United States Department of the Interior

FISH AND WILDLIFE SERVICE
Nevada Fish and Wildlife Office
4701 North Torrey Pines Drive
Las Vegas, Nevada 89130
Ph: (702) 515-5230 ~ Fax: (702) 515-5231

September 16, 2010
File No. 84320-2010-F-0208

Memorandum

To: Field Manager, Pahrump Field Office, Bureau of Land Management, Las Vegas, Nevada

From: State Supervisor, Nevada Fish and Wildlife Office, Reno, Nevada

Subject: Formal Consultation for the Silver State Solar Project (NextLight Renewable Power, LLC), Clark County, Nevada

This transmits the Fish and Wildlife Service's (Service) biological opinion in response to your memorandum received February 23, 2010, requesting initiation of formal consultation for the Silver State Solar Project. The Bureau of Land Management (BLM) determined that the proposed issuance of a right-of-way for the subject project may adversely affect the desert tortoise (*Gopherus agassizii*) (Mojave population), a species listed as threatened under the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*).

The attached Biological Opinion is based on information provided in your memorandum dated February 23, 2010; the January 2010 Draft Plan of Development for the project; the April 2010 Draft Environmental Impact Statement for the project; the July 2010 Translocation Plan; discussions between the Service and BLM; and our files. A complete project file of this consultation is available in the Service's Nevada Fish and Wildlife Office in Las Vegas.

If you require additional assistance, please contact Brian A. Novosak or Michael Burroughs in the Nevada Fish and Wildlife Office in Las Vegas at (702) 515-5230. Please reference Service File No. 84320-2010-F-0208 in future correspondence concerning this consultation.

Robert D. Williams

Attachment

cc:
Chief, U.S. Army Corps of Engineers, St. George Regulatory Office, St. George, Utah
Supervisory Biologist – Habitat, Nevada Department of Wildlife, Las Vegas, Nevada

TAKE PRIDE IN AMERICA

ATTACHMENT

BIOLOGICAL OPINION
File No. 84320-2010-F-0208

A. CONSULTATION HISTORY

September 2008: The Fish and Wildlife Service (Service) recommended desert tortoise (*Gopherus agassizii*) (Mojave population) pre-project survey methodology for the project based on previous discussions regarding the project acreage, transect configuration, and survey effort.

June 30, 2009: The Bureau of Land Management (BLM) published the Notice of Intent (NOI) to prepare an Environmental Impact Statement (EIS) in the Federal Register for the NextLight Renewable Power, LLC (NextLight), Silver State North Solar Project and Silver State Solar Project, Primm, Nevada.

August 3, 2009: The Service sent scoping comments via memorandum on the proposed Silver State North and South Solar Projects in response to the NOI (Service File No. 84320-2009-FA-0121).

December 18, 2009: NextLight and their consultant, CH2MHILL, met with BLM and the Service to discuss BLM's December 4, 2009, comments on the draft Biological Assessment (BA). At the meeting, BLM and the Service stated that the Service's Desert Tortoise Recovery Office (DTRO) was preparing guidance for the project proponents to use when developing desert tortoise relocation/translocation plans and that the guidance was anticipated to be available in early January 2010. BLM provided NextLight with a preliminary summary document that outlined the types of measures the guidance would likely include.

February 8, 2010: NextLight and their consultant, CH2MHILL, met with BLM and the Service to discuss BLM's December 18, 2009, comments on the draft BA. At the meeting, BLM and the Service stated that BLM will provide NextLight with the draft DTRO guidance for developing a Desert Tortoise relocation/translocation plan.

February 23, 2010: The Service received a letter from BLM, dated February 23, 2010, requesting initiation of formal consultation and determined that the information provided in the BA was sufficient to initiate formal consultation on that date.

April 19, 2010: The Service received a copy of the draft EIS and responded with comments to BLM's Las Vegas Field Office on June 1, 2010 (Service File No. 84320-2009-FA-0121).

April 28, 2010:	Solar manufacturer First Solar purchased NextLight Renewable Power, LLC.
June 15, 2010:	The Service extended the consultation period 60 days to September 6, 2010, due to additional review by the Department of Interior - Office of the Solicitor for renewable energy projects.
June 25, 2010:	The Service received a copy of a report titled "Desert tortoise surveys on the proposed NextLight Silver State Solar Project sites: Phase 1 construction site, proposed relocation site, and proposed translocation site, Clark County, Nevada (NVN-085077/NVN-085801)" from NextLight that documents results from a supplemental survey for desert tortoises conducted in May 2010.
July 15, 2010:	The Service received a copy of the Desert Tortoise Relocation/ Translocation Plan from NextLight which was then updated on July 30, 2010.
July 30, 2010:	The Service provided a draft biological opinion to BLM, Nevada Department of Wildlife, U.S. Army Corps of Engineers, and U.S. Department of Interior – Office of the Solicitor for review and comments.

B. DESCRIPTION OF THE PROPOSED ACTION

1. Summary

BLM proposes to grant a right-of-way (ROW) for the Silver State Solar Project (project). NextLight proposes to construct and operate the project, which would be located in the Ivanpah Valley approximately 40 miles south of Las Vegas and 2 miles due east of Primm, Nevada in unincorporated Clark County on lands administered by BLM (Figure 1.1-1 in the BA [BLM 2010b]). Although purchased by First Solar, we refer to the Applicant as NextLight based on information contained in the BA submitted by BLM (BLM 2010b). Other jurisdictional Federal agencies may include the U.S. Army Corps of Engineers (for a permit under the Clean Water Act), the U.S. Department of Treasury (partial funding provided through the American Recovery and Reinvestment Act), and the Federal Communications Commission (for operation of a two-way radio communications system). The proposed project is bounded to the east by the Lucy Gray Mountains, to the west by the NV Energy Walter M. Higgins Power Generating Station and Union Pacific Railroad, and to the southwest by the California state line. A major electric transmission line corridor is located to the north and west of the proposed project site.

The proposed project would be constructed in three phases. Phase I would consist of the construction of a 60-megawatt (MW) solar plant and associated facilities. Phase II would include construction of a 140-MW solar plant and associated facilities. Phase III would construct the

remaining solar panels to produce 200 MW and infrastructure to complete the project. If BLM approves the ROW grant by late 2010, initial delivery of power is scheduled for mid-2011 (April-July).

The project ROW applications comprise a total of 7,925 acres in desert tortoise habitat; however, actual footprint for the project and related facilities would be approximately 2,966 acres (Figure 2.2-1 and Table 2-2 in the BA [BLM 2010b]). Facilities and equipment inside a fenced perimeter would include: an operation and maintenance facility, with switchyards, the solar field, transmission lines, and access ways; outside the fenced perimeter: access roads, transmission lines, stormwater control berms, and a firebreak. A detailed description of the proposed facility is available in the BA (BLM 2010b) and is hereby incorporated by reference.

2. Construction

Construction of the project would take place from the fourth quarter of 2010 to the fourth quarter of 2014. Construction would include the major phases of mobilization, construction grading and site preparation, installation of drainage and erosion controls, photovoltaic (PV) panel assembly, and solar field construction. The project would be constructed sequentially in distinct phases and interconnected to each electric utility separately based on the scheduled availability of the transmission interconnections.

Initial grading work would use track-driven excavators, graders, dump trucks, and end loaders, in addition to the support pickups, water trucks, and cranes. It is anticipated that approximately 20 pieces of this type of large equipment would be onsite for the first year of construction for grading.

As the project moves into the next stages of civil work, additional equipment for foundations and road construction would be brought in, including paving machines, trenching machines, concrete mixers and pumps, additional excavators for foundation drilling, tractors, and additional support vehicles.

Within each area of construction, NextLight would till and compact the soil, removing all vegetation, prior to construction.

The onsite construction workforce is expected to be approximately 230 to 400 and could increase traffic volume by a maximum of 812 vehicle trips per day depending on the rate of construction. Construction would generally occur between 7 a.m. and 7 p.m., Monday through Friday. Further, construction requirements would require some night-time activity for installation, service or electrical connection of PV panels while no sunlight is present.

a. Roads

Access to the project site would be constructed on the alignment of an existing unpaved and unnamed road from the Interstate 15 frontage road to the project site; however, if this road is not improved by Clark County, an alternative access road would need to be constructed. Alternative

access road would consist of new construction to extend from Primm Boulevard to the project site while using an existing overpass on private property and BLM-administered lands. The alternative access would be a paved 0.3-mile-long by 30-feet-wide road.

A new gravel (aggregate rock) perimeter road would be located just inside the perimeter fence of the proposed site and would be constructed to allow access by maintenance and security personnel. This road would be approximately 13.4 miles long and 25 feet wide.

An 8.27-mile-long and 15-foot-wide service road would be constructed outside the perimeter fence to provide secondary access to the site. It would extend along the northern boundary of the project site where it would connect to the existing trail that provides public access to the Lucy Gray Mountains. The new road would be graded to accommodate four-wheel-drive vehicles.

b. Solar Field

The project would use crystalline silicon or thin film PV technology mounted on either single-axis trackers or fixed-tilt structures. The construction of the solar field would proceed in 1-MW blocks. Each block would be approximately 700 feet by 400 feet and would contain solar panels, an inverter, and step-up transformer. Support foundations for PV structures would be composed of galvanized steel piers driven to a depth of 8 to 12 feet. The solar field and support facilities perimeter would be secured with chain link metal-fabric security fencing. Controlled access gates would be located at the site entrance. Access gates would also be located at specific locations along the perimeter road to allow maintenance and security crew access to all portions of the project site.

c. Perimeter Fence

The solar field and support facilities perimeter would be secured with permanent chain link metal-fabric security fencing. The perimeter fence would be an 8-foot-high chain-link fence with barbed-wire security strands at the top. Desert tortoise-proof fencing would be installed against the lower 2 feet of the chain link fence and would extend an additional 1 foot below the ground. Desert tortoise fencing below ground would be angled outward, away from the solar collector field, to discourage burrowing.

d. Stormwater Control Berms

Four existing natural washes that traverse the project site would be reinforced with five berms made of compacted soil and lined with aggregate rock. Each berm would be constructed outside the perimeter fence. The berms would be constructed to a height of 3 to 5 feet above grade with a top width of approximately 15 feet. Phase 1 would not require drainage control facilities because the area is level and is not susceptible to erosion; however, Phase 2 and Phase 3 require drainage control berms. Following completion of the drainage structures, areas disturbed during construction would be restored in accordance with an approved restoration plan. The drainage control berms would occupy approximately 17.7 acres. Construction is anticipated to disturb an additional 11 acres. Table 2-2 in the BA (BLM 2010b) presents the detailed acreage associated with each berm.

e. Fire Break

A 20-foot-wide by 13.65-mile-long firebreak would be established outside the fenced perimeter around the entire project. Construction of the firebreak would require removal of shrubs and bushes. It is anticipated that the firebreak would be scraped with a grader or disc periodically to reduce vegetation. A firebreak would not be established along the stormwater flow corridors.

f. Transmission Lines

Two types of overhead transmission line poles would be erected – steel, 220 kilovolt (kV)/230kV monopoles for interconnection of the high voltage electrical system and wooden, 34.5kV monopoles for collection of the medium voltage electrical system. There would be 2.62 miles of 220kV transmission line within the fenced perimeter and 0.30 miles outside the perimeter. The length of the 34.5kV collector lines would be variable within the fenced perimeter, but would be 0.8 miles in length outside the perimeter. Standard transmission line construction techniques would be used to construct the 220kV/230kV transmission lines and the 34.5kV collector lines including: foundation installation, pole installation, and conductor stringing. Foundations for each pole type would be constructed. The 220kV/230kV monopoles would have a foundation excavated to 12 to 30 feet in depth and 4 to 7 feet in diameter depending on the local soil conditions and the purpose of the poles (end and angle structures required deeper foundations). These foundations would be reinforced rebar foundations and backfilled with concrete. The 34.5kV poles would be directly embedded to 10 percent of the pole height plus 2 feet, typically 8 feet deep. A ground rod of 8 to 12 feet would be hammered into the ground adjacent to the wood pole. Stringing areas would be established and the location of each pole would be surveyed and staked. A total of 22 steel poles would be installed with 800-foot spacing between poles and 192 wood poles would be installed with 150-foot spacing between poles.

g. Groundwater

Water would be supplied by on-site wells under a long-term contract from the Las Vegas Valley Water District. Peak use would be during construction for dust suppression. Up to 600 acre-feet would be used for construction, with no more than 200 acre-feet a year for 4 years. Water requirements for operations and maintenance would be 21 acre-feet per year for 30 years. Impervious areas of the proposed project would only cover 0.05 percent of the Ivanpah Valley groundwater basin, most of which is undeveloped.

