total animals tested.

BrightSource has proposed numerous measures to minimize injury or mortality of desert tortoises and ensure success of the translocation effort. Because the project would be built in phases over several years, during which time desert tortoise numbers on the project site will likely change, we cannot predict exactly how many desert tortoises will be removed from the project site and other related work areas. However, based on current surveys that cover the project site, CLA, natural gas line, and Colosseum Road, we estimate that BrightSource will have to capture and translocate approximately 32 subadult and/or adult desert tortoises (14, 6, and 12 from Ivanpah 1 and the CLA, Ivanpah 2, and Ivanpah 3, respectively) from these areas. Although BrightSource would move some desert tortoises a relatively short distance (i.e., less than 500 meters), other desert tortoises are likely to be translocated outside of their existing home ranges. We have estimated that the project site may contain approximately 35 juvenile desert tortoises (15, 7, and 13 from Ivanpah 1 and the CLA, Ivanpah 2, and Ivanpah 3, respectively) and produces as many as 139 desert tortoise eggs (61, 26, and 52 from Ivanpah 1 and the CLA, Ivanpah 2, and Ivanpah 3, respectively) per year. However, because of the difficulty in finding desert tortoise eggs and juvenile desert tortoises, we anticipate that BrightSource will translocate few, if any, eggs or juveniles from the project site. Effects to juvenile desert tortoises and eggs that are missed on the project site are discussed later in this section.

Based on our current estimates of the resident population density in the translocation areas (i.e., 7 subadult and/or adult desert tortoises per square mile), the combined size of the translocation areas (i.e., 2.74 square miles), and the post-translocation density threshold identified in the project description (i.e., 21 subadult and/or adult desert tortoises per square mile), we anticipate that the proposed translocation areas can accommodate approximately 38 additional subadult and/or adult desert tortoises. Consequently, the proposed translocation areas appear to be large enough to accommodate all 32 subadult and/or adult desert tortoises that BrightSource needs to move. However, we will not be able to determine this until surveys of the translocation areas and the project sites are performed. At that point, we will know the precise number of individuals on the project site and have a more precise estimate of the number of individuals

within the translocation areas. If the translocation areas prove to be too small, BrightSource would have to identify a new translocation area for the additional desert tortoises. This action would constitute a significant change in the project description and would likely require re-initiation of consultation.

BrightSource has indicated that the 8-mile line to Mountain Pass will use existing poles and would require a 40-foot by 60-foot area of disturbance for every 10,000 feet of line. Consequently, we estimate that project work areas for installation of the fiber optic line would total 0.28 acre in size. Based on this estimate and the estimated density for this portion of the action area of approximately 7 subadult and/or adult desert tortoises per square mile, we anticipate that few, if any, desert tortoises or eggs are likely to be moved during installation of the fiber optic line. Because of the small size of work areas and the difficulty in locating juvenile desert tortoises and eggs, we do not anticipate the movement of any juvenile desert tortoises or eggs.

To prevent translocated desert tortoises from entering roadways following translocation, BrightSource will fence approximately 7 miles of Interstate 15 between Nipton Road and Yates Wells Road. BrightSource has indicated that it would require a 10-foot-wide area of disturbance to install desert tortoise exclusion fencing around the 3 phases of its project. We anticipate that it would require a similar disturbance right-of-way to install desert tortoise exclusion fencing along Interstate 15. Therefore, we estimate that fence installation will directly affect up to 9.1 acres (0.01 square mile). Boarman and Sasaki (2006) found that desert tortoise populations are depressed next to major roadways out to a distance of at least 400 meters (437.5 yards). Because the fence installation would occur along a major roadway and considering the estimated density of desert tortoises in this portion of the action area (i.e., 7 subadult and/or adult desert tortoises per square mile) and the small area of direct effects, we expect that fence installation will affect few desert tortoises or eggs.

Some potential exists that handling of desert tortoises may cause elevated levels of stress that may render these animals more susceptible to disease or dehydration from loss of fluids. Because BrightSource will use experienced biologists that are approved by the Service and approved handling techniques, collected desert tortoises are unlikely to suffer substantially elevated stress levels during handling.

Following release, we cannot predict the movement patterns that all translocated animals are likely to exhibit. Translocation studies, including a study performed in the Ivanpah Valley, have shown that straight-line movement distances following release can be over 3.73 miles in the first year for some desert tortoises (Berry 1986, Field et al. 2007, Nussear 2004). Mean dispersal distances observed on 3 study plots south of Fort Irwin ranged from 153.1 to 6,168 yards, with maximum dispersal distances of between 13,795 to 25,155.3 yards (Walde et al. 2008). For short distance translocations, data appear to indicate shorter post-translocation dispersal distances (79.8 to 1610.9 yards) (Walde et al. 2008). Translocated populations can also significantly expand the area they occupy in the first year following translocation (e.g., from 3.9 to 6.9 square miles at a Nevada site; from 0.2 to 10.3 square miles at a Utah site). The degree to which these

animals expand the area they use depends on whether the translocated animals are released into typical or atypical habitat; that is, if the translocation area supports habitat that is similar to that of the source area, desert tortoises are likely to move less (Nussear 2004).

Translocated animals appear to reduce movement distances following their first post-translocation hibernation to a level that is not significantly different from resident populations (Field et al. 2007, Nussear 2004). As time increases from the date of translocation, most desert tortoises change their movement patterns from dispersed, random patterns to more constrained patterns, which indicate an adoption of a new home range (Nussear 2004).

We cannot predict the direction that translocated animals are likely to move. In some studies, translocated desert tortoises have exhibited a tendency to orient toward the location of their capture and attempt to move in that direction (Berry 1986), but in other instances, no discernible homing tendency has been observed in translocated animals (Field et al. 2007). Information specific to short-distance translocations indicates that at least some individuals will attempt to return to their former home ranges after release (Stitt et al. 2003, Rakestraw 1997).

Based on this information, at least a portion of the translocated animals are likely to make extensive, long-distance movements during the first year following translocation and the area that the translocated population occupies is likely to increase significantly. Animals translocated more than 500 meters to the long-distance translocation areas or to the SEZ translocation area are most likely to exhibit this pattern. However, desert tortoises moved into the short-distance translocation area are more likely to move distances similar to that observed by Walde et al. (2008) because they will be translocated a relatively short distance. Some of the translocated desert tortoises are likely to attempt to return to the project site, where they would encounter the project site fence and either turn around or walk the fence line. Following the first hibernation period after translocation, individuals are likely to significantly reduce movement distances and establish new home ranges.

In one study, the majority of the dispersal movement away from the release site occurred during the first 2 weeks after translocation (Field et al. 2007). Desert tortoises that make long-distance movements following translocation can travel for 5 to 10 days and average 671.5 yards per day (Berry 1986). During this time and over the period prior to home range establishment, desert tortoises may suffer a higher potential for mortality because they are moving great distances through unfamiliar territory and are less likely to have established cover sites for protection. Studies have documented various sources of mortality for translocated individuals, including predation, exposure, fire, disease, crushing by cattle, and flooding (Nussear 2004, Field et al. 2007, Berry 1986, U.S. Army 2009, 2010). Of these, predation appears to be the primary source of mortality in most translocation studies (Nussear 2004, Field et al. 2007, U.S. Army 2009, 2010).

Based on the description of the action area in the Environmental Baseline section of this biological opinion, the potential exists for all six sources of mortality within the action area. However, fire is likely to be localized and highly dependent on the abundance of non-native

grasses and other weeds. The potential also exists for desert tortoises to die on roads during the period when translocated individuals are seeking new home range locations. However, because BrightSource will fence Interstate 15 prior to translocation, road kills are less likely to occur at this translocation site.