3. Operation and Maintenance (O&M)

The operation and maintenance of the solar PV plant would require up to 15 full-time personnel, consisting of plant operators, maintenance technicians, and site security. Staff would be present on-site 24-hours per day. Periodic, routine maintenance would include monthly, quarterly, semi-annual and annual inspections and service. The PV module replacement rates are anticipated to be less than 0.5 percent per year, on average.

The O&M would require the use of vehicles and equipment including trucks for on-site welding, refueling, lubricating, panel washing, and crane trucks for minor equipment maintenance.

Additional maintenance equipment would include forklifts, manlifts, and chemical application equipment for weed abatement and soil stabilizer treatment in the restoration area. Flatbed trucks, dump trucks, and pick-up trucks would be in daily use on the site.

At designated intervals, approximately every 10 to 15 years, major equipment maintenance would be performed. On occasion, large heavy-haul transport equipment, including overhead cranes, would be brought on-site. No heavy equipment would be used during normal plant operation.

Hazardous Waste

NextLight would prepare a Waste Management Plan that would describe the storage, transportation, and handling of wastes, would emphasize the recycling of wastes where possible, and would identify the specific landfills that would receive construction wastes that cannot be recycled. A spill prevention and control plan would be developed in accordance with Federal regulations to protect the environment from spills of petroleum products. Typical wastes generated during construction are identified in the Table 2-6 of the Plan of Development (POD) (BLM 2010a).

In the POD (BLM 2010a), NextLight is proposing to use isoproplyamine salt of glyphosphate (i.e., *Roundup*) and will coordinate weed control activities with the BLM Weed Coordinator, particularly regarding proposed herbicide treatments. The project proponent will prepare, submit, obtain and maintain an herbicide use proposal for the proposed action.

4. Decommissioning and Restoration

The project facilities have an expected life of 50 years or more. NextLight would develop a Site Rehabilitation Plan for the revegetation and rehabilitation of areas disturbed by the project. This plan would be implemented immediately after construction for the areas that are temporarily disturbed, such as portions of the transmission line route.

A Facility Decommissioning Plan would be developed at least 6 months prior to commencement of site closure activities. The Facility Decommissioning Plan would be developed in coordination with BLM, with input from other agencies as appropriate. The Facility Decommissioning Plan would depend on the expected future use of the site, but would address removal of hazardous materials, impacts and mitigation associated with closure activities, schedule of closure activities, equipment to remain on the site, and conformance of the plan with applicable regulatory requirements and resource plans.

5. Proposed Avoidance and Minimization Measures

a. General Protective Measures

The BLM proposes to minimize the effects of the project on the desert tortoise and its habitat by ensuring several categories of measures are implemented: reducing speed limits; conducting worker awareness training; conducting clearance, relocation/translocation, and monitoring of desert tortoise activity within the project area by an authorized biologist; constructing temporary and permanent desert tortoise exclusion fencing; implementing a litter-control program; implementing noxious weed control; minimizing habitat disturbance; and will collect fees from the applicant to offset desert tortoise habitat loss. A complete list of proposed measures can be found in the BA submitted by BLM (BLM 2010b) and is hereby incorporated by reference.

Small petroleum spills from the operation of heavy equipment and filling of transformer and hydraulic equipment reservoirs would be cleaned up when they occur and the resultant waste material properly disposed in accordance with Federal and State regulations.

b. Remuneration Fees

Prior to surface-disturbing activities associated with the proposed project, BLM would collect remuneration fees for compensation of desert tortoise habitat loss following the guidance in BLM's August 17, 2010, instruction memorandum (NV- 2010-062). BLM estimates that 2,966 acres of habitat would be disturbed. Total fees for disturbance of desert tortoise habitat within the material site and expansion area would be $2,295,684 ($774/acre x 2,966 acres) (Hastey *et al.* 1991). These funds would be used for management actions expected to provide a benefit to the desert tortoise over time. Actions may involve habitat acquisition, population or habitat enhancement, increasing knowledge of the species' biological requirements, reducing loss of individual animals, documenting the species current status and trend, and preserving distinct population attributes (Hastey *et al.* 1991).

c. Relocation/Translocation

Prior to construction, clearance surveys and translocations would be conducted for desert tortoise on each construction area in accordance with current Service protocols (Service 2009a, 2010b, 2010c) and an approved desert tortoise relocation/translocation plan (NextLight 2010b). The Service currently refers to all movement of desert tortoises as translocations regardless of the distance. Consequently, in this biological opinion, the Service uses the term translocation exclusively.

There are 11 basic necessary action steps for translocations presented in chronological order in the following. Details are available in the "Translocation of Desert Tortoises (Mojave Population) from Project Sites: Plan Development Guidance " (hereinafter referred to as Translocation Guidance; Service 2010c) and "Translocation of Desert Tortoises (Mojave Population) from Project Sites: A Technical Paper (Draft)" (hereinafter referred to as the Technical Paper; Service 2010b).

1. Determine need for translocation of desert tortoises.

2. Estimate the number of desert tortoises that will be affected at the project site.

3. Identify potential recipient (translocation) and control sites for projects.

4. Estimate desert tortoise densities at agreed-upon recipient and control sites.

5. Develop the translocation plan.

6. Confirm densities at the recipient and control sites while *in situ* health assessment sampling is conducted.

7. Prepare the project site for translocation of desert tortoises and decisions regarding interim holding/monitoring arrangements.

8. Construct project fencing, conduct protocol clearance surveys of the project site, and perform complete health assessments.

9. Concurrence with results of complete health assessments and disposition plans, and translocation of desert tortoises following results of disease testing.

10. Implement post-translocation monitoring and adaptive management.

11. Compile and synthesize data throughout duration of translocation.

From September 2008 to June 2010 as part of the consultation process prior to issuance of this biological opinion, NextLight worked with BLM and the Service to complete steps 1 through 5, and portions of steps 6 and 7 – all translocation planning not resulting in any effects to the desert tortoise. As noted below, the remaining portions of 6 and 7, as well as steps 8 through 11 are intended to be conducted subsequent to the issuance of and in accordance with this biological opinion.

<u>Step 6: Confirm densities at the recipient and control sites while *in situ* health assessment sampling is conducted.</u>

The resident desert tortoise populations at the initial recipient site have been surveyed to estimate density (NextLight 2010a), while the densities at the subsequent recipient area and the control areas have been estimated using historic surveys. Prior to translocation, population surveys and health assessments would be conducted at the subsequent recipient area and the control areas. On site (*in situ*) health assessments would include a physical inspection (*i.e.*, notation of clinical signs of acute disease infection; evidence of emaciation or dehydration; palpation for bladder stones; body mass and carapace measurements). Complete health assessments for desert tortoises that would receive

animals from greater than 500 meters (m) would include disease testing via blood samples.

Step 7: Prepare the project site for translocation of desert tortoise and decisions regarding interim holding/monitoring arrangements.

Desert tortoises located during protocol clearance surveys of the project site may be transferred to an off-site quarantine facility (*ex situ*) or monitored on the project site via telemetry. If *ex situ* monitoring is selected, the off-site facility would be constructed and operated according to the Translocation Guidance (Service 2010c). Transmitters and unique identifiers would be affixed to each desert tortoise following Service protocols (Service 2009a). If *in situ* monitoring is chosen, telemetry monitoring would be conducted a minimum of once per month.

Step 8: Construct project fencing, conduct protocol clearance surveys of the project site, and perform complete health assessments.

The boundaries of each construction area would be marked and temporary fencing would be erected around the perimeter to prevent vehicles or personnel from straying onto adjacent offsite habitat. Temporary fencing during construction would consist of: 1) portable stand-alone chain-link fence modules or plastic snow fencing supported by standard metal fencepost, and 2) desert tortoise fencing in compliance with the "Recommended Specifications for Desert Tortoise Exclusion Fencing" (Service 2009a).

Within 24 hours prior to the initiation of construction of the desert tortoise-exclusion fence, two complete desert tortoise clearance surveys (Service 2009a) of the proposed perimeter fence-line and associated disturbance ROW would be conducted. During these surveys, an authorized biologist would inspect all burrows to determine occupancy (including eggs) and collapse all unoccupied burrows. For occupied burrows, all desert tortoises would be removed by an authorized biologist and placed in a sheltered location outside of the project areas. Any desert tortoise eggs found would be relocated offsite in accordance with approved protocol (Service 2009a).

Following construction of the desert tortoise exclusion perimeter fence, a clearance survey of the enclosed area would be conducted. Authorized desert tortoise biologists would conduct at least three complete sweeps of the project site using transects no wider than 30 feet. Surveyors would conduct transects for each sweep in different directions to allow for opposing angles of observation. The site would be considered cleared after two complete passes have discovered no new desert tortoises. Authorized desert tortoise biologists would excavate all potential desert tortoise burrows by hand to confirm occupancy status. Data would be collected on all desert tortoises handled and all individuals would be examined for clinical signs of disease. Health assessments would include a physical inspection (*i.e.*, notation of clinical signs of acute disease infection, body mass, and carapace measurements). For desert tortoises that would be moved greater than 500 meters (m), complete health assessments would include disease testing

via blood samples. Any desert tortoise eggs found would be relocated offsite in accordance with approved protocol (Service 2009a).

Step 9: Concurrence with results of complete health assessments and disposition plans, and translocation of desert tortoise following results of disease testing.

After receiving concurrence with the results of complete health assessments from the Nevada Department of Wildlife and the Service, an authorized desert tortoise biologist would move all desert tortoises found during clearance surveys to pre-selected locations outside the fenced perimeter in accordance with Service-approved guidance (Service 2009a). Desert tortoises that are determined to be infectious or unhealthy would not be eligible for translocation and would be removed from the project site and taken to the Desert Tortoise Conservation Center.

Desert tortoises located during Phase I of the proposed project would be translocated to the east of the project site. Desert tortoises found during Phases II and III of the proposed project would be translocated to multiple release points within a subsequent recipient area located in desert tortoise critical habitat and a BLM-designated Area of Critical Environmental Concern (ACEC). Translocations would not be permitted in summer (June to August) or winter (November to February). Prior to translocations in the ACEC, the sites would be temporarily fenced to restrict desert tortoise movements. The temporary fence would be removed by the project proponent; the timing of which would be specified by the Service.

A record of all desert tortoises encountered and translocated during project surveys and monitoring would be maintained. The record would 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; if moved, the location from which it was captured and the location in which it was released; whether desert tortoises voided their bladders; and diagnostic markings (i.e., identification numbers).

Steps 10 and 11: Implement post-translocation monitoring and adaptive management; compile and synthesize data throughout duration of translocation.

For monitoring purposes, all translocated desert tortoises, an equal number of desert tortoises within the recipient sites, and an equal number of desert tortoises at the control sites would be assigned a unique identifier (provided by the Service) and be fitted with a transmitter by qualified personnel.

All project-related desert tortoises would be monitored for a period of 5 years following the initial release. During monitoring, information body mass, carapace length, and body condition would be collected and health assessments would be conducted. Any health problems observed (*e.g.*, rapid declines in body condition, perceived outbreaks of disease, mortality events) would be reported to the Service so appropriate actions can be taken in a timely manner. Mortalities would be investigated thoroughly. Information on health

concerns and mortalities would be provided to the Service within 48 hours. Fresh carcasses would be submitted for necropsy and the cost covered by the proponent. If monitoring shows a higher-than-background mortality rate among the desert tortoises moved from the project site, the data would be reviewed and used to develop a remedial action plan prior to further phased translocation activities.

In addition to monitoring the desert tortoises, annual surveys of vegetation along transects at representative sampling locations within the recipient would be conducted to capture potential changes in forage diversity and availability.

Upon conclusion of the five-year monitoring period, health assessments would be performed on all remaining monitored desert tortoises and transmitters would remain attached until the Service has determined whether or not further action is warranted at the site. Information would be reported to the Service.

C. Analytical Framework for the Service's Determinations

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

The jeopardy analysis in this biological opinion considers the effects of the proposed Federal action, and any cumulative effects, on the rangewide survival and recovery of the desert tortoise. It 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.