BrightSource has selected translocation areas in desert tortoise habitat that should serve as suitable recipient sites for these animals. It has also identified post-translocation density thresholds to ensure that the final translocation areas are large enough to accommodate all desert tortoises from the site. It has proposed numerous protective measures in its translocation plan that are likely to reduce the potential for mortality of translocated individuals. In addition, because construction and translocation will occur in phases and BrightSource has identified a 10 percent mortality threshold for the translocation effort, some potential exists that it can reduce the level of translocation-related effects through adaptive management. However, adaptive management measures are not available for our evaluation, so we cannot predict their effectiveness in this biological opinion.

Translocating desert tortoises may also adversely affect resident desert tortoises within the action area due to local increases in population density. Increased densities may result in an increased spread of upper respiratory tract disease or other diseases, an increased incidence of aggressive interactions between individuals, and an increased incidence of predation that may not have occurred in the absence of translocation. Saethre et al. (2003) evaluated the effects of density on desert tortoises in nine semi-natural enclosures at the Desert Tortoise Conservation Center in Nevada. The enclosures housed from approximately 289 to 2,890 desert tortoises per square mile. Saethre et al. (2003) observed a greater incidence of fighting during the first year of the experiment but did not detect any trends in body condition index, reproduction, or presence of the symptoms of upper respiratory tract disease among the enclosures. Body condition index and reproduction are important indicators of how translocation may affect resident desert tortoises; generally, stress suppresses body condition index and reproduction in desert tortoises. This study did not draw any conclusions regarding density-dependent effects on predation of desert tortoises. Additionally, as discussed previously in this section, desert tortoises tend to move substantial distances from the release sites; this behavior reduces the likelihood of overcrowding in smaller areas.

We anticipate that density-dependent effects on resident populations are likely to be minor for the following reasons: 1) current densities in the translocation areas are likely to be low based on our population estimates for the action area, 2) translocation will result in a dispersed release of individuals, 3) the translocation areas are not confined spaces, so released individuals would be able to disperse into other areas, and 4) BrightSource has identified a post-translocation density threshold for the translocation areas that is significantly lower than densities at which adverse effects were observed in previous studies.

Translocation has the potential to increase the prevalence of diseases, such as upper respiratory tract disease, in a resident population. Stress associated with handling and movement or due to density dependent effects could exacerbate this threat if translocated individuals with subclinical upper respiratory tract disease or other diseases begin to exhibit clinical signs of disease due to

the stress associated with handling and movement. This potential conversion of translocated desert tortoises from a non-contagious to contagious state may increase the potential for infection in the resident population above pre-translocation levels.

We cannot reasonably predict the increase in disease prevalence within the resident population that may occur due to translocation. However, the following mitigating circumstances are likely to reduce the magnitude of this threat: 1) BrightSource will use experienced biologists and approved handling techniques that are unlikely to result in substantially elevated stress levels in translocated animals, 2) desert tortoises on the project site are currently part of a continuous population with the resident populations of the translocation areas and are likely to share similar pathogens and immunities, 3) BrightSource will move some of the translocated desert tortoises a relatively short distance into the SEZ and western translocation areas, which is likely to reduce post-translocation stress associated with long-distance movements, 4) density dependent stress is unlikely to occur for the reasons discussed above, 5) BrightSource will not translocate any animal that either has clinical signs of disease or tests ELISA-positive, and 6) BrightSource has identified specific translocation buffers to prevent release of individuals within proximity of diseased resident animals.

Because ELISA testing can result in false positive results (i.e., an animal may test positive even though it is not a carrier of the disease) the potential exists for removal of healthy individuals from the translocated population due to concern over disease. These individuals would not be released into the wild and would no longer contribute to the environmental baseline for the action area. Because BrightSource would coordinate with the Service and perform follow-up testing of ELISA-positive individuals, the potential for removing false-positive individuals from the translocated population is low. Consequently, we conclude that few, if any, desert tortoises will be incorrectly removed from the population due to false positive results.

In a study conducted in Ivanpah Valley, 21.4 percent of 28 translocated desert tortoises died (Field et al. 2007). Other studies have documented mortality rates of 0, 15, and 21 percent in other areas (Nussear 2004, Cook et al. 1978 in Nussear 2004). Esque et al. (2010) observed mortality of 89 of 357 translocated desert tortoises (24.9 percent). Esque et al. (2010) and Nussear (2004) found that mortality among translocated animals was not statistically different from mortality observed in resident populations. In addition, Esque et al. (2010) found that mortality rates in resident (29 of 140 desert tortoises; 20.7 percent mortality), control (28 of 149 desert tortoises; 18.8 percent mortality), and translocated populations did not differ statistically and concluded that the translocation was not the cause of the observed mortality. With the exception of the Esque et al. (2010) study, none of the studies cited in this paragraph used controls to compare mortality rates in resident and translocated populations to the mortality rate experienced in populations not affected by translocation.

Based on the information that we have gathered and considering the uncertainty of site-specific applicability, we estimate that translocated, resident, and control desert tortoises are likely to experience mortality rates of approximately 30 percent due to predation, exposure, fire, disease, crushing by cattle and vehicles, and flooding. (We based our estimate of overall mortality in the

three populations on the work of Esque et al. (2010) and then buffered it to 30 percent to accommodate the additional mortality that would be likely to occur if all or most of the monitoring period occurs during years of low rainfall.) Consequently, we estimate that approximately 10, 87, and 226 translocated, resident, and control desert tortoises, respectively, may die during the 3-year post-translocation monitoring period. We conclude that mortality rates in the resident and translocated populations are unlikely to be elevated above levels that these populations would experience in the absence of translocation, based on the information provided in Esque et al. (2010). Therefore, we do not anticipate this mortality will be the result of translocation. The monitoring of a nearby control population will assist us in determining whether this prediction is realized. If monitoring shows this conclusion to be incorrect, this will constitute new information and require the re-initiation of consultation. One shortcoming of the proposed monitoring program is that, while it includes the observation of a control population that will not be affected in any manner by the translocation, it omits a mechanism to prompt the implementation of corrective actions if significant differences in mortality rates among the populations can be attributed to the translocation.

We have estimated that few, if any, desert tortoises are likely to be moved during installation of the fiber optic line. Because disturbance areas on this portion of the project are small, movement of desert tortoises immediately outside of the work area is not likely to remove them from their current home ranges. Consequently, any desert tortoise moved from the fiber optic line will likely continue to occupy familiar territory and use known shelter sites and is unlikely to suffer post-translocation mortality associated with displacement from the work area.

Many translocated juveniles will likely die due to their greater susceptibility to predation. Because we anticipate that BrightSource will move few, if any, juvenile desert tortoises, we do not anticipate a large amount of juvenile mortality associated with translocation because surveyors will miss most juvenile desert tortoises during clearance surveys. Consequently, most juveniles will likely die during construction. We have discussed this effect below.

Effects of Post-translocation Monitoring

Based on the description of the post translocation monitoring program and our estimate of the number of desert tortoises on the project site, we anticipate that BrightSource will attach transmitters to 96 desert tortoises to facilitate monitoring of the translocated, resident, and control populations. As a result, desert tortoises will carry transmitters and be monitored and handled periodically for visual health assessments. Some potential exists that handling of desert tortoises may cause elevated levels of stress that may render these animals more susceptible to disease or dehydration from loss of fluids. Because BrightSource will use experienced biologists, approved by the Service, and approved handling techniques, these desert tortoises are unlikely to suffer substantially elevated stress levels resulting from handling and monitoring activities.