Section 7(a)(2) of the Act also requires that Federal agencies ensure that any action they authorize, fund, or carry out does not result in the destruction or adverse modification of designated critical habitat. Our analysis of effects to desert tortoise designated critical habitat follows Service-issued guidance: *Application of the "Destruction of Adverse Modification" Standard under section 7(a)(2) of the Endangered Species Act* issued on December 9 2004. The guidance addresses the 9th Circuit Court of Appeals ruling in *Gifford Pinchot Task Force v U.S. Fish and Wildlife Service*, No. 03-35279 (August 6, 2004) and states that an evaluation of effects

to designated critical habitat should consider the concepts embodied in the sections 3 (definitions of "critical habitat" and "conservation"), 4 (the procedures for delineating and adjusting areas included in a designation) and 7 (the substantive standard in paragraph (a)(2) and the procedures in paragraph (b)) and focus on the function and conservation role of both the affected critical habitat unit as well as the entire designation.

D. STATUS OF THE SPECIES AND CRITICAL HABITAT RANGEWIDE

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

1. Listing History

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

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

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

2. Recovery Plan

On June 28, 1994, the Service approved the final Desert Tortoise (Mojave Population) Recovery Plan (1994 Recovery Plan) (Service 1994). The 1994 Recovery Plan divided the range of the

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

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

On November 3, 2004, the Service announced the formation of the DTRO. The DTRO is revising the 1994 Recovery Plan and coordinating with regional recovery implementation work groups to develop 5-year recovery action plans under the umbrella plan. A draft revision of the recovery plan was released to the public on August 4, 2008 (Service 2008). The Service anticipates a final recovery plan in 2010.

The draft recovery plan identifies three recovery objectives:

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

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

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

Recovery objectives and criteria generally will be measured within tortoise conservation areas or other areas identified by Recovery Implementation Teams, and they are not independent of each

other but must be evaluated collectively. Recovery does not depend on absolute numbers of tortoises or comparisons to pre-listing estimates of tortoise populations, but rather the reversal of downward population trends and elimination or reduction of threats that initiated the listing.

3. Recovery Units

a. Northeastern Mojave Recovery Unit

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

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

Using the U.S. Geological Survey habitat model (Nussear *et al.* 2009) and a 0.5 probability threshold based on the prevalence approach (Liu *et al.* 2005), the Service estimates that about one half of the Northeastern Mojave Recovery Unit contains potential desert tortoise habitat (approximately 4,853,368 acres). Although this analysis likely omits some marginal desert tortoise habitat, it explains the occurrence of 95 percent of the 938 test points used in the model. This analysis does not consider habitat loss, fragmentation, or degradation associated with human-caused impacts.

b. Eastern Mojave Recovery Unit

The 1994 Recovery Plan delineates the Eastern Mojave Recovery Unit to occur primarily in California, but also extends into Nevada in the Amargosa, Pahrump, and Piute valleys. The Ivanpah, Piute-Eldorado, and Fenner DWMAs are included in the Eastern Mojave Recovery Unit which generally overlap the Ivanpah and Piute-Eldorado CHUs in California. In the Eastern Mojave Recovery Unit, desert tortoises are often active in late summer and early autumn in addition to spring because this region receives both winter and summer rains and supports two distinct annual floras on which they can feed. Desert tortoises in the Eastern Mojave Recovery Unit occupy a variety of vegetation types and feed on summer and winter annuals, cacti, perennial grasses, and herbaceous perennials. They den singly in caliche caves, bajadas, and washes. This recovery unit is isolated from the Western Mojave Recovery Unit by the Baker Sink, a low-elevation, extremely hot and arid strip that extends from Death Valley to Bristol Dry

Lake. The Baker Sink area is generally not considered suitable for desert tortoises. Desert tortoise densities in the Eastern Mojave Recovery Unit can vary dramatically, ranging from 5 to as much as 350 adults per square mile (Service 1994).

c. Northern Colorado Recovery Unit

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

d. Eastern Colorado Recovery Unit

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

e. Western Mojave Recovery Unit

The 1994 Recovery Plan delineates the Western Mojave Recovery Unit completely in California. It is composed of the Western Mojave, Southern Mojave, and Central Mojave regions which are exceptionally heterogeneous and have broad, indistinct boundaries due to gradational transitions among sub-regions and with surrounding areas (Webb *et al*. 2009). The central Mojave is topographically and climatically transitional between the southwestern and eastern Mojave Desert. The south-central Mojave is a transitional region to the Colorado/Sonoran Desert, and the southern half of this region is similar climatically and floristically to the eastern Mojave. Many of the differences in vegetation among these regions can be explained by differences in climate (Rowlands 1995), which varies linearly across the range of the desert tortoise. The most pronounced difference between the Western Mojave and other recovery units is in timing of rainfall and the resulting vegetation. Most rainfall occurs in fall and winter and produces winter annuals, which are the primary food source of desert tortoises. Above ground activity occurs primarily in spring, associated with winter annual production. Thus, desert tortoises are adapted to a regime of winter rains and rare summer storms. Here, desert tortoises occur primarily in valleys, on alluvial fans, bajadas, and rolling hills in saltbush, creosote bush, and scrub steppe communities. Desert tortoises dig deep burrows (usually located under shrubs on bajadas) for winter hibernation and summer aestivation. These desert tortoises generally den singly.

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

f. Upper Virgin River Recovery Unit

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

4. Species Account

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

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

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

Desert tortoises are most commonly found within the desert scrub vegetation type, primarily in creosote bush scrub. In addition, they occur in succulent scrub, cheesebush scrub, blackbrush scrub, hopsage scrub, shadscale scrub, microphyll woodland, Mojave saltbush-allscale scrub and

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

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

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

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

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

The U.S. Geological Survey modeled desert tortoise habitat across the range of the desert tortoise (Nussear *et al.* 2009). This model, which is based on 3,753 desert tortoise locations, uses 16 environmental variables, such as precipitation, geology, vegetation, and slope. In addition, Nussear *et al.* used 938 additional occurrence locations to test the model's accuracy. Using this model and a 0.5 probability threshold based on the prevalence approach (Liu *et al.* 2005), the Service estimates that there are approximately 20,542,646 acres of potential desert tortoise habitat rangewide. This analysis likely omits some marginal desert tortoise habitat, and it does not consider habitat loss, fragmentation, or degradation associated with human-caused impacts; however, it provides a reference point relative to the amount of desert tortoise habitat.

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

5. Reproduction

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

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

The average clutch size is 4.5 eggs (range 1 to 8; on rare occasions, clutches can contain up to 15 eggs), with 0-3 clutches deposited per year (Turner *et al*. 1986). Clutch size and number probably depend on female size, water, and annual productivity of forage plants in the current and previous year (Turner *et a*l. 1984, 1986; Henen 1997). The eggs typically hatch from late August through early October. The ability to alter reproductive output in response to resource

availability may allow individuals more options to ensure higher lifetime reproductive success. The interaction of longevity, late maturation, and relatively low annual reproductive output causes desert tortoise populations to recover slowly from natural or anthropogenic decreases in density. To ensure stability or increased populations, these factors also require relatively high juvenile survivorship (75 to 98 percent per year), particularly when adult mortality is elevated (Congdon *et al.* 1993). Bjurlin and Bissonette (2004) determined that 74 percent of desert tortoise nests survived and, over 2 years, 84 and 91 percent of the neonates survived the initial period of post-hatching dispersal. They predicted that 40 percent of eggs produce hatchlings that survive to hibernation at their study site. Desert tortoises generally lay eggs from mid-May to early July, but occasionally as late as October (Ernst *et al.* 1994). Eggs are laid in sandy or friable soil, often at the entrance to burrows. Hatching occurs 90 to 120 days later, mostly in late summer and fall (mid-August to October). Eggs and young are untended by the parents. Desert tortoise sex determination is environmentally controlled during incubation (Spotila *et al*. 1994). Hatchlings develop into females when the incubation (*i.e.*, soil) temperature is greater than 88.7° F and males when the temperature is below that (Spotila *et al*. 1994). Mortality is higher when incubation temperatures are greater than 95.5° F or less than 78.8° F. The sensitivity of embryonic desert tortoises to incubation temperature may make populations vulnerable to unusual changes in soil temperature (e.g., from changes in vegetation cover).

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

6. Population Distribution and Monitoring

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

within critical habitat) reveal continued desert tortoise presence, although local population declines are known within some of these areas, such as the Beaver Dam Slope, Arizona.

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

In an attempt to refine the long-term monitoring program for the desert tortoise, annual rangewide population monitoring using line distance transects began in 2001 (1999 in the Upper Virgin River Recovery Unit; McLuckie *et al*. 2006) and is the first comprehensive effort undertaken to date to estimate densities across the range of the species (Service 2006). Rangewide sampling was initiated during a severe drought that intensified in 2002 and 2003, particularly in the western Mojave Desert in California. At the time the 1994 Recovery Plan was written, there was less consideration of the potentially important role of drought in the desert ecosystem, particularly regarding desert tortoises. In the meantime, studies have documented vulnerability of juvenile (Wilson *et al*. 2001) and adult desert tortoises (Peterson 1994, Peterson 1996, Henen 1997, Longshore *et al*. 2003) to drought.

The monitoring program is designed to detect long-term population trends, so density estimates from any brief time period (e.g., 2001 to 2005) would be expected to detect only catastrophic declines or remarkable population increases. Therefore, following the first 5 years of the long-term monitoring project, the goal was not to document trends within this time period, but to gather information on baseline densities and annual and regional (between recovery unit) variability (Service 2006). Density estimates of adult desert tortoises varied among recovery units and years. Only if this variability is associated with consistent changes between years will monitoring less than 25 years describe important trends. For instance, considerable decreases in density were reported in 2003 in the Eastern Colorado and Western Mojave recovery units, with no correspondingly large rebound in subsequent estimates (Service 2006). Until the underlying

variability that may affect our interpretation of these first years of data can be identified, inferences as to the meaning of these data should not be made. Over the first 5 years of monitoring, desert tortoises were least abundant in the Northeast Mojave Recovery Unit (0.68 to 8.30 desert tortoises per kilometer^2 [0.26 to 3.20 desert tortoises per mile^2] (Service 2009b).

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

Declines in desert tortoise abundance appear to correspond with increased incidence of disease in some desert tortoise populations. The Goffs permanent study plot in Ivanpah Valley, California, suffered 92 to 96 percent decreases in desert tortoise density between 1994 and 2000 (Berry 2003). The high prevalence of disease in Goffs desert tortoises likely contributed to this decline (Christopher *et al*. 2003). Upper respiratory tract disease has not yet been detected at permanent study plots in the Colorado Desert of California, but is prevalent at study plots across the rest of the species' range (Berry 2003) and has been shown to be a contributing factor in population declines in the western Mojave Desert (Brown *et al*. 2002; Christopher *et al*. 2003). High mortality rates at permanent study plots in the northeastern and eastern Mojave Desert appear to be associated with incidence of shell diseases in desert tortoises (Jacobson *et al*. 1994). Low levels of shell diseases were detected in many populations when the plots were first established, but were found to increase during the 1980s and 1990s (Jacobson *et al*. 1994; Christopher *et al*. 2003). A herpesvirus has recently been discovered in desert tortoises, but little is known about its effects on desert tortoise populations at this time (Berry *et al*. 2002; Origgi *et al*. 2002).

The general trend for desert tortoises within the California Desert is one of decline. Tracy *et al.* (2004) concluded that the apparent downward trend in desert tortoise populations in the western portion of the range that was identified at the time of listing is valid and ongoing. Results from other portions of the range were inconclusive, but recent surveys of some populations found too few desert tortoises to produce population estimates (*e.g.*, 2000 survey of the Beaver Dam Slope,

Arizona), suggesting that declines may have occurred more broadly. Transects surveyed in the Western Mojave Recovery Unit that did not detect any sign over large areas of previously-occupied habitat, and the numerous carcasses found on permanent study plots provide evidence of a decline. During line distance sampling conducted in 8 DWMAs in California in 2003, 930 carcasses and 438 live desert tortoises were detected; more carcasses than live desert tortoises were detected in every study area (Woodman 2004). In 2004, workers conducting line distance sampling in California detected 1,796 carcasses and 534 live desert tortoises; more carcasses were detected than live desert tortoises in every study area (Woodman 2005). Below, we elaborate on patterns within each recovery unit.

a. Northeastern Mojave Recovery Unit

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

Results of desert tortoise surveys at three survey plots in Arizona indicate that all three sites have experienced significant die-offs. Six live desert tortoises were located in a 2001 survey of the Beaver Dam Slope Exclosure Plot (Walker and Woodman 2002). Three had definitive signs of URTD, and two of those also had lesions indicative of cutaneous dyskeratosis. Previous surveys of this plot detected 31 live desert tortoises in 1996, 20 live desert tortoises in 1989, and 19 live desert tortoises in 1980. The 2001 survey report indicated that it is likely that there is no longer a reproductively viable population of desert tortoises on this study plot. Thirty-seven live desert tortoises were located in a 2002 survey of the Littlefield Plot (Young *et al*. 2002). None had definitive signs of URTD. Twenty-three desert tortoises had lesions indicative of cutaneous dyskeratosis. Previous surveys of this plot detected 80 live desert tortoises in 1998 and 46 live desert tortoises in 1993. The survey report indicated that the site might be in the middle of a die-off due to the high number of carcasses found since the site was last surveyed in 1998. Nine live desert tortoises were located during the mark phase of a 2003 survey of the Virgin Slope Plot (Goodlett and Woodman 2003). The surveyors determined that the confidence intervals of the population estimate would be excessively wide and not lead to an accurate population estimate, so the recapture phase was not conducted. One desert tortoise had definitive signs of URTD. Seven desert tortoises had lesions indicative of cutaneous dyskeratosis. Previous surveys of this plot detected 41 live desert tortoises in 1997 and 15 live desert tortoises in 1992. The survey report indicated that the site may be at the end of a die-off that began around 1996-1997.

b. Eastern Mojave Recovery Unit

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

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

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

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

c. Northern Colorado Recovery Unit

Two permanent study plots are located within the Chemehuevi DWMA. At the Chemehuevi Valley and Wash plot, 257 and 235 desert tortoises were registered in 1988 and 1992, respectively (Berry 1999). During the 1999 spring survey, only 38 live desert tortoises were found. The shell and skeletal remains of at least 327 desert tortoises were collected; most, if not

all, of these desert tortoises died between 1992 and 1999. The frequency of shell lesions and nutritional deficiencies appeared to be increasing and may be related to the mortalities.

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

d. Eastern Colorado Recovery Unit

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

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

e. Western Mojave Recovery Unit

This recovery unit includes the Pinto Mountains, Ord-Rodman, Superior-Cronese, and Fremont-Kramer DWMAs. Based on areas sampled within the Western Mojave Recovery Unit (Service 2009b), we estimate 43,701 desert tortoises (with a 95 percent confident interval of 24,361 to 79,126 tortoises) occur in this recovery unit.

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

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

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

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

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

The Western Mojave Recovery Unit has experienced marked population declines as indicated in the 1994 Recovery Plan and continues today. Spatial analyses of this Recovery Unit show areas with increased probabilities of encountering dead rather than live animals, areas where kernel estimates for carcasses exist in the absence of live animals, and extensive regions where there are clusters of carcasses where there are no clusters of live animals. Collectively, these analyses point generally toward the same areas within the Western Mojave Recovery Unit, namely the northern portion of the Fremont-Kramer DWMA and the northwestern part of the Superior-Cronese DWMA. Together, these independent analyses, based on different combinations of data, all suggest the same conclusion for the Western Mojave. Data are not currently available with sufficient detail for most of the range of the desert tortoise with the exception of the Western Mojave Recovery Unit (Tracy *et al*. 2004).

f. Upper Virgin River Recovery Unit

The 1994 Recovery Plan states that desert tortoises occur in densities of up to 250 adult desert tortoises per square mile within small areas of this recovery unit; overall, the area supports a mosaic of areas supporting high and low densities of desert tortoises (Service 1994). The Utah Division of Wildlife Resources (UDWR) has intensively monitored desert tortoises, using a distance sampling technique, since 1998. Monitoring in 2003 indicated that the density of desert tortoises was approximately 44 per square mile throughout the reserve. This density represents a 41 percent decline since monitoring began in 1998 (McLuckie *et al*. 2006). The report notes that

the majority of desert tortoises that died within one year (n=64) were found in areas with relatively high densities; the remains showed no evidence of predation.

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

Summary

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

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

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

7. Threats

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

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

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

Numerous wildfires occurred in desert tortoise habitat across the range of the desert tortoise in 2005 due to abundant fuel from the proliferation of nonnative plant species after a very wet winter. These wildfires heavily impacted two of the six desert tortoise recovery units, burning almost 19 percent of desert tortoise habitat in the Upper Virgin River and 10 percent in the Northeastern Mojave (Table 1). There were no significant fires from 2007 to 2009 in this area. In the Upper Virgin River Recovery Unit, 19 percent of the Upper Virgin River CHU burned. In the Northeastern Mojave Recovery Unit, three CHUs were impacted: approximately 23 percent of the Beaver Dam Slope CHU burned, 13 percent of the Gold Butte-Pakoon CHU, and 4 percent of the Mormon Mesa CHU. Although it is known that desert tortoises were burned and killed by the wildfires, desert tortoise mortality estimates are not available. Recovery of these burned areas is likely to require decades.

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

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

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

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

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

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

8. Desert Tortoise Critical Habitat – Rangewide Status

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

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

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

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

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

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

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

Although recovery of the desert tortoise will focus on DWMAs/ACECs, section II.A.6. of the 1994 Recovery Plan and section 2(b) of the Act provide for protection and conservation of ecosystems on which federally-listed threatened and endangered species depend, which includes both recovery and non-recovery areas. The Mojave Desert ecosystem, of which the desert tortoise and its habitat are an integral part, consists of a dynamic complex of plant, animal, fungal, and microorganism communities and their associated nonliving environment interacting as an ecological unit (Noss and Cooperrider 1994). Actions that adversely affect components of the Mojave Desert ecosystem may directly or indirectly affect the desert tortoise. The 1994 Recovery Plan further states that desert tortoises and habitat outside recovery areas may be important in recovery of the tortoise. Healthy, isolated desert tortoise populations outside recovery areas may have a better chance of surviving catastrophic effects such as disease, than large, contiguous populations (Service 1994).

The 1994 Recovery Plan recommended DWMAs and subsequently the Service designated CHUs based on these proposed DWMAs (Service 1993). When designated, desert tortoise critical habitat contained all the primary constituent elements of desert tortoise critical habitat. The

following seven principles of conservation biology serve as the standards by which the Service determines whether or not the CHUs are functioning properly:

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

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

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

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

e. *Habitat patches should contain minimal edge-to-area ratios*. This principle was met when CHUs were designated and generally continue to be valid. Notable exceptions include the northern Gold Butte-Pakoon CHU, and the southern termini of the Mormon Mesa, Ivanpah Valley, and Chuckwalla CHUs which have large edge-to-area ratios and further compromised by highways that traverse these relatively narrow areas within the CHUs.

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

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

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

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

Many of the threats to the desert tortoise exist across broad portions of the species' range. We have developed a prototype decision support system that uses the best data that could be obtained within the planning process and provides a guide as to what additional data are most needed. The initial datasets provide a structure and way to prioritize the next round of data gathering, particularly including impacts to critical habitat. These data, including future updates, will be made publicly available through the Recovery Implementation Team (RIT) process. Data are not readily available to quantify the number of acres of critical habitat that have been degraded; however, we are currently in the process of assembling various spatial data layers, such as aerial photography and satellite-derived land cover data, to complete these sorts of analyses as part of the RITs' prioritization and evaluation of recovery actions. To date, protection of these lands has not been sufficient to recover the species and lands outside critical habitat have become more important for recovery.

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

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

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

- Desert Tortoise Recovery Plan Assessment Report (Tracy *et al*. 2004)—all CHUs
- Final Environmental Impact Report and Statement for the West Mojave Plan (BLM 2005)— Fremont-Kramer CHU, Superior-Cronese CHU, Ord-Rodman CHU, and Pinto Mountains CHU
- Mojave National Preserve General Management Plan (NPS 2002)—Ivanpah Valley CHU and Piute-Eldorado CHU
- Northern and Eastern Colorado Coordinated Management Plan (BLM 2002a)—Chemehuevi CHU, Pinto Mountains CHU, and Chuckwalla CHU
- Northern and Eastern Mojave Desert Management Plan (BLM 2002b)—Ivanpah Valley CHU, Piute-Eldorado CHU, and Chemehuevi CHU
- Clark County Multiple Species HCP (RECON 2000)—Beaver Dam Slope CHU, Mormon Mesa CHU, Gold Butte-Pakoon CHU, and Piute-Eldorado CHU
- Washington County HCP (Washington County Commission 1995)—Upper Virgin River CHU
- Biological Assessment for the Proposed Addition of Maneuver Training Land at Fort Irwin, CA (U.S. Army National Training Center 2003)—Superior-Cronese CHU
- Desert Tortoise (Mojave Population) Recovery Plan and Proposed Desert Wildlife Management Areas for Recovery of the Mojave Population of the Desert Tortoise (companion document to the Desert Tortoise Recovery Plan) (Service 1994)—all CHUs

E. ENVIRONMENTAL BASELINE

The action area is defined as all areas to be affected directly or indirectly by the Federal action, including interrelated and interdependent actions, and not merely the immediate area involved in the action (50 CFR § 402.02). Subsequent analyses of the environmental baseline, effects of the action, cumulative effects, and levels of incidental take are based upon the action area as determined by the Service.

The action area for this project includes the project area (disturbance footprint, the ROW grant area, and access roads) and desert tortoise translocation areas including recipient and control sites.

1. Status of the Desert Tortoise in the Action Area

a. Proposed Project Area

The project is located in the Ivanpah Valley, which is bounded by the Lucy Gray Range and McCullough Mountains to the east, the New York Mountains and the Mid-Hills to the south, the Ivanpah Mountains, Mescal Range, and Clark Mountain to the west, and the Clark Mountain and southernmost Spring Range to the north. The project site is located on a broad alluvial fan spreading out to the west from the lower slopes of the Lucy Gray Mountains. The alluvial fan drains into both the Ivanpah Dry Lake to the west and south, and to the Roach Dry Lake to the northwest. At its closest point to the project site, Ivanpah Dry Lake is located approximately 2 miles away, Roach Dry Lake is approximately 0.5 mile away, and the project site is approximately 0.5 mile from the lower western slopes of the Lucy Gray Mountains. The project site terrain varies from approximately 2,700 feet above mean sea level (msl) in the western portion of the site to 3,700 feet above msl in the southeastern portion of the site (located within the Lucy Gray Mountains).

The desert tortoise is distributed throughout the Ivanpah Valley with the exception of the dry lakes and developed areas (BLM 2002b). The project site is not located within designated critical habitat for the desert tortoise, but is located approximately 1 mile north of the Ivanpah CHU in California. The project area contains good to excellent quality desert tortoise habitat due to its location within the Ivanpah Valley. Mojave creosote bush (*Larrea tridentata*) scrub is the predominant vegetation type within the project area. Very small inclusions of Mojave wash scrub are also present. Creosote bush is the dominant species with white bursage (*Ambrosia dumosa*), cheesebush (*Hymenoclea salsola*), Nevada ephedra (*Ephedra nevadensis*), and Mojave yucca (*Yucca schidigera*) as common associates. Several species of cacti including California barrel cactus (*Ferocactus cylindraceus* var. *lecontei*), clustered barrel cactus (*Echinocactus polycephalus* var. *polycephalus*), Engelmann's hedgehog cactus (*Echinocereus engelmannii*), buckhorn cholla (*Opuntia acanthocarpa* var. *coloradensis*), pencil cactus (*Opuntia ramosissima*), and beavertail cactus (*Opuntia basilaris* var. *basilaris*) are also common in parts of this community. Numerous ephemeral washes occur throughout the project area. Shrubs located along the banks of the ephemeral washes were generally larger than the shrubs located in

upland areas. Species observed in and immediately adjacent to ephemeral washes in the project area were similar to those observed in the surrounding Mojave creosote bush scrub.

In October 2008, August 2009, and May 2010 surveys were conducted within the project area to estimate the desert tortoise population densities. Surveys were conducted by experienced, qualified desert tortoise biologists.