Effects of Construction of the ISEGS Facilities

BrightSource will permanently fence all three project phases, Colosseum Road, and the CLA with desert tortoise exclusion fencing and clear all desert tortoises from the project site prior to ground disturbance. During construction of the permanent perimeter fencing and during other ground-disturbing activities that are outside of the permanently fenced facilities (i.e., fiber optic line, highway fence, natural gas distribution line), Bright Source will perform pre-activity clearance surveys and employ monitors to move desert tortoises out of harm's way if they re-enter work areas. For these reasons, we anticipate that construction, including construction access, is unlikely to kill subadult and adult desert tortoises. Some potential always exists that surveyors may miss an individual during clearance surveys and construction monitoring. We cannot predict how many subadult and adult desert tortoises that clearance surveys and construction monitoring would miss. However, because BrightSource will use qualified biologists, authorized by the Service for clearance surveys, we anticipate that the number is likely to be small.

In addition, juvenile desert tortoises and eggs are difficult to detect during clearance surveys and construction monitoring; therefore, the potential exists that surveyors may miss most of them and they are likely to remain in the work areas during construction. Juvenile desert tortoises and eggs that surveyors miss during clearance surveys or project monitoring are likely to be killed during construction. Based on the estimates in the Environmental Baseline section of this biological opinion, we estimate that as many as 35 juvenile desert tortoises (15, 7, and 13 from Ivanpah 1 and the CLA, Ivanpah 2, and Ivanpah 3, respectively) may be killed during construction. We have estimated that the reproductive females on the project site collectively produce as many as 139 desert tortoise eggs (61, 26, and 52 from Ivanpah 1 and the CLA, Ivanpah 2, and Ivanpah 3, respectively) per year. However, we cannot estimate how many of these eggs that construction activities would destroy because this number covers the entire year's total production, and we do not know what portion of this total will be present on site when construction activities are occurring on a given phase. In the Summary of Effects section (below) we discuss the significance of the loss of these individuals and eggs to the overall status of the species within the Northeastern Mojave Recovery Unit and range wide.

Effects of Operations and Maintenance Activities

Following fencing, operation and maintenance activities within permanently fenced areas are unlikely to directly injure or kill any desert tortoises. However, we have discussed additional indirect effects associated with operation and maintenance of this facility in the Miscellaneous Effects section later in this biological opinion.

Over the 45-year life of this project, BrightSource may conduct some ground-disturbing maintenance activities outside of fenced areas. These activities have the potential to injure or kill desert tortoises primarily as a result of vehicle strikes, as workers travel to and from work sites outside of the fenced areas; a limited possibility exists that desert tortoises could be injured or killed by equipment or workers moving around a work site. Because Class I maintenance

activities would not result in surface disturbance or loss of habitat and BrightSource would implement protective measures to reduce the potential for effects to desert tortoises, Class I maintenance activities would kill few, if any, desert tortoises.

Class II maintenance activities associated with repair of desert tortoise exclusion fencing would likely kill or injure few, if any, desert tortoises for the following reasons: 1) fence repairs are likely to result in minimal ground disturbance in localized areas, 2) at least a portion of the work area would be on disturbed areas within the fenced project site, 3) perimeter roads would exist that would allow access to most repair locations with minimal off-road travel, and 4) BrightSource would implement numerous protective measures to reduce the potential for injury or mortality of desert tortoises.

Because we do not have sufficient detail regarding the other types of maintenance activities discussed in the Description of the Proposed Action, we cannot adequately analyze the potential for injury or mortality of desert tortoises. Consequently, we are not analyzing Class III maintenance activities or any Class II maintenance activities that would occur outside of the fence and not be associated with repair of fencing. The Bureau has indicated that these actions would require future site-specific authorizations. At the time the Bureau considers authorization of these future activities, it will need to determine whether these future activities may affect desert tortoises. Some of these actions may require future site-specific consultation under section 7.

Effects of Restoration/Reclamation Activities

Decommissioning or restoration activities within the permanently fenced project area are unlikely to result in injury or mortality of desert tortoises. BrightSource will also need to perform restoration of long-term and short-term disturbance associated with the natural gas distribution line and fiber optic line. BrightSource would implement pre-activity clearance surveys and employ desert tortoise monitors to ensure that desert tortoises do not enter restoration work areas. Consequently, restoration activities will injure or kill few, if any, desert tortoises. These actions are likely to reduce the amount of time required to return disturbed areas to habitat suitable for desert tortoise occupancy. However, this process is likely to take several decades.

Effects of Accessing Worksites

BrightSource will fence the primary access road for the ISEGS facility (Colosseum Road) with desert tortoise exclusion fencing, so accessing the main fenced facilities is unlikely to result in injury or mortality of desert tortoises. In the event that the fence is damaged, a small number of desert tortoises could enter the roadway and be injured or killed. In addition, access of project work areas outside of the fenced facilities (i.e., natural gas pipeline, fiber optic line, highway fence) has the potential to injure or kill desert tortoises due to elevated use of existing routes. Because all workers will have undergone an education program about desert tortoises, workers may be less likely to strike desert tortoises than a casual user. We cannot predict how many

individuals will be killed or injured because of the variables involved, such as weather conditions, the nature and condition of the road, and activity patterns of desert tortoises at the time the roads are being used. However, we expect the number that would be injured or killed to be small and does not substantially change the number of desert tortoises that we anticipate may be killed or injured by the overall effects of the project.

Effects of Loss of Habitat

The biological assessment has defined permanent, long-term, and short-term disturbance as follows:

- **Permanent Disturbance:** project disturbance that would remain after the project's lifespan.
- **Long-term Disturbance:** project disturbance that would remain in place for the lifespan of the project, but would be restored following closure.
- **Short-term disturbance:** project disturbance restored within 5 years of the time of the disturbance.

Based on these definitions and the project description provided in the biological assessment, construction of the 3 project phases and the CLA, including installation of exclusion fencing, and improvements to Colosseum Road would result in 3,391.9 and 94 acres of permanent/long-term and short-term disturbance, respectively (CH2MHill 2009a). Installation of the natural gas distribution line and associated facilities will result in an additional 1.7 and 6 acres of new permanent/long-term and short-term disturbance. We anticipate that installation of fencing along Interstate 15 would temporarily disturb approximately 9.1 acres of desert tortoise habitat.

The following table, adapted from table 2.1-1 of the revised biological assessment (CH2MHill 2010a), provides details regarding the disturbance associated with each project feature.

Permanent and Long-term Disturbance	Acres
Ivanpah 1	913.5
Ivanpah 2	1,097
Ivanpah 3	1,227
CLA and SCE Substation	68.4
Gas Line	1.7
Colosseum Road	14.3
Total	3,321.9
Short-term disturbance	
CLA and SCE Substation	115.6
Gas Line	6.0
Construction areas for linear corridors	10.4
Credit for existing roads within project area	-9.9
Total	122.1

Based on the definitions above, we estimate that installation of the fiber optic line would result in approximately 0.28 acre of new short-term disturbance. In addition to the disturbances associated with construction of the ISEGS facility, Class II and III maintenance activities are likely to result in additional habitat disturbance over the 45-year life of the project. Based on the information provided, we cannot estimate the amount of disturbance associated with Class II and III maintenance activities over the life of the project. We are not analyzing these activities in the biological opinion because they will require future authorizations from the Bureau.

These disturbances are likely to result in desert tortoise habitat loss that will persist for various periods. Following extensive disturbance and compaction, Mojave Desert soils can take between 92 and 124 years to recover in the absence of active restoration (Webb 2002). In addition, recovery of plant cover and biomass in the Mojave Desert can require 50 to 300 years in the absence of restoration efforts (Lovich and Bainbridge 1999). Although active restoration, including decompaction, seeding, and planting, can reduce the time required to restore desert ecosystems, success is varied and dependent on numerous variables. Based on this information, 3,321.9 acres, currently characterized as permanent/long-term disturbance, are likely to be permanently lost or unsuitable as habitat for several decades following decommissioning of the facilities and commencement of restoration work. Because active restoration will occur, we estimate that BrightSource will restore 132 acres of short-term disturbance to desert tortoise habitat prior to decommissioning of the facility. Based on the information provided, we cannot estimate the amount or duration of habitat loss associated with Class II and III maintenance activities. Consequently, we are not analyzing the effects of these activities in this biological opinion. The Bureau has indicated that these actions will require future Bureau authorizations.