The Tortoise Regional Estimates of Density Model (TRED) was the basis for the October 2008 and August 2009 pre-project surveys (Karl 2007). The TRED survey methodology was developed prior to the current survey methodology (Service 2010a) and was chosen as an alternative to the 1992 methods to increase sampling effort and improve abundance estimates. The TRED method employs 2.4-kilometer (1.5-mile) long triangular transects configured as an equilateral triangle where four transects are walked in each square kilometer, systematically starting in a corner of the kilometer. Using the TRED method, four live desert tortoises were observed within 17 square miles of the proposed project boundary. In total, 39 transects were surveyed. It is impossible to statistically quantify the error associated with this survey since calibration transects and other sources of variation, which measure observer bias, were not conducted or taken into account, but it is estimated there are 88 (42 to 123) sub-adult and adult desert tortoises to be displaced within the fenced area of the proposed project (2,966 acres). 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 sub-adult or adult desert tortoises. The Desert Tortoise Survey Report is provided in Attachment 3 of the BA (BLM 2010b) and provides more detailed information.

The May 2010 subsequent surveys were conducted within a subset of the area previously surveyed using the Service's updated pre-project survey protocol (Service 2010a). Using this sampling method, 7 live tortoises, 62 burrows, and 23 carcasses were located on Phase I of the project site (685 acres) (NextLight 2010a). Using the formula in the Pre-Project Survey Protocol (Service 2010a), it is estimated that there are 13.7 (5.11 to 36.97) sub-adult and adult desert tortoises on Phase I. Results of these subsequent surveys were consistent with the previous surveys. For detailed information on this survey, see CH2MHILL (2010).

Based on the TRED surveys and the subsequent transect survey, the estimated number of desert tortoises to be displaced within the fenced area of the proposed project is estimated to range from 42 to 123 adults and sub-adults. In addition to sub-adult and adult desert tortoises, the project site is likely to contain juvenile desert tortoises. At the Goffs study site in California, Turner *et al.* (1987) estimated that 31.1 percent to 51.2 percent of the population is composed of juvenile desert tortoises. Using this information, we anticipate that no more than 129 juvenile desert tortoises occur on the site. Based on this number of adults and sub-adults combined with studies by Bjurlin and Bissonette (2004) that investigated nest and neonatal survival, as well as the results from the surveys above, we estimate that the project area may support up to 97 desert tortoises hatchlings. 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 over time (*i.e.*, all desert tortoises may not have been detected during the pre-project survey; some desert tortoises

may die or may leave the proposed project area before construction of the proposed project commences; other, unaccounted desert tortoises may move on to the site before construction begins; and undetected hatchling desert tortoises may emerge from nests on the proposed project site). However, the information above provides the best available data to establish a baseline for analysis.

We also expect that the proposed project site is likely to contain desert tortoise eggs. Based on studies performed in Ivanpah Valley and the Goffs study site in California that identified a sex ratio of 1:1 (Turner *et al.* 1984, Turner *et al.* 1987), we estimate that approximately half of the sub-adult and adult population is composed of reproductive females. However, it is difficult to estimate the number of eggs that may be within the proposed project area based on the number of reproductive females on the proposed project area because: 1) some territories of female desert tortoises on the proposed project area may extend off of the proposed project area and their nests may be established outside the proposed project area; 2) fewer eggs may be present on the proposed project site at the time of construction depending on the time of the year; 3) the number of eggs that can be produced in a season is dependent on a variety of environmental and physiological factors; and 4) not all reproductive females produce eggs every year. Therefore, we are unable to estimate the number of eggs that may occur on the proposed project area.

b. Proposed Recipient (Translocation) Areas

Translocation sites must be sufficiently large to accommodate and maintain the resident (if present) and translocated desert tortoises, as well as be free of disease. At a minimum, the translocation site must be equal in size to the proposed project site, and the maximum allowable final density at recipient sites after translocation (includes residents and translocated tortoises) must not exceed 130 percent of the mean density detected in the nearest recovery unit (4.1 per km^2 in the Northeastern Mojave Recovery Unit) (Service 2010b). Because of the potential number of desert tortoises that may need to be translocated and other concerns outlined in the Technical Paper (Service 2010b), the BLM and the Service identified multiple recipient areas: the initial recipient area would be adjacent to the project site to the east and used for desert tortoises found during Phase I, while a second recipient area with multiple release points along State Route 164 (SR 164) just west of Searchlight, Nevada and along US 95 just north of Searchlight, Nevada would be used for subsequent phases of the proposed project.

<u>Initial recipient area</u>

The BLM selected the initial recipient area for translocation of desert tortoises in compliance with guidance from the Translocation Guidance (Service 2010c). This area is approximately 6,125 acres and is contiguous with the proposed project site within the Ivanpah Valley. No natural barriers exist between the project site and the initial recipient area. This would ensure that desert tortoises at the two sites were once part of a larger mixing population and are genetically similar. Because this area is contiguous with the proposed project site, its habitat characteristics are similar to the project site and it provides resources to support all life stages of translocated desert tortoises.

In May 2010, surveys were conducted on initial recipient area (6,125 acres or 24.81 km^2) using 100 percent coverage line distance sampling method. This survey located 8 live tortoises, 70 burrows, and 90 carcasses (CH2MHILL 2010). Using the formula in the Pre-Project Survey Protocol (Service 2010a), we estimate there are 74 (29.18 to 187.71) adult and sub-adult desert tortoises on the initial recipient area. The maximum allowable final density at the initial recipient site must not exceed 101 individuals (Service 2010b); therefore, 27 desert tortoises from the project site can be translocated to this area. If additional resident desert tortoises are located on the initial recipient area during project activities, fewer individual can be translocated to this area. In such case, these additional desert tortoises from the project site would be translocated to the subsequent recipient area.

Subsequent recipient area and release points

This area was selected by BLM and the Service following the Translocation Guidance (Service 2010c). The Service prioritized recovery efforts in depleted or depressed areas and identified areas adjacent to highways as potential recipient areas (Service 2010c). The subsequent recipient area is located within the same recovery unit (Northeastern Mojave) as the proposed project area in the Eldorado Valley within the Piute-Eldorado Critical Habitat Unit. The subsequent recipient area contains three release points which are 25, 35, and 37 km east of the proposed project site, respectively. Each release point is approximately 3,000 acres (12.14 km^2) and is fenced along the highway, while the remaining three sides would be temporarily fenced to temporarily restrict desert tortoise movements.

The habitat in and around the subsequent recipient area/release points contain friable soils and vegetation typical of high quality desert tortoise habitat and would be suitable for all life stages. The area ranges in elevation from 3,855 to 4,035 feet and consists predominantly of Mojave Desert shrubland, which includes Mojave Mid-elevation Mixed Desert Scrub (blackbrush scrub community), Sonora-Mojave Creosote Bush-White Bursage Desert Scrub (creosote bush scrub community), Inter-mountain Basins Semi-desert Shrub Steppe (mixed desert shrub community), and Sonora-Mojave Mixed Salt Desert Scrub (saltbush community). Blackbrush scrub and creosote bush scrub communities are the dominant vegetation in the area. Blackbrush is found mostly in the western half of the recipient area. Associated species include red brome (*Bromus rubens*), Mormon tea (*Ephedra viridis*), threadleaf snakeweed (*Gutierrezia microcephala*), Joshua tree (*Yucca brevifolia*), and banana yucca (*Yucca baccata*).

Creosote and the co-dominant white bursage are found mostly in the eastern half of the recipient area, on alluvial slopes, valley floors, and mountain slopes below 4,000 feet in elevation. Plant species found in association with the creosote bursage community include threadleaf snakeweed, Mexican bladdersage (*Salizaria mexicana*), spiny menodora (*Menodora spinescens*), turpentine broom (*Thamnosma montana*), red brome, Nevada ephedra, and banana yucca.

The mixed desert shrub community is found scattered throughout the recipient area. The mixed desert shrub community is composed of a variety of shrubs and lacks a true dominant species. Associated plant species include blackbrush, creosote, threadleaf snakeweed, Mexican bladdersage, spiny menodora, turpentine broom, red brome, Nevada ephedra, Mormon tea, indigo bush (*Psorothamnus fremontii*), banana yucca, and Joshua tree.

Overall, densities of desert tortoises in Eldorado Valley are considered low to moderate with 6 to 37 sub-adults and adults per square mile (one per 20 to 100 acres) (BLM 1998); however, desert tortoise populations adjacent to highways are frequently depressed up to several kilometers from the road, presumably due to crushing by vehicles (Hoff and Marlow 2002, Boarman and Sazaki 2006). Hoff and Marlow (2002) conducted surveys within the subsequent recipient area, alongside SR 164 and identified a zone of depression where desert tortoise numbers have been drastically reduced as a result of road mortality. Also, desert tortoise surveys conducted along US 95 in October and November 2001 for the Nevada Department of Transportation (NDOT) as part of a highway widening project (Service File No. 1-5-02-F-447), estimated an average density of 12 desert tortoises per square mile. In May 2010, NextLight conducted line distance sampling along SR 164 south of the highway, adjacent to the subsequent recipient area and one of the release points. These 100 percent coverage surveys confirmed that areas adjacent to roads are depressed when no live tortoises were located (CH2MHILL 2010). Prior to translocation, population surveys and health assessments would be conducted at the subsequent recipient area and the release areas. The maximum final density at each release point within the subsequent recipient area must not exceed 49 individuals (Service 2010b).

c. Control Areas

To provide "control" baseline data from which to compare the effectiveness of the translocation as a project minimization measure, BLM and the Service selected these areas following the Translocation Guidance (Service 2010c). Each control area would be equivalent in habitat type/quality and desert tortoise population size/structure as its respective recipient site. None have previously received translocated desert tortoises.

<u>Control area for the initial recipient site</u>

This site has been identified to provide a baseline for the initial recipient area. It would be located adjacent to the project site and the initial recipient area in California along the Nevada-California border. Because this area is in the same valley and adjacent to the initial release area, its habitat characteristics are similar to the initial release area.

The highest known densities of desert tortoise occur in southern part of the CHU with lower densities to the north (Service 1994). Using the latest density estimates from the rangewide monitoring program, the control area had a density of 6.5 tortoises per km^2 (one desert tortoise per 50 acres) in 2007 (Service 2009b). This number is based on the effort required to locate 10 desert tortoises.

Control area for the subsequent recipient site

This area was identified to provide a baseline for the subsequent recipient area. It would be located in an isolated portion of the Piute or Eldorado Valley adjacent to the subsequent recipient area. Because this area is contiguous with the subsequent recipient area, its habitat characteristics are similar to the subsequent recipient area.

Desert tortoise densities are estimated at 40 to 63 per square mile (one per 10 to 16 acres) in Piute Valley (BLM 1998) and 6 to 37 sub-adults and adults per square mile (one per 20 to 100 acres) (BLM 1998). Overall, densities in Piute Valley are considered moderate, while densities in Eldorado Valley are considered low to moderate. Because this area is contiguous with the subsequent recipient area, its habitat characteristics are similar to the subsequent recipient area.

2. Factors Affecting the Species in the Action Area

a. Proposed Project Area

The proposed project area is bounded by the NV Energy Walter M. Higgins Generating Station and the Union Pacific Railroad to the west; the Lucy Gray Mountains to the east; a major electric transmission line corridor to the north; and the California/Nevada state line to the south. The land use type throughout the project site includes undeveloped, desert alluvial valleys.

The proposed project site would be located near, or cross through, a variety of land-use types which have been affected by activities ranging from the: construction and continued use of major highways (such as Interstate 15), secondary roads, unimproved roads, trails, pipelines, Union Pacific Railroad, electrical transmission lines and substations, and utility corridors; recreational opportunities (such as the Primm Golf Club and land sailing/racing on the Ivanpah Dry Lakebed); casinos and retail businesses; and other facilities developed around the Nevada communities of Jean and Primm. Additionally, a congressionally defined Airport Environs Overlay District exists along the western side of the proposed project area.

Development on adjacent lands has caused habitat loss, degradation, and fragmentation for the local desert tortoise population, as well as increased harm and harassment of individual desert tortoises. Urbanization, grazing, vandalism, illegal dumping, mining, off-road recreation, and construction of utility corridors, facilities and roads continue to contribute to the cumulative degradation of biological resources in the area, including desert tortoise habitat.

Section 7 Consultations Affecting the Proposed Project Area

The following consultations address areas that overlap the action area addressed in this biological opinion:

1) On November 25, 1997, the Service issued a Programmatic Biological Opinion (Service File No. 1-5-97-F-251) to BLM for implementation of various land

management programs within the Las Vegas District planning area excluding desert tortoise critical habitat and ACECs, and outside the Las Vegas Valley. Activities proposed that may affect the desert tortoise in the action area include issuance of ROW, Recreation and Public Purposes leases, mineral material sales and leases, and mining plans of operation. The programmatic consultation is limited to activities which may affect up to 240 acres per project, and a cumulative total of 10,000 acres excluding land exchanges and sales. Only land disposals by sale or exchange in Clark County (but outside the Las Vegas Valley) are covered under the consultation up to a cumulative total of 14,637 acres. Thus, a maximum total of 24,637 acres of desert tortoise habitat may be affected by the proposed programmatic activities.

2) On June 18, 1998, the Service issued a Programmatic Biological Opinion (Service File No. 1-5-98-F-053) to BLM for implementation of various land management programs within desert tortoise habitat and the Las Vegas planning area, including desert tortoise critical habitat and ACECs. Activities that were proposed that may affect the desert tortoise in the action area include recreation; designation of utility corridors and mineral material extraction areas along U.S. Highway 93 (US 93); and designation of the Coyote Spring, Mormon Mesa (Clark County portion), and Gold Butte desert tortoise ACECs. Recreation activities on BLM-managed lands incorporated off-road race events. The Programmatic Biological Opinion was amended on April 21, 2004 (Service File No. 1-5-98-F-053.AMD1), to allow re-alignment of 1.3 miles of the Terrible Town 250 race course along an existing ROW to avoid the Amargosa Mesquite ACEC. The Programmatic Biological Opinion covered a 10-year period that ended in June 2008. The Service and BLM agreed to allow activities to continue under the Programmatic Biological Opinion if the activities were determined to be within the scope and effects analysis. Based on conversations with BLM recreation and wildlife personnel, the Service determined that certain speed and non-speed OHV events result in effects outside the analysis for these actions in the Programmatic Biological Opinion; therefore, separate section 7 consultation are required for OHV race events, as they are no longer authorized under the Programmatic Biological Opinion (Service File No. 1-5-98-F-053.AMD2).

Habitat Conservation Plans

Since the Mojave population of the desert tortoise was first listed under the Act in 1989, three regional-level habitat conservation plans (HCPs) have been implemented for development of desert tortoise habitat in Clark County, Nevada. Approximately 89 percent of Clark County consisted of public lands administered by the Federal government, thereby providing little opportunity for mitigation for the loss of desert tortoise habitat under an HCP on non-Federal lands. Alternatively, funds are collected under HCPs and spent to implement conservation and recovery actions on Federal lands as mitigation for impacts that occur on non-Federal lands. Lands managed by BLM are included in these areas where mitigation funds are used to promote recovery of the desert

tortoise. Actions taken in relation to the HCPs mentioned here are/were taken in areas that overlap the action area addressed in this biological opinion.

1) On May 23, 1991, the Service issued a biological opinion on the issuance of incidental take permit PRT-756260 (Service File No. 1-5-91-FW-40) under section 10(a)(1)(B) of the Act. The Service concluded that incidental take of 3,710 desert tortoises on up to 22,352 acres of habitat within the Las Vegas Valley and Boulder City in Clark County, Nevada, was not likely to jeopardize the continued existence of the desert tortoise. The permit application was accompanied by the *Short-Term Habitat Conservation Plan for the Desert Tortoise in the Las Vegas Valley, Clark County, Nevada* (Regional Environmental Consultants [RECON] 1991) (Short-term HCP) and an implementation agreement that identified specific measures to minimize and mitigate the effects of the action on desert tortoises.

   On July 29, 1994, the Service issued a non-jeopardy biological opinion on the issuance of an amendment to incidental take permit PRT-756260 (Service File No. 1-5-94-FW-237) to extend the expiration date of the existing permit by one year (to July 31, 1995) and include an additional disturbance of 8,000 acres of desert tortoise habitat within the existing permit area. The amendment did not authorize an increase in the number of desert tortoises allowed to be taken under the existing permit. Additional measures to minimize and mitigate the effects of the amendment were also identified. Approximately 1,300 desert tortoises were taken under the authority of PRT-756260, as amended. In addition, during the short-term HCP, as amended, approximately 541,000 acres of desert tortoise habitat have been conserved in Clark County on lands administered by BLM and NPS.

2) On July 11, 1995, the Service issued an incidental take permit (PRT-801045) to Clark County, Nevada, including cities within the County and NDOT, under the authority of section 10(a)(1)(B) of the Act. The permit became effective August 1, 1995, and allowed the "incidental take" of desert tortoises for a period of 30 years on 111,000 acres of non-Federal land in Clark County, and approximately 2,900 acres associated with NDOT activities in Clark, Lincoln, Esmeralda, Mineral, and Nye counties, Nevada. The Clark County Desert Conservation Plan (DCP) served as the permittees' HCP and detailed their proposed measures to minimize, monitor, and mitigate the effects of the proposed take on the desert tortoise (RECON 1995). The permittees and NDOT imposed and paid a fee of $550 per acre of habitat disturbance to fund these measures. The permittees expended approximately $1.65 million per year to minimize and mitigate the potential loss of desert tortoise habitat. The majority of these funds were used to implement minimization and mitigation measures, such as increased law enforcement; construction of highway barriers; road designation, signing, closure, and rehabilitation; and desert tortoise inventory and monitoring within the lands

managed for desert tortoise recovery (e.g., ACECs or desert wildlife management areas). The benefit to the species, as provided by the DCP, minimized and mitigated those effects that occurred through development within the permit area and aided recovery efforts for the desert tortoise.

3) On November 22, 2000, the Service issued an incidental take permit (TE-034927) to Clark County, Nevada, including cities within the County and NDOT which supersedes the DCP permit. In the biological/conference opinion (Service File No. 1-5-00-FW-575), the Service determined that issuance of the incidental take permit to Clark County would not jeopardize the listed desert tortoise

The incidental take permit allows incidental take of desert tortoise for a period of 30 years on 145,000 acres of non-Federal land in Clark County, and within NDOT rights-of-way, south of the 38th parallel in Nevada. The Clark County Multiple Species Habitat Conservation Plan (MSHCP) and Environmental Impact Statement (RECON 2000), serves as the permittees' HCP and details their proposed measures to minimize, mitigate, and monitor the effects of covered activities.

As partial mitigation under the DCP, carried forward in the MSHCP, the County purchased a conservation easement from the City of Boulder City in 1994. The term of the Boulder City Conservation Easement (BCCE) is for 50 years and it will be retained in a natural condition for recovery of the desert tortoise and conservation of other species in the area. Certain uses shall be prohibited within the BCCE including motor vehicle activity off designated roads, livestock grazing, and any activity that is inconsistent with the purposes of the BCCE. Much of the BCCE is also designated desert tortoise critical habitat. Within the boundary of the BCCE, Boulder City reserved the Solar Energy Zone for energy development projects in addition to adjacent energy generation facilities described previously.

b. Proposed Recipient (Translocation) Areas

<u>Initial recipient area</u>

The initial recipient area is located adjacent to the project site within the boundary of the Jean/Roach Special Recreation Management Area (SRMA). Although the initial recipient site occurs within a SRMA:

- No ROW or utility corridors currently occur within the recipient area. Moreover, historically there have been no ROW applications submitted within the recipient area.

- The majority of recreational activities that occur on the SRMA (competitive OHV races, model rocket launching, video filming, horseback rides, hiking, music festivals, etc.) occur north of the proposed initial recipient area.

- A segment of existing OHV race course bisects the recipient area and has historically been utilized for permitted OHV events. However, events utilizing this race course would be conducted when tortoises are least active (August, November, and December) and would be permitted no more than once per year.

- BLM does not anticipate renewable energy (solar) ROW application submissions for the public lands contained within the initial recipient area due to the existing topography. Industry standards for PV and concentrated-solar panel technology prescribe a positive natural terrain slope of less than 5 percent. The recipient area encompasses the bajada west of the Lucy Gray Mountain range, wherein large, contiguous tracts of Federal land with a slope less than 5 percent do not exist.

- Because this area is contiguous with the proposed project site, it is of the same character as the proposed project area as detailed above.

Subsequent recipient area and release points

The subsequent recipient area is located within the Eldorado CHU and within the BLM-managed Piute-Eldorado ACEC. This area is managed for conservation and potential threats are avoided or reduced under this designation. There is very little development around the subsequent recipient area, with the exception of the community of Searchlight and Walking Box Ranch on the southeastern edge. The area is triangular and bounded by a desert tortoise exclusionary fence along SR 164 to the south; US 95 to the north and east; and the McCullough Mountains to the north and west. Within the subsequent recipient area, three release points have been identified adjacent to the highway.
In addition to the section 7 consultations and section 10 HCPs listed in the Proposed Project Area section above, except Service File No. 1-5-97-F-251, the following section 7 consultation affects the control area:

3) On May 28, 2002, the Service issued a biological opinion to the Federal Highway Administration [Service File No. 1-5-02-F-447, as reinitiated on October 27, 2004, (Service File No. 1-5-02-F-447R) and June 28, 2007 (Service File No. 1-5-02-F-447R2)] for widening 56 miles of US 95 from the US 93-US 95 junction near Railroad Pass to the US 95 intersection with State Road 163 in Clark County, Nevada. The Service concluded that incidental take of 7 desert tortoises through mortality and 200 desert tortoises from harassment, and loss of 2,019 acres of habitat outside of Searchlight, Nevada (including 595 acres within a mineral material site located outside the subsequent recipient area south of SR 164), was not likely to jeopardize the continued existence of the desert tortoise.

c. Control Area

Control area for the initial recipient site

The control area for the initial recipient area is located within the Ivanpah Valley CHU and within the BLM-managed Ivanpah ACEC in California. Although a variety of human uses have contributed to habitat loss and degradation in the Ivanpah CHU, such as military maneuvers during the mid-1960s in the southern Ivanpah Valley, cattle grazing, recreation, roads, railroads, and powerline corridors (Service 1994), this area is now managed for conservation of the desert tortoise with a one percent cap on new ground disturbance.

Control area for the subsequent recipient area

The control area for the subsequent recipient area is located within the Piute-Eldorado CHU and within the BLM-managed Piute-Eldorado ACEC. Within the subsequent control area, there is evidence of OHV use and litter along the highway, but little beyond the ROW fence other than a few small, dirt roads scattered throughout the area. Livestock grazing has been discontinued in all areas designated as ACEC on BLM lands in southern Nevada which generally overlap CHU boundaries. Several ROW and mining plans of operations have been approved by BLM in Piute and Eldorado Valleys. Most ROWs were granted for utility transmission including natural gas, electrical, and fiber-optic lines. These ROWs are adjacent to the recipient area beyond the fence. Eldorado Valley contains an existing 500 kV transmission line and an energy development zone outside Boulder City, Nevada. Some wind site testing has been authorized on Highland Range. In Piute Valley there is some pending wind site testing and an active water pipeline adjacent to SR 164. Because this area is adjacent to the recipient area, it is of the same character as the release points.

In addition to the section 7 consultations and section 10 HCPs listed in the Proposed Project Area and subsequent recipient area sections above, the following section 7 consultation affects the control area:

4) On February 27, 2009, the Service issued a biological opinion on the issuance of an incidental take permit to BLM (Service File No. 84320-2009-F-0002) for a water and wastewater systems improvements project where the Las Vegas Valley Water District and Clark County Water Reclamation District applied for a ROW permit to construct and operate water pumping, delivery, treatment infrastructure, and facilities on BLM-managed land for the Town of Searchlight, Nevada. The Service concluded that incidental take of 11 desert tortoises on up to 41.22 acres of habitat outside of Searchlight, Clark County, Nevada, was not likely to jeopardize the continued existence of the desert tortoise.

F. EFFECTS OF THE PROPOSED ACTIONS ON THE LISTED SPECIES

Direct effects are the immediate, often obvious effect of the proposed action on the desert tortoise or its habitat. Indirect effects are those for which the proposed action is an essential cause, and that are later in time, but still are reasonably certain to occur. If an effect will occur whether or not the action takes place, the action is not an essential cause of the indirect effect. In contrast to direct effects, indirect effects can often be more subtle, and may affect desert tortoise populations and habitat quality over an extended period of time, long after project activities have been completed. Indirect effects are of particular concern for long-lived species such as the desert tortoise, because project-related effects may not become evident in individuals or populations until years later.