Based on the work by Nussear et al. (2009), we calculated that the Northeastern Mojave Recovery Unit contains approximately 7,583 square miles of modeled desert tortoise habitat. Because the model does not take into account existing human disturbance, we used a more conservative estimate in which we considered half of the modeled habitat was no longer suitable for desert tortoises because of development or degradation resulting from human activities; we also removed the 300,000 acres lost to fire in 2005. Therefore, based on this estimate, approximately 3,323 square miles of modeled desert tortoise habitat remain in the recovery unit. The habitat that would be disturbed on a long-term basis (i.e., approximately 3,322 acres) constitutes approximately 0.07 percent of the modeled habitat in the Northeastern Mojave Recovery Unit and approximately 0.15 percent of the modeled habitat if we use the conservative estimate. Although this percentage does not constitute a numerically substantial portion of the Northeastern Mojave Recovery Unit, we do not have the ability to place a numerical value on edge effects and overall fragmentation that the proposed action may cause or that occurs in the recovery unit as a whole. Given that, this low percentage of the recovery unit that would be lost likely underestimates the biological value of the area. However, the area where the ISEGS project is located is already substantially cut off from the remainder of the Northeastern Mojave Recovery Unit by Interstate 15, Ivanpah Lake, Primm, Nevada, and the Clark Mountains. Although the construction of the ISEGS facility will increase fragmentation and edge effect in

the area bounded by Interstate 15 and the Clark Mountains, it is unlikely to greatly increase fragmentation and edge effect when considered in the larger context of the recovery unit.

Effects of Compensation

The Bureau is proposing to require compensation for loss of habitat associated with this project at a ratio of 1:1 per the provisions of the Northern and Eastern Mojave Plan. Compensation will include acquisition of private lands containing desert tortoise habitat that will be placed under Bureau management and/or implementation of habitat enhancement and rehabilitation projects on public land. All acquisitions and habitat enhancements or rehabilitation actions associated with the Bureau's compensation requirements would be performed within the Northeastern Mojave Recovery Unit.

Potential habitat enhancement and rehabilitation actions that the Bureau has proposed, include highway fencing, fencing the boundary of two desert residential communities, non-native plant control, rehabilitation of closed routes, and identification and clean up of degraded sites (i.e., illegal dumps, illegal routes). All actions would occur within or would benefit Desert Wildlife Management Areas or other areas that are important to desert tortoise conservation in the Northeastern Mojave Recovery Unit or in nearby areas in the Eastern Mojave Recovery Unit. The mitigation that is ultimately implemented for the ISEGS project will involve implementation of some, if not all, of these actions solely or in some combination with land acquisition.

In addition to the Bureau's compensation strategy, the California Energy Commission has required BrightSource to compensate for the loss of desert tortoise habitat at a ratio of 2:1. Although these funds may be spent in locations outside of the Northeastern Mojave Recovery Unit, at least some funds are likely to be expended within the unit; we expect that these funds would be used to implement actions similar to those implemented by the Bureau and would also result in actions that would promote the conservation of the species. The California Energy Commission will also require BrightSource to provide funding for the implementation of regional management programs for the common raven.

Although acquisition of suitable desert tortoise habitat through these compensation requirements will not create new habitat within the Northeastern Mojave Recovery Unit, it will result in a net increase in the amount of desert tortoise habitat managed for the conservation of this species. In addition, the funding of management actions and regional management of common ravens is likely to result in restoration and rehabilitation of degraded habitat, protection of existing habitat from future sources of degradation, and a reduction in the direct mortality of desert tortoises. In general, the actions proposed for compensation are identified in the original and draft revised recovery plans (Service 1994, 2008) as being necessary for the recovery of the desert tortoise. These actions will increase the quantity and/or quality of habitat for the desert tortoise and reduce the number of existing threats and mortality sources in the areas where they occur. We cannot quantify the level of effects that these actions will have, but they are likely to reduce mortality of desert tortoises and improve habitat quality with the Northeastern and Eastern Mojave Recovery Units. Because habitat enhancement actions and land acquisition would occur

in Desert Wildlife Management Areas or other locations that are important to desert tortoise conservation, the proposed compensation requirements would provide a positive recovery benefit to the desert tortoise and offset loss of habitat and other adverse effects associated with the project.

Implementation of some habitat enhancement actions has the potential to result in adverse effects to the desert tortoise. Because we do not have specific information regarding future habitat enhancement and rehabilitation projects, we cannot perform a detailed analysis of these actions. The Bureau has indicated that these actions would require future project-specific authorizations prior to implementation. Consequently, we will address their adverse effects to the desert tortoise in future project-specific section 7 consultations.

Miscellaneous Effects

Indirect effects associated with construction, operation, maintenance, and decommissioning of the ISEGS facility may injure or kill desert tortoises. These effects include increased predation by common ravens that are attracted to the area because of increased human activity and modification of the habitat and diet of desert tortoises due to the spread of non-native plant species. Ivanpah Valley currently supports numerous facilities that subsidize common ravens (e.g., water sources, trash, road-killed animals, nest and roost sites, etc.); these facilities are associated with established communities (i.e., Primm, Nevada and Nipton, California), golf courses, an interstate highway, and utility lines that are likely to elevate the level of predation of desert tortoises by common ravens within the action area. Construction and operation of the ISEGS facility has the potential to attract additional common ravens and increase predation in the action area. BrightSource has proposed numerous measures to address predation by common ravens associated with the project site. These measures include subsidy control, a monitoring program, and contingencies for removal of problem common ravens. In addition, BrightSource will provide funds for implementation of regional management actions for common ravens.

We cannot reasonably predict the amount of predation by common ravens that construction and operation of this project is likely to add to baseline levels within the action area, but we anticipate that the program proposed by BrightSource is likely to be effective in eliminating some, but not all, common raven use of the project site. Depending on the location of specific control actions, funding of regional management of common ravens may also aid in reducing the amount of common raven predation on desert tortoises within the action area.

Non-native plant species currently occur on the proposed project site and are likely to occur in other portions of the action area at varying densities. Within Ivanpah Valley, numerous features serve as vectors for infestation of the action area by non-native plant species (e.g., highways, cattle allotment). However, construction and operation of the ISEGS facility has 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. In addition, access to the project site and other project features by construction and operations personnel is likely to increase the volume and distribution of non-native seed carried into the action area. The

increased abundance in non-native species associated with this project may result in an increased fire risk, which may result in future habitat loss.

BrightSource has proposed numerous measures to address control of non-native plant species within the project site. We cannot reasonably predict the increase in non-native species abundance that this project will create within the action area, but we anticipate that the program proposed by BrightSource will be reasonably effective in reducing the increase in some species. However, BrightSource has not proposed any measures to control species, such as red brome, that are ubiquitous in the area. Increases in the abundance of this species elevate the risk of fire, which, in turn, heightens the risk of future habitat loss, which could reduce the number and distribution of desert tortoises within the action area. We anticipate that BrightSource's use of herbicides in control of weeds would have minimal effects because these herbicides would be used within fenced areas that do not contain desert tortoises.