Project activities could result in direct mortality, injury, or harassment of individuals as a result of encounters with vehicles or heavy equipment. Also, desert tortoises may take shelter under parked vehicles and be killed, injured, or harassed when the vehicle is moved. Other direct effects could include individual desert tortoises or their eggs being crushed or entombed in burrows. Desert tortoises may be collected or vandalized. Construction or operation of facilities may disrupt behavior due to noise or vibrations from the heavy equipment; lead to injury or mortality from encounters with workers' or visitors' pets; and trash that may attract predators such as ravens and coyotes. Desert tortoises may also be attracted to the construction area by application of water to control dust, placing them at higher risk of injury or mortality. Measures proposed by BLM should ensure these potential effects are minimized or avoided: (1) biological clearances are conducted and all desert tortoises within the project footprint are translocated; and (2) temporary and permanent fencing are constructed and maintained around the project area.

Installation of the exclusionary fencing around the solar field could result in direct effects such as mortality, injury, or harassment of desert tortoises from equipment operation, installation activities, and removal of desert tortoise burrows. The fencing would preclude desert tortoises from re-entering or leaving if not found and removed during the clearance survey. Fencing would result in fragmentation of habitat and individual home ranges. During construction and operation, breaches in the exclusionary fencing may allow desert tortoises to pass through the barrier and be affected by project-related activities. Measures proposed by BLM should ensure these potential effects are minimized or avoided: (1) biological clearances are conducted and all desert tortoises within the project footprint are translocated; (2) temporary and permanent fencing are constructed and maintained around the project area; and (3) timely repair of the fencing is conducted.

Capturing, handling, and translocating desert tortoises from the proposed site after the installation of the fencing would result in harassment and may also result in death or injury. Desert tortoises may die or become injured by capture and relocation/translocation if these methods are performed improperly, particularly during extreme temperatures, or if they void their bladders. Averill-Murray (2001) determined that desert tortoises that voided their bladders during handling had significantly lower overall survival rates (0.81-0.88) than those that did not void (0.96). If multiple desert tortoises are handled by biologists without the use of appropriate protective measures and procedures, such as reused latex gloves, pathogens may be spread

among the desert tortoises. Walde *et al.* (2008) found that the differences in reproduction among translocated, resident, and control desert tortoises were "not likely to be statistically significant" in a study of desert tortoises at Fort Irwin. Measures proposed by BLM should ensure these potential effects are minimized or avoided: (1) Service-approved guidelines are followed when desert tortoises are handled; and (2) all personnel handling desert tortoises are Authorized Desert Tortoise Biologists.

Hazardous materials and wastes pose potential threats to desert tortoises. Measures proposed by BLM to ensure that a Waste Management Plan and a Spill Prevention Plan is implemented should minimize or avoid these potential effects.

Fire poses a threat to desert tortoise habitat. Construction activities and operation and maintenance activities could result in accidental fires that spread into adjacent desert tortoise habitat. Measures proposed by BLM to ensure that a fire protection system is installed should minimize or avoid these potential effects.

Project equipment may transport weeds into the project area where they may become established. Habitat quality would be reduced with the potential introduction of invasive plant species and compaction of soils. Additionally, the introduction of noxious weeds may lead to increased wildfire risk (Brooks *et al.* 2003). Measures proposed by BLM to ensure that weeds are controlled at the proposed project site should minimize or avoid these potential effects.

Human activities may provide food in the form of trash and litter or water that attracts desert tortoise predators such as the common raven, desert kit fox, feral dogs, and coyote (Berry 1986a; BLM 1990). Measures proposed by BLM to ensure a litter program is implemented and all trash removed daily should minimize or avoid these potential effects.

Facility infrastructure such as power poles could provide perching and nesting opportunities for ravens. Natural predation rates may be altered or increased when natural habitats are disturbed or modified. Common raven populations in some areas of the Mojave Desert have increased 1,500 percent from 1968 to 1988 in response to expanding human use of the desert (Boarman 2002). Since ravens were scarce in the Mojave Desert prior to 1940, the current level of raven predation on juvenile desert tortoises is considered to be an unnatural occurrence (BLM 1990). Measures proposed by BLM should ensure these potential effects are minimized or avoided: (1) project structures are designed to deter perching and nesting of ravens; (2) power lines are inspected at least annually; and (3) raven nests are reported to the Service and removed before they become active.

In addition to ravens, feral dogs have emerged as significant predators of the tortoise. Feral dogs may range several miles into the desert and have been found digging up and killing desert tortoises (Service 1994, Evans 2001). There are no reports of feral dogs in this area; furthermore, this area is away from urban areas where dogs may exist.

Domestic dogs brought to the project site by visitors may harass, injure, or kill desert tortoises, particularly if allowed off leash to roam freely in occupied desert tortoise habitat (Service 1994, Evans 2001). Measures proposed by BLM to ensure that: (1) biological clearances are conducted and all desert tortoises within the project footprint are translocated and (2) permanent fencing is constructed and maintained around the project area, should minimize or avoid these potential effects.

The project would result in the loss of 2,966 acres of desert tortoise habitat. Removal of habitat within the home range of a desert tortoise or segregating individuals from their home range (loss of connectivity) with a fence would likely result in displacement stress that could result in loss of health, increased risk of predation, and death. Measures proposed by BLM should ensure these potential effects are minimized or avoided: (1) Service-approved translocation guidelines are followed; (2) desert tortoises are monitored and findings reported to the Service; and (3) adaptive management strategies are implemented.

For gene flow to reliably happen across the range, populations of tortoises need to be connected across the range by occupied areas of habitat that contain sustainable numbers of tortoises. Desert tortoise population genetic studies and distribution provide evidence that individual desert tortoises breed with their neighbors, those tortoises breed with their neighbors on the other side, and so on. Removal of 2,966 acres of tortoise habitat from the area between Interstate 15 and the Lucy Gray Mountains would further limit movement of tortoises but sufficient habitat would remain between the eastern project boundary and the Lucy Gray Mountains to maintain connectivity. Translocation of displaced tortoises into this area adjacent to the project would increase the number of tortoises and maintain gene flow.

Disturbance of 2,966 acres will result in the direct loss of habitat for all tortoises that occur on these acres at the time the area is cleared and will no longer be available for tortoises in adjacent habitat that may use the project acres for foraging, breeding, or sheltering. In addition to the immediate and short-term effects to desert tortoises in the action area, the direct loss of habitat at the site precludes the use of this habitat by all future generations of tortoises that would have otherwise been recruited within and occupied the site. Translocation of tortoise into adjacent habitat would minimize this effect by allowing displaced tortoises to remain in the greater Ivanpah Valley population and contribute towards recovery of the species.

Following release, 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 prior to home range establishment. 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 1986b; U.S. Army 2009; U.S. Army 2010). We cannot predict the distances or direction that translocated desert tortoises are likely to move. The degree to which these desert tortoises expand the area they use depends on whether the translocated desert tortoises 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). 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). However, Field *et al.* (2007) and Nussear (2004) showed translocated desert tortoises appear to reduce movement distances following their first post-translocation hibernation to a level that is not significantly different from resident populations. 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 1986b; Field *et al.* 2007; Nussear 2004). Mean dispersal distances observed on three study plots south of Fort Irwin ranged from 153 to 6,168 yards, with maximum dispersal distances of between 13,795 to 25,155 yards (Walde *et al.* 2008). Measures proposed by BLM should ensure these potential effects are minimized or avoided: (1) Service-approved translocation guidelines are followed; (2) desert tortoises are monitored and findings reported to the Service, (3) temporary desert tortoise fencing is constructed around all release points within the subsequent recipient area; and (4) adaptive management strategies are implemented.

Translocated desert tortoises from the construction area would be moved into areas already supporting other desert tortoises. As a result, there could be increased competition for forage; especially during drought years. Increased desert tortoise densities may lead to increased inter-specific encounters and thereby increase the potential for spread of disease and potentially reduce the overall health of the population. Increased desert tortoise densities could also lead to increased competition for shelter sites and other resources or increased incidence of aggressive interactions between individuals (Saethre *et al.* 2003). Measures proposed by BLM should ensure these potential effects are minimized or avoided: (1) Service-approved translocation guidelines are followed; (2) desert tortoises are monitored and findings reported to the Service; and (3) adaptive management strategies are implemented.

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). However, Nussear (2004) found that mortality among translocated desert tortoises was not statistically different from mortality observed in resident populations, but mortality rates in resident populations were not compared to those in control groups; therefore, we cannot determine if the translocation caused increased mortality rates in the resident population. Recent work on translocation associated with the expansion of Fort Irwin (U.S. Army 2009; U.S. Army 2010) compared the mortality rates associated with resident and translocated populations with that of the control populations and indicates that translocation does not increase mortality above natural levels (Esque *et al.* 2010). We estimate that most tortoise mortality is likely to occur in the first year after release. After the first year, the individuals in the translocated population are likely to settle into new home ranges and mortality is likely to decrease.

The recipient and control sites may include desert tortoise critical habitat. We determined that the only critical habitat effects that may occur as a result of the proposed action involve installation of temporary desert tortoise fencing to restrict tortoise emigration from release. However, the primary constituent elements of critical habitat will be unaffected by project-related activities.

G. CUMULATIVE EFFECTS

Cumulative effects are those effects of future non-Federal (State, tribal, local government, or private) activities 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.

In general, actions on private lands within and adjacent to Primm, Nevada are expected to continue to increase in proportion to increases in the human populations and access in these areas. Increased development would cause continued habitat loss, degradation, and fragmentation for the local desert tortoise population; as well as increased harm and harassment of individual desert tortoises, contributing to the cumulative degradation of the area. Planned future actions, such as those that may occur as a result of the development of the Ivanpah Valley Airport, completion of rail lines, and future industrial solar power plants, would likely continue this trend. However, we know of no specific proposal by any non-federal entity in the action area. The Service determines that most other future actions in the action area would likely require section 7 consultation since the action area is managed by BLM, a Federal agency.

H. 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. NextLight will implement numerous measures to ensure that most tortoises are located and translocated, potential desert tortoise injury and mortality is minimized, and reduce the potential that desert tortoises will occupy project work sites (i.e., clearance surveys, exclusion fencing, translocation, qualified desert tortoise biologists, desert tortoise monitors).

2. The number of desert tortoises likely to be injured and killed as a result of translocation will likely to be small relative to the number of desert tortoises that occur across the range of the species.

3. NextLight will implement 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 or connectivity between areas that BLM or other agencies have designated for intensive management to achieve conservation of desert tortoises.

   While the project will reduce the amount of available desert tortoise habitat, sufficient habitat will remain to provide connectivity of tortoise habitat in Ivanpah Valley. Translocation of desert tortoises into habitat adjacent to the project area will increase tortoise numbers in those adjacent areas and potentially enhance gene flow within the population.

   The project will remove habitat for tortoises that occur on the site and future generations of tortoises that would occur in the area. Successful translocation of displaced tortoises would minimize these effects by allowing those tortoises to remain in the population and contribute towards recovery of the species.

6. Compensation requirements through BLM will result in an increase in the quantity and quality of habitat managed for the conservation of the desert tortoise including restoration of lost or degraded habitat within these areas.

Based on the information contained in the project description the recipient and control sites may include desert tortoise critical habitat. We determined that the only critical habitat effects that may occur as a result of the proposed action involve installation of temporary desert tortoise fencing to temporarily restrict tortoise emigration from release points. However, the primary constituent elements of critical habitat will be unaffected by project-related activities. Therefore, we conclude that the proposed action will affect, but is not likely to adversely modify designated critical habitat for the desert tortoise.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act

provided that such taking is in compliance with the Terms and Conditions of an incidental take statement.

The Terms and Conditions may include: (1) restating measures proposed by BLM; (2) modifying the measures proposed by BLM; or (3) specifying additional measures considered necessary by the Service. Where these Terms and Conditions vary from or contradict the minimization measures proposed under the Description of the Proposed Action, specifications in these Terms and Conditions shall apply. The measures described below are nondiscretionary and must be implemented by BLM, or other jurisdictional Federal agencies, so that they become binding conditions of any project, contract, grant, or permit issued by BLM as appropriate, in order for the exemption in section 7(o)(2) to apply. Other jurisdictional Federal agencies may include the U.S. Army Corps of Engineers (for a permit under the Clean Water Act), the U.S. Department of Treasury (partial funding provided through the American Recovery and Reinvestment Act), and the Federal Communications Commission (for operation of a two-way radio communications system). The Service's evaluation of the effects of the proposed actions includes consideration of the measures developed by BLM, and repeated in the *Description of the Proposed Action* portion of this biological opinion, to minimize the adverse effects of the proposed action on the desert tortoise. Any subsequent changes in the minimization measures proposed by BLM, or other jurisdictional Federal agencies, may constitute a modification of the proposed action and may warrant reinitiation of formal consultation, as specified at 50 CFR § 402.16. These Reasonable and Prudent Measures are intended to clarify or supplement the protective measures that were proposed by BLM as part of the proposed action.