Summary of Effects

Prior to construction of the ISEGS facility, we estimate that BrightSource would capture and translocate approximately 32 subadult and/or adult desert tortoises from project worksites. We anticipate that they will translocate few, if any, juvenile desert tortoises. Because BrightSource will implement a variety of measures to reduce stress to these animals, we do not anticipate that injury or mortality will result from handling of these animals. We anticipate that disease screening associated with the translocation effort will result in the improper removal of few, if any, desert tortoises with false positive ELISA test results. Following release of translocated animals, we anticipate that approximately 30 percent (i.e., 10 subadult and/or adult desert tortoises) will die due to predation, exposure, fire, disease, crushing by cattle, road kills, or flooding. Most of this mortality is likely to occur in the first year after release, during the period that translocated animals are making long-distance movements and attempting to establish new home ranges. In addition, some resident desert tortoises in the translocation areas are likely to die due to the same causes of mortality. We have concluded that mortality rates within the resident and translocated populations are unlikely to be above what they would experience in the absence of translocation, and we do not anticipate that post-translocation mortality will actually be caused by the act of moving desert tortoises. If post-translocation monitoring indicates elevated levels of mortality in resident and translocated populations, re-initiation of consultation may be required to address this unanticipated effect.

We also anticipate that BrightSource may have to quarantine and collect blood from the 32 translocated animals and collect additional blood samples from 32 control animals and up to 98 resident desert tortoises to assess disease. Some potential exists that collection of blood from some of these individuals could result in injury, if done improperly. However, we anticipate that the number of desert tortoises that may be injured would be minimal because BrightSource would use experienced biologists authorized by the Service to perform these activities.

In addition to the 32 translocated desert tortoises that BrightSource would attach transmitters to and monitor following release, we estimate that they will attach transmitters to and monitor an

additional 32 resident and 32 control animals. We do not anticipate that placing transmitters on these animals or periodic handling for the purposes of monitoring will result in substantial adverse effects because BrightSource will use experienced biologists, approved by the Service, and approved handling techniques.

Because BrightSource will surround the majority of its work areas with desert tortoise exclusion fencing, perform clearance surveys on all work areas, and implement numerous measures to prevent injury and mortality of desert tortoises, we anticipate that construction of the ISEGS project site, including use of access routes, is likely to kill or injure few subadult and adult desert tortoises. Because of the difficulty detecting them, we estimate that project implementation may kill or injure up to 35 juvenile desert tortoises. We also anticipate that project construction will destroy any desert tortoise eggs within work areas; some eggs may be detected and moved to a translocation area, but most are unlikely to be found. Given the numerous variables discussed in this section, we cannot predict the precise number of eggs with any certainty.

Following construction, we do not anticipate that operations, maintenance, or restoration and reclamation activities within the permanently fenced portions of the ISEGS facility or regular access to the ISEGS facility along Colosseum Road will injure or kill desert tortoises. Because BrightSource would implement numerous protective measures, restoration activities in unfenced work areas are unlikely to injure or kill desert tortoises. We cannot accurately predict the number of desert tortoises that most Class II maintenance activities would kill or injure outside of the fenced project site because we do not have sufficient information to predict the location, frequency, or magnitude of these actions. However, Class I activities and Class II maintenance activities associated with fence repair would kill or injure few, if any, desert tortoises because of the nature of these activities and the protective measures that BrightSource would implement.

Project development will result in 3,297.03 acres of long-term/permanent disturbance to desert tortoise habitat. Although all of this area, except for the permanent facilities (i.e., SCE substation and gas metering stations), will undergo restoration/reclamation work, it is unlikely to serve as suitable desert tortoise habitat for many years following facility closure. We cannot predict the amount of time required to return areas of long-term disturbance to suitable desert tortoise habitat because of numerous variables associated with restoration success, including the timing and amount of rainfall. We estimate that BrightSource will return an additional 285.4 acres of short-term disturbance to suitable desert tortoise habitat by the end of the 45-year project lifespan.

Construction, operation, maintenance, and decommissioning of the ISEGS facility have the potential to increase common raven predation on desert tortoises within the action area. In addition, this project is likely to result in an increased abundance of non-native plant species and a subsequent increase in fire frequency within the action area. The measures proposed by BrightSource to address these threats will reduce the magnitude of these effects, but some level of adverse effect will likely persist. We cannot reasonably predict the number of desert tortoises that these threats will adversely affect.

The compensation required by the Bureau would, to some degree, offset the adverse effects of the proposed solar power facility. All of the actions that would be undertaken as compensation are consistent with recommendations for recovery of the desert tortoise. However, the lack of specificity with regard to which actions will be implemented, the uncertainty of success of the actions, and the time lag between implementation of the conservation actions and a substantive effect on recovery of the desert tortoise prohibit us from concluding that the compensation measures would completely offset the adverse effects of the solar facility. Because of the long term or permanent loss of approximately 3,297 acres of desert tortoise habitat, the project will likely result in a net decrease in desert tortoise habitat.

To conclude, areas disturbed by the proposed solar facility and its ancillary features would no longer support reproduction of desert tortoises. Most of the desert tortoises that currently reside within these areas will likely continue to reproduce after translocation. Consequently, we anticipate that the proposed action will not appreciably diminish the reproductive capacity of the species.

Implementation of the proposed action would not appreciably reduce the number of desert tortoises in the Northeastern Mojave Recovery Unit. Based on the amount of modeled desert tortoise habitat (7,583.39 square miles) and the average density (4.4 desert tortoises per square mile) that the Service has estimated for this recovery unit, we estimate that approximately 33,367 subadult and/or adult desert tortoises occur in the Northeastern Mojave Recovery Unit. Using the conservative estimate of the amount of remaining modeled habitat (i.e., 3,323 square miles; see the Effects of the Action - Effects of Loss of Habitat section of this biological opinion), we estimate that approximately 15,652 subadult and/or adult desert tortoises reside within the Northeastern Mojave Recovery Unit. Using this estimate and the information and methods described above for estimating the number of juvenile desert tortoises and eggs within the project site, action area, and translocation area, we estimate that the Northeastern Mojave Recovery Unit may contain approximately 16,422 juvenile desert tortoises in at any given time. Reproductive females within the Northeastern Mojave Recovery Unit may produce as many as 134,733 desert tortoise eggs over the course of a year. Consequently, we conclude that the number of desert tortoises and eggs that are likely to be lost as a result of the ISEGS project comprises a relatively small portion of the overall population in the Northeastern Mojave Recovery Unit.

In previous consultations, we estimated the number of desert tortoises found in the desert wildlife management areas and critical habitat by multiplying the average density of animals found in these areas by their total size. For the numbers of desert tortoises outside of those areas, we used a density value of one-tenth of that estimated within desert wildlife management areas and critical habitat, which we multiplied by the estimated area of available desert tortoise habitat. We did not correct for areas that were unsuitable habitat in either case in these past consultation estimates. Because the method of estimating the number of desert tortoises we use in this biological opinion takes into account a conservative estimate of modeled desert tortoise habitat, we used the same average density across all areas of desert tortoise habitat for our estimate.

The distribution of the desert tortoise would be reduced by approximately 5 square miles, based on the amount of long-term and permanent disturbance associated with the proposed action. As we mentioned previously in the biological opinion, this loss comprises approximately 0.07 percent of the modeled habitat in the Northeastern Mojave Recovery Unit and approximately 0.15 percent of the modeled habitat if we use the conservative estimate discussed previously in this section. Although this loss of habitat is likely to increase fragmentation of habitat and decrease the overall sustainability of the portion of the recovery unit that is isolated by Interstate 15, Ivanpah Lake, Primm, Nevada, and the Clark Mountains, it will not appreciably reduce the amount of habitat available to the desert tortoise when considered in the context of the entire Northeastern Mojave Recovery Unit.

Although the effects of this project on desert tortoises are substantial, we do not anticipate that it will result in effects that appreciably reduce the current distribution, numbers, or reproduction of the overall population within the Northeastern Mojave Recovery Unit or range wide. We anticipate that the compensation programs (i.e., one proposed by the Bureau and the other approved by the California Energy Commission) will result in an increase in the amount of habitat that is managed for the conservation of this species and will result in many advances in the implementation of recovery actions. We anticipate that this compensation will offset many adverse effects associated with this project. Taking into consideration the compensation that is proposed, the lack of statistical trends in population size in this recovery unit, and considering the relative scale of the adverse effects in context with our current estimates of the species' status in the Northeastern Mojave Recovery Unit and range wide, we do not anticipate that construction of this project would appreciably reduce our ability to recover 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 in this section because they require separate consultation pursuant to section 7 of the Act. The Bureau manages all of the land in the action area with the exception of two 640-acre sections owned by the State of California. There are no proposed, non-federal actions within these parcels.

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 are likely to directly kill few subadult and adult desert tortoises because BrightSource will implement numerous measures to reduce the potential that desert tortoises will occupy project work sites (i.e., clearance surveys, exclusion fencing, translocation, qualified biologists, desert tortoise monitors).

2. The number of desert tortoises injured and killed as a result of translocation will likely be small relative to the number of desert tortoises that occur within the Northeastern Mojave Recovery Unit and across the range of the species.
3. BrightSource will implement numerous measures to reduce the potential for increased predation by common ravens and spread of non-native plant species.
4. Current information from permanent study plots and line distance sampling does not document a statistical trend in adult desert tortoise densities in this recovery unit. Therefore, we have no information to indicate that the loss of a small number of individuals as a result of this project would appreciably reduce our ability to reach population recovery objectives for the desert tortoise in the Northeastern Mojave Recovery Unit.
5. This project would not result in loss of desert tortoise habitat in areas that the Bureau or other agencies have designated for intensive management to achieve conservation of desert tortoises.
6. Compensation requirements through the Bureau and California Energy Commission will result in an increase in the amount of existing habitat that is managed for the conservation of the desert tortoise and will likely lead to restoration of lost or degraded habitat within these areas.
7. Regional management actions are likely to aid in reducing common raven predation in a portion of the desert tortoise's range.

As we noted previously in this biological opinion, the analysis we conduct under section 79a)(2) of the Endangered Species Act must be conducted in relation to the status of the entire listed taxon. We based the analysis in this biological opinion within the context of the Northeastern Mojave Recovery Unit because of the wide range of the desert tortoises. Because we have determined that the effects of this action would not compromise the integrity of the Northeastern Mojave Recovery Unit or impede the survival or recovery of the desert tortoises in a measurable manner in this portion of its range, we have not extended the analysis of the effects of this proposed action to the remainder of the range of the Mojave population of 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 the biological opinion. If the Bureau fails to include the terms and conditions of this incidental take statement as enforceable conditions of its right-of-way grant, 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)].

Translocation of Desert Tortoises

We anticipate that the translocation of approximately 32 subadult /adult desert tortoises from project facilities (i.e., Ivanpah 1, 2, and 3 project sites, the CLA, and natural gas distribution line) would involve take, in the form of capture and harassment, of all of these individuals. We anticipate the translocation of few, if any, desert tortoises from the fiber-optic line or highway fence project sites. We emphasize that these numbers are estimates, based on the best available information. The number of individuals translocated may be somewhat higher or lower. We anticipate that few, if any, of these individuals will be injured or killed due to handling.

We cannot precisely quantify how many juvenile desert tortoise eggs that project activities would take because we do not know how successful surveyors will be in locating them. However, we have estimated that as many as 35 juvenile desert tortoises may be on the project site, based on the number of adults detected during pre-project surveys and information on desert tortoise demographics. We have also estimated that as many as 139 desert tortoise eggs may be produced on the project site each year. Based on our estimate that few, if any, subadult and adult desert tortoises would be in project work sites on the fiber-optic line and highway fence, we anticipate that these portions of the action area will contain few, if any, juveniles or eggs. We emphasize that these numbers are estimates, based on the best available information; the number of individuals may be somewhat higher or lower. Because of the difficulty in locating juvenile desert tortoises and desert tortoise eggs and because of the difficulty in determining what proportion of the total number of eggs might be on site at the time that construction occurs, we anticipate that the total number taken in the form of capture for translocation will be a small fraction of these numbers. Any individuals and eggs that are not captured would likely be killed or injured by construction activities. We have discussed injury and mortality of these individuals later in this section.

We do not anticipate that the post-translocation mortality rates for the resident and translocated population will be statistically greater than that of the control population. Consequently, we do not anticipate take associated with translocation aside from what we have described in this incidental take statement.

Disease Testing

We anticipate that as many as 162 subadult and/or adult desert tortoises (i.e., 98, 32, and 32 in the resident, control, and translocated populations, respectively) will be taken, in the form of capture and harassment, when BrightSource collects blood to assess disease prevalence. Although such an invasive procedure presents some likelihood that individuals could be injured or killed, we do not anticipate that blood collection will result in the mortality of any individuals because BrightSource would use experienced biologists, authorized by the Service.

Post-translocation Monitoring

We anticipate the take, in the form of capture, of approximately 64 desert tortoises each in the resident and control population for monitoring. As discussed above, because the project site population may increase between now and the time of translocation, a somewhat larger number of desert tortoises may require monitoring depending on the final number of desert tortoises translocated. Although these animals and the 32 desert tortoises from the translocated population would be captured multiple times over the course of the post-translocation monitoring effort, we do not anticipate injury or mortality of these individuals as a result of the post-translocation monitoring.

Construction of ISEGS Facilities

We anticipate that construction of the ISEGS project site, including use of access routes, is likely to take, in the form of mortality or injury, few, if any, subadult or adult desert tortoises because BrightSource will fence the majority of its work areas with desert tortoise exclusion fencing, perform clearance surveys on all work areas, and implement numerous measures to prevent adverse effects to desert tortoises

We anticipate that construction of the ISEGS facilities is likely to take, in the form of mortality or injury, many of the juvenile desert tortoises and destroy eggs that occur within this area; because of the difficulty detecting them, these individuals and eggs are likely to be missed during clearance surveys. We have estimated that as many as 35 juvenile desert tortoises may be on the project site and that as many as 139 desert tortoise eggs may be produced on the project site each year. Because of the difficulty in locating juvenile desert tortoises and eggs, we cannot determine a precise number because we do not know how successful surveyors will be at locating these individuals.

Compensation

All enhancement actions associated with the Bureau's compensation requirements will require future Bureau authorizations. Consequently, we have not provided incidental take exemptions for these actions in this biological opinion. These actions will require future project-specific consultation if they may affect the desert tortoise or other listed species.

Operation and Maintenance of ISEGS Facilities

We anticipate that operation and maintenance activities, including site access, within permanently fenced areas are likely to take 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.

We anticipate that Class I maintenance activities that are outside of fenced work areas and Class II maintenance activities associated with fence repair are likely to take, in the form of injury or mortality, few, if any, desert tortoises because Class I activities would not result in ground disturbance, Class II activities would be localized and infrequent, and access to repair sites would require little, if any, off-road travel. In addition, for all maintenance work, BrightSource would implement numerous protective measures to avoid killing or injuring desert tortoises. We anticipate that these maintenance activities may result in the take, in the form of capture, of a small number of desert tortoises if they are encountered during work activities and moved from harm's way.

Because we do not have sufficient information regarding the location or extent of other Class II and Class III maintenance activities that may occur outside of the permanently fenced work areas, we cannot determine the level of take associated with these activities. Consequently, we cannot provide an exemption from the prohibitions against take for these activities. These actions will require further site-specific or programmatic consultation.

Decommissioning and Restoration of ISEGS Facilities

We anticipate that restoration of temporary disturbance within fenced facilities during operation and maintenance or following decommissioning is unlikely to result in take of desert tortoises because BrightSource will clear all fenced areas of desert tortoises prior to construction of facilities. After facility closure, decommissioning activities and restoration of long-term disturbance within fenced areas are unlikely to take desert tortoises for the same reason. We anticipate that restoration of temporary disturbances and long-term disturbances outside of fenced work areas is likely to take, in the form of injury or mortality, few, if any, desert tortoises for the following reasons: 1) desert tortoise habitat will either be absent from restoration sites or will be of a substantially degraded nature that it will not attract desert tortoises; 2) BrightSource will implement clearance surveys of any restoration sites where ground-disturbing activities are likely to occur, 3) BrightSource will implement numerous measures to reduce the potential for take on restoration sites (e.g., worker education, desert tortoise monitors, etc.). We anticipate that a few desert tortoises are likely to be taken, in the form of capture as they are moved out of harm's way, during these activities. Because much of this work would occur many years from now, we cannot quantify the number of animals that are likely to be taken.

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 of the ISEGS project:

1. The Bureau must ensure that desert tortoises do not enter fenced project facilities.
2. The Bureau must ensure that the level of incidental take anticipated in this biological opinion is commensurate with the analysis contained herein.
3. The Bureau must ensure that translocation of desert tortoises does not result in injury or mortality of translocated or resident desert tortoises that is substantially elevated above natural injury and mortality rates within the action area.
4. The Bureau must ensure that desert tortoises carrying transmitters are routinely monitored to prevent loss of these animals prior to the removal of transmitters.
5. The Bureau must ensure that the ISEGS facility does not serve as a subsidy to common ravens.
6. The Bureau must ensure that desert tortoises that exhibit clinical signs of disease are not translocated.
7. The Bureau must ensure the proper implementation of health assessments and disease testing to ensure the accuracy of results and to minimize the injury of desert tortoises.
8. The Bureau must ensure that translocation does not result in density-dependent effects or disease related effects to the resident or translocated populations.

Our evaluation of the proposed action includes consideration of the protective measures described 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).

TERMS AND CONDITIONS

To be exempt from the prohibitions of section 9 of the Act, the Bureau must comply with the following terms and conditions, which implement the reasonable and prudent measures described in the previous section, or make them enforceable conditions of its right-of-way grant, and must comply with the reporting and monitoring requirements. These conditions are non-discretionary.

1. The following term and condition implements reasonable and prudent measure 1:

The Bureau must ensure that BrightSource monitors the integrity of all desert tortoise exclusion fencing at least once a month and following any rain events that result in surface flow of water in washes within the action area. The Bureau must ensure that BrightSource promptly repairs any damage identified during monitoring.

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

- a. To ensure that the measures proposed by the Bureau and BrightSource are effective and are being properly implemented, the Bureau 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 Service and the Bureau must review the circumstances surrounding the incident to determine whether additional protective measures are required. Project activities may continue pending the outcome of the review, provided that the proposed protective measures and any appropriate terms and conditions of this biological opinion have been and continue to be fully implemented.
- b. If more than 38 subadult or adult desert tortoises are identified for translocation during clearance surveys of the project site, the Bureau must re-initiate consultation, pursuant to the implementing regulations for section 7(a)(2) of the Endangered Species Act at 50 Code of Federal Regulations 402.16, on the proposed action. This condition only applies to clearance of the project site for construction and does not apply to the short distance movement of desert tortoises out of harm's way during activities that occur outside of the fenced project site. Because we do not expect that capturing and removing desert tortoises from work areas outside of the project site is likely to result in injury or mortality of desert tortoises, we are not establishing a re-initiation criterion for that activity.
- c. If 9 desert tortoises are killed or injured as a result of any construction, operation, maintenance, decommissioning, or restoration activities covered by this biological opinion over the life of the ISEGS project, the Bureau must re-initiate consultation, pursuant to the implementing regulations for section 7(a)(2) of the Endangered Species Act at 50 Code of Federal Regulations 402.16, on the proposed action. This term and condition also applies to direct mortality and injury of desert tortoises during translocation and post-translocation monitoring on the resident, control, and translocated populations (i.e., due to handling, road kills, or other effects caused by personnel working on the project). However, it does not apply to post-translocation mortality within these populations that is not connected directly to an action required to carry out the translocation and monitoring effort.
- d. If 3 desert tortoises are killed or injured in any 1 year as a result of any construction, operation, maintenance, decommissioning, or restoration activities covered by this biological opinion, the Bureau must re-initiate consultation, pursuant to the implementing

regulations for section 7(a)(2) of the Endangered Species Act at 50 Code of Federal Regulations 402.16, on the proposed action. This term and condition also applies to direct mortality and injury of desert tortoises during translocation and post-translocation monitoring on the resident, control, and translocated populations (i.e., due to handling, road kills caused by personnel working on the project). However, it does not apply to post-translocation mortality within these populations that is not connected directly to an action required to carry out the translocation and monitoring effort.

3. The following term and condition implements reasonable and prudent measure 3:

If monitoring of translocated and resident desert tortoises indicates a statistically significant elevation in mortality rates above that observed in control populations, the Bureau must re-initiate consultation, pursuant to the implementing regulations for section 7(a)(2) of the Endangered Species Act at 50 Code of Federal Regulations 402.16, on the proposed action.

4. The following terms and conditions implement reasonable and prudent measure 4:

- a. The Bureau must ensure that BrightSource monitors all translocated desert tortoises according to the following schedule: 1) within 24 hours of release, 2) twice weekly for the first 2 weeks after release, 3) starting the third week after release, at least once a week from March 1 to October 31 and once every other week from November 1 to February 28.
- b. The Bureau must ensure that BrightSource monitors all desert tortoises that carry transmitters in the resident and control populations at least once a week from March 1 to October 31 and once every other week from November 1 to February 28.

5. The following term and condition implements reasonable and prudent measure 5:

The Bureau must meet with the Service to review data and reports associated with BrightSource's monitoring and adaptive management program for common ravens prior to the cessation of these activities. If the agencies determine that further monitoring and adaptive management are warranted, the Bureau must require BrightSource to extend these activities.

6. The following term and condition implements reasonable and prudent measure 6:

After performance of visual health assessments on project-site desert tortoises, the Bureau must ensure that BrightSource contacts the Service with the results of the health assessments and the proposed disposition of each individual. The Bureau must ensure that BrightSource receives authorization for translocation of these individuals from the Service prior to commencement of translocation.

7. The following term and condition implements reasonable and prudent measure 7:

The Bureau must ensure that all individuals that will perform visual health assessments and blood collection have been specifically authorized or trained for that activity by the Service. The Service must receive the credentials for all individuals seeking approval at least 30 days prior to the need for visual health assessments and blood collection.

8. The following terms and conditions implement reasonable and prudent measure 8:

- a. If pre-translocation surveys of the translocation area indicate that it cannot accommodate all desert tortoises from the ISEGS project under the threshold established in the description of the proposed action, the Bureau must re-initiate consultation, pursuant to the implementing regulations for section 7(a)(2) of the Endangered Species Act at 50 Code of Federal Regulations 402.16 to address modifications to the translocation plan.
- b. If pre-translocation surveys of the translocation areas indicate a disease prevalence of more than 5 percent or indicates that additional translocation areas will be required to accommodate the disease buffering requirements identified in the description of the proposed action, the Bureau must re-initiate consultation, pursuant to the implementing regulations for section 7(a)(2) of the Endangered Species Act at 50 Code of Federal Regulations 402.16 to address modifications to the translocation plan.
- c. The Bureau must ensure that BrightSource performs disease sampling of all areas that desert tortoises may move to following translocation as described in the Environmental Baseline section of this biological opinion (i.e., area bounded by Interstate 15, the Clark Mountains, Ivanpah Lake, and Primm, Nevada), as opposed to the 6 kilometer buffer identified in the project description.

Because of the complex nature of this incidental take statement, we have attached a summary of the levels of incidental take that would necessitate re-initiation of formal consultation.

REPORTING REQUIREMENTS

Within 60 days of the completion of the proposed action, the Bureau must provide a report to the Service that provides details on the effects of the action on the desert tortoise. The Bureau must also provide an annual report by December 31 of each year during construction of each phase and during the subsequent translocation monitoring. Specifically, these reports must include information on the effectiveness and practicality of minimization measures, any instances when desert tortoises were killed, injured, or handled; the circumstances of such incidents and the specific information for each animal; and any actions undertaken to prevent similar instances from re-occurring. In addition, these reports should provide detailed information on the results of translocation monitoring to include the following: 1) location of all desert tortoises carrying transmitters, 2) mortality rate from each population, 3) statistical analysis of mortality rate between all three populations, and 4) health status and body condition of all desert tortoises that

carry transmitters. These reports should also provide an estimate of the actual acreage disturbed by various aspects of the construction and operation up to the time of the report. 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.

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.

1. We recommend that the Bureau work with BrightSource and the Service to determine if the desert tortoises associated with the resident, control, and translocated populations can be used to answer additional research questions related to translocation or desert tortoise biology.
2. We recommend that the Bureau amend the California Desert Conservation Area Plan to prohibit large-scale development (e.g., solar energy facilities, wind development, etc.) within the area bounded by Interstate 15, the State line, and Clark Mountains. We offer this recommendation because this area will have been used as a recipient site for translocated desert tortoises from the ISEGS project. Additionally, three other projects, the Joint Port of Entry, DesertXpress, and a pipeline extension from the Kern River Gas Transmission Company's line may be built in this valley. Given these activities, the potential exists that this portion of the Ivanpah Valley may be disturbed and fragmented to the extent that desert tortoises and other wildlife populations may be severely compromised.
3. We recommend that the Bureau perform additional wild burro gathers in the former Clark Mountain Herd Management Area to remove remaining burros that may adversely affect habitat within translocation areas.
4. Based upon our review, certain aspects of the weed management plan may result in an inefficient use of resources. We recommend that the Bureau and BrightSource work with the Mojave Resource Conservation District to develop a site-specific weed management plan that would be effective and efficient.

5. We recommend that the Bureau consider alternative configurations for this project that would focus ground disturbance on lands next to Interstate 15 that are likely to have very low desert tortoise densities.

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.

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, location of the carcass, a photograph, cause of death, if known, and any other pertinent information.

We will advise you on the appropriate means of disposing of the carcass when you contact us. We may advise you to provide it to a laboratory for analysis. Until we provide information on the disposition of the carcass, you must handle it such that the biological material is preserved in the best possible state for later analysis. If possible, the carcass should be kept on ice or refrigerated (not frozen) until we provide further direction.

Injured desert tortoises must be taken to a qualified veterinarian for treatment. If any injured desert tortoises survive, the Service must be contacted regarding their final disposition.

REINITIATION NOTICE

This concludes formal consultation on the Bureau's proposal to issue a right-of-way grant to BrightSource Energy for construction of the ISEGS facility in San Bernardino County, California. Reinitiation of formal consultation is required where discretionary federal involvement or control over the action has been retained or is authorized by law and: (a) if the amount or extent of taking specified in the incidental take statement is exceeded; (b) 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; (c) 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 (d) 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).

If you have any questions regarding this biological opinion, please contact Brian Croft of my staff at (951) 697-5365.

Attachment

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Summary of Levels of Take that Necessitate Re-initiation of Formal Consultation

The following table summarizes the incidental take that we anticipate for the ISEGS project and identifies re-initiation thresholds for capture, harassment, injury, and mortality as defined in the body of the incidental take statement or in the terms and conditions of this biological opinion.

Source of Take	Age Class	Anticipated Take		Re-initiation Thresholds based on Incidental Take Statement or Terms and Conditions	
		Captured and/or Harassed	Killed or Injured	Captured and/or Harassed ₁	Killed or Injured
Translocation and Disease Testing of Project Site Desert Tortoises	Subadult/Adult	~32	few, if any	38 ₂	9 desert tortoises over the life of the project or 3 in any given year ₅
	Juveniles	few, if any	few, if any	35 ₂	
	Eggs	few, if any	few, if any	139 ₂	
Movement of desert tortoises off of the fiber-optic line and Interstate 15 fence alignment	Subadult/Adult	few, if any	few, if any	None established ₃	
	Juveniles	few, if any	few, if any	None established ₃	
	Eggs	few, if any	few, if any	NA	
Survey and Disease Testing of Control and Resident Population	Subadult/Adult	130 ₄	few, if any	130	
	Juveniles	0	0	NA	
	Eggs	0	0	NA	
Construction of ISEGS Facility	Subadult/Adult	few, if any	few, if any ₆	38 ₂	
	Juveniles	few, if any	Most ₆	35 ₂	
	Eggs	few, if any	Most ₆	13 ₂	
Operation and Maintenance	Subadult/Adult	few, if any	few, if any	None established ₇	
	Juveniles	few, if any	few, if any	None established ₇	
	Eggs	few, if any	few, if any	None established ₇	
Post-translocation Monitoring	Subadult/Adult	96 ₈	few, if any	None established ₃	
	Juveniles	0	0	NA	
	Eggs	0	0	NA	
Effects of Translocation itself on Residents and Translocated desert tortoises	NA	NA	NA	NA	A statistically significant difference in mortality between the control and resident or translocated populations ₁₀
	NA	NA	NA	NA	
	NA	NA	NA	NA	
Decommissioning	Subadult/Adult	few, if any	few, if any	None established ₂	9 desert tortoises over the life of the project or 3 in any given year ₅
	Juveniles	few, if any	few, if any	None established ₂	
	Eggs	few, if any	few, if any	NA	

Table Notes:

1. By 'capture,' we mean the act, by authorized biologists (and monitors working under their supervision), of removing desert tortoises from their home ranges to be placed in a quarantine facility, translocated, or moved a short distance from harm's way. By 'harassment,' we mean the act, by authorized biologists, of collecting blood or conducting other invasive health assessments that may result in the likelihood of injury or mortality; see the regulatory definition of harassment in the Incidental Take Statement section of this biological opinion.
2. The re-initiation thresholds identified are the totals for both sources of take and do not represent separate take thresholds for each activity. For example, although we anticipate that 32 subadult and adult desert tortoises are likely to be captured for translocation at the project site, we have established a re-initiation trigger of 38 because we have determined this is the maximum number of subadult and adult desert tortoises that the recipient site is likely to be able to hold. If 38 or more subadult and adult desert tortoises are found onsite, re-initiation of formal consultation would be warranted.
3. No re-initiation trigger is set because this movement not likely to result in injury or mortality, given that these animals will remain within their home ranges. Also, a very small number of desert tortoises may need to be moved more than once to remove them from unfenced work areas and constraining the number of times the animal can be captured and moved would reduce the effectiveness of biological monitoring as a take minimization measure on these actions.
4. The 130 subadults and adults include 98 resident individuals and 32 control individuals.
5. Does not apply to post-translocation mortality that is not directly associated with an action required to carry out the translocation (e.g., handling, disease testing, accessing the translocation areas by vehicle, etc.).
6. We anticipate that any desert tortoises and eggs that are not translocated will be killed or injured by construction. We anticipate that few, if any, subadults and adults will be killed or injured because most will have been translocated. Because of their small size, juveniles and eggs are difficult to detect, so we anticipate that most will be killed or injured.
7. No re-initiation trigger because we only anticipate the capture of desert tortoises during operation and maintenance in instances where desert tortoise exclusion fencing has been washed out. In such rare situation, the biologically preferable option is to move the desert tortoises out of harm's way rather than leave them in place and in danger, while awaiting re-initiation of consultation.
8. Includes all control and translocated individuals identified above for capture and harassment associated with disease testing and translocation and a subset (32 individuals) of the resident population identified above. These individuals would be captured multiple times over the course of the post-translocation monitoring period, but we do not anticipate that these individuals would suffer harassment.
9. No re-initiation threshold set because multiple captures of the same individuals will be required to facilitate post-translocation monitoring.
10. For post-translocation monitoring only.