The BLM, and other jurisdictional Federal agencies, have a continuing duty to regulate the activities covered by the Incidental Take Statement in the biological opinion. If BLM , or other jurisdictional Federal agencies, fail to include the Terms and Conditions of this Incidental Take Statement as enforceable conditions of its discretionary action, the protective coverage of section 7(o)(2) may lapse. To monitor the effect of incidental take, BLM must report the progress of its action and its effects on the desert tortoise to the Service as specified in the Incidental Take Statement [50 *Code of Federal Regulations* 402.14(i)(3)].

A. AMOUNT OR EXTENT OF TAKE ANTICIPATED

The Service determined that the incidental take of the desert tortoise will be difficult to detect or quantify. As discussed previously, we also determined that the number of eggs that may be within the proposed project area cannot be quantified. Rather than relying on numbers of eggs for take and reinitiation requirements, we rely upon the extent of habitat disturbance, which can be accurately quantified, and estimates of tortoises expected to occur on those acres as the surrogate. Should the extent of habitat disturbance or the number of tortoise injuries or mortalities exceed those in our assessment, reinitiation of consultation would be required. Destruction of any desert tortoise outside the project footprint resulting from this project would also constitute a reinitiation trigger.

Based on the analysis of impacts provided above, measures proposed by BLM, and the anticipated project duration, the Service anticipates that the following take could occur as a result of the proposed action:

1. Capture and Translocation of Desert Tortoises

a. Based on the best available information, approximately 123 sub-adult and adult desert tortoises are anticipated to be captured and translocated during the life of the project. It is unknown how many juvenile and hatchling desert tortoises and desert tortoise eggs will be detected, but all juvenile and hatchling desert tortoises that are detected in disturbed areas within the fenced perimeter, access roads, power transmission lines, berms, and firebreaks will be captured and translocated, and all desert tortoise eggs that are located will be excavated and relocated.

b. No more than three (3) adult or sub-adult tortoises and an unknown number of juvenile desert tortoises and eggs are anticipated to be killed or injured during translocation and monitoring due to stress associated with this activity.

c. Following capture and translocation, we anticipate mortality rate of translocated and monitored resident tortoises in the recipient area to be similar to the mortality rate of monitored control desert tortoises.

2. Construction of Facilities

NextLight 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. Consequently, we anticipate that construction activities at the project site, including transmission lines and use of access routes, is likely to take no more than five (5) sub-adult and adult desert tortoises. We anticipate that all undetected desert tortoises (and eggs) will be accidentally injured, killed, or destroyed. It is unknown how many juvenile and hatchling desert tortoises and desert tortoise eggs will be undetected within disturbed areas; however, the Service estimates that no more than 129 juvenile desert tortoises and 97 hatchling desert tortoises will be accidentally injured or killed).

3. Operation and Maintenance of Project Facilities

a. Following fencing of project areas and project construction, operation and maintenance activities, including site access within permanently fenced areas are unlikely to directly injure or kill any desert tortoises. However, desert tortoises that were undetected during construction may be detected during operation and maintenance activities (*e.g.*, a small hatchling desert tortoise may grow to a size that is easier to detect). It is unknown how many desert tortoises and desert tortoise eggs will be detected, but any detected desert tortoise will be captured and translocated, and all desert tortoise eggs that are located will be excavated and

relocated. We include these animals within the take authorized during construction activities.

b. Maintenance activities located outside of fenced work areas would kill or injure few, if any, desert tortoises because these activities would not result in ground disturbance. In addition, NextLight would implement numerous protective measures to avoid adverse effects. Other maintenance activities associated with fence repair would kill or injure few, if any, desert tortoises because this action would be localized and infrequent, access to repair sites would require little if any off-road travel and NextLight would implement numerous protective measures to reduce the potential for take. The Service estimates that no more than one (1) desert tortoise will be accidentally injured or killed annually for maintenance activities outside the fenced perimeter.

4. Restoration and Decommissioning of Facilities

a. Restoration of temporary disturbance within the fenced perimeter during operation and maintenance is unlikely to result in take of desert tortoises because NextLight will have cleared all fenced areas of desert tortoises prior to initial construction of facilities. However, desert tortoises that were undetected during construction may be detected during restoration activities. It is unknown how many desert tortoises and desert tortoise eggs will be detected, but any detected desert tortoises will be captured and translocated, and all desert tortoise eggs that are located will be excavated and relocated. We include these animals within the take authorized during construction activities. For restoration outside of fenced areas, we have included take of these animals as operation and maintenance.

b. After facility closure, decommissioning activities and restoration of long-term disturbance within fenced areas are proposed to be conducted. Because we do not have sufficient information regarding the method or extent of decommissioning activities that may occur, we cannot determine the level of take associated with these activities. Consequently, we are not granting an exemption from the prohibitions against take for these activities. These actions will require reinitiating consultation.

B. EFFECT OF TAKE

In the accompanying biological opinion, the Service has determined that this level of anticipated take will not jeopardize the continued existence of the desert tortoise.

Our evaluation of the proposed action includes consideration of the protective measures described in the *Description of the Proposed Action* section of the accompanying 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 reinitiation of consultation, pursuant to the implementing regulations of the section 7(a)(2) of the Act (50 CFR § 402.16).

C. REASONABLE AND PRUDENT MEASURES WITH TERMS AND CONDITIONS

The Service believes that the Reasonable and Prudent Measures (RPMs) below are necessary and appropriate to minimize take of desert tortoises. In order to be exempt from the prohibitions of section 9 of the Act, BLM, or other jurisdictional Federal agencies, must ensure full compliance with Terms and Conditions, which follow and implement the RPMs below. These conditions are non-discretionary.

RPM 1: *The BLM, or other jurisdictional Federal agencies as appropriate, shall ensure that desert tortoises in harm's way are located, properly handled, translocated, monitored, and excluded from fenced project facilities.*

Terms and Conditions:

1.a. A desert tortoise education program shall be presented to all personnel onsite during construction activities. This program will contain information concerning the biology and distribution of the desert tortoise, its legal status and occurrence in the proposed project area, the definition of take and associated penalties, measures designed to minimize the effects of construction activities, the means by which employees can facilitate this process, and reporting requirements to be implemented when desert tortoises are encountered.

1.b. An authorized desert tortoise biologist shall be onsite during the desert tortoise active season for all construction activities to ensure compliance with this biological opinion, including avoidance of inadvertently harming any desert tortoises that may wander on to the construction site via unfenced areas.

The authorized desert tortoise biologist shall be responsible for: (1) enforcing the litter-control program; (2) ensuring that tortoise-proof fences are maintained where applicable; (3) ensuring that desert tortoise habitat disturbance is restricted to authorized areas; (4) ensuring that all equipment and materials are stored within the boundaries of the construction zone or within the boundaries of previously-disturbed areas; (5) ensuring that all vehicles associated with construction activities remain within the proposed construction zones; and (6) ensuring compliance with the Terms and Conditions of this biological opinion. Desert tortoises shall be handled according to Service-approved protocol (Service 2009a).

In accordance with *Procedures for Endangered Species Act Compliance for the Mojave Desert Tortoise* (Service 2009a), an authorized desert tortoise biologist shall possess a bachelor's degree in biology, ecology, wildlife biology,

herpetology, or closely related fields. The biologist must have demonstrated prior field experience using accepted resource agency techniques to survey for desert tortoises and desert tortoise sign. In addition, the biologist shall have the ability to recognize and accurately record survey results.

1.c. A temporary, tortoise-proof fence shall be constructed and maintained around the project area until a permanent tortoise-proof fence is erected. An authorized desert tortoise biologist will be present at all times during fence construction. Temporary fencing along the highway will be completed before construction begins.

Fencing will consist of 1-inch horizontal by 2-inch vertical mesh. The tortoise-proof fencing will extend at least 18 inches aboveground and, where feasible, 6 inches below ground. In situations where it is not feasible to bury the fence, the lower 6-12 inches of the fence shall be bent at a 90-degree angle towards the potential direction of encounter with desert tortoise and covered with cobble or other suitable material to ensure that desert tortoises cannot dig underneath, thus creating gaps through which desert tortoises may traverse. The fence shall be inspected, and zero clearance maintained between the bottom of the fence and the ground as stated in the Terms and Conditions below.

Temporary fencing to restrict tortoise emigration from release sites will be installed as stated above except methods will be used that will not result in disturbance of critical habitat.

1.d. Cattleguards shall be placed at all road access points, where desert tortoise-proof fencing is interrupted, to exclude desert tortoises from the road and entering the ROW. BLM, or other jurisdictional Federal agencies as appropriate, shall coordinate with the Service on placement and design of cattleguards and their connection with the fencing, to ensure that cattleguards provide a functional barrier to desert tortoise access to the road ROW.

1.e. After construction of the temporary tortoise-proof fence and before surface-disturbing activities, an authorized desert tortoise biologist shall conduct a clearance survey to locate and remove desert tortoises using techniques providing full coverage of all areas. Two passes of complete coverage will be accomplished. All desert tortoise burrows, and other species burrows that may be used by desert tortoises, will be examined to determine occupancy of each burrow by desert tortoises. Any desert tortoises or eggs found in the fence line will be relocated offsite by an authorized desert tortoise biologist in accordance with approved protocol (Service 2009a). Desert tortoise burrows that occur immediately outside of the fence alignment that can be avoided by fence construction activities shall be clearly marked or flagged to prevent crushing.

1.f. All burrows found within areas proposed for disturbance, whether occupied or vacant, shall be excavated by an authorized desert tortoise biologist and collapsed or blocked to prevent desert tortoise re-entry. All burrows will be excavated with hand tools to allow removal of desert tortoises or desert tortoise eggs. All desert tortoise handling and excavations, including nests, will be conducted by an authorized desert tortoise biologist in accordance with Service-approved protocol (Service 2009a).

1.g. All desert tortoises encountered at the project site and an equal number of desert tortoises at the recipient and control sites shall be given unique identification numbers assigned by the Service in coordination with state wildlife agencies. A tracking device (e.g., transmitter) must be affixed to each desert tortoise encountered. Prior to translocation, resident and control desert tortoises must be located monthly at minimum.

1.h. All located desert tortoises shall be relocated offsite to a preapproved recipient site in accordance with the project translocation plan (NextLight 2010b). Prior to translocation at the subsequent recipient site, temporary fencing will be installed at the release points to restrict desert tortoise movements within the area temporarily. The temporary fence shall be removed by the project proponent, the timing of which would be specified by the Service. Desert tortoises found aboveground will be placed under a bush in the shade. A desert tortoise located in a burrow will be placed in an existing unoccupied burrow of the same size and orientation as the one from which it was taken. If a suitable natural burrow is unavailable or the occupancy status of the burrow is in question, a qualified desert tortoise biologist will construct one of the same size and orientation as the one from which it was removed using the protocol for burrow construction (Service 2009a). Projected density after translocation (includes residents and translocated tortoises) must not exceed 130 percent of the mean density detected in the nearest recovery unit. Translocations shall not occur at times of severe environmental stress for desert tortoises. Minimally, this pertains to time of year, local/regional weather patterns, weather conditions during the proposed release event, and condition of the donor and recipient sites.

1.i. Permanent tortoise-proof fencing along the project area shall be appropriately constructed, monitored and maintained. During construction, fencing will be checked weekly during the desert tortoise active period (March 1 through October 31), and monthly during the desert tortoise inactive period and after major storm events. After the completion, fencing will be monitored on a quarterly basis and after major storm events, unless modified as directed by the Service. Repairs will be made in a timely manner upon discovery. Monitoring and maintenance shall include regular removal of trash and sediment accumulation and restoration of zero ground clearance between the ground and the bottom of the fence, including re-covering the bent portion of the fence if not buried.

1.j. Any desert tortoise found within one hour before nightfall shall be placed in a separate, clean cardboard box and held in a cool, predator-free location. The box will be covered and kept upright at all times to minimize stress to the tortoise. Each box will be used once and then disposed properly. The desert tortoise will be released the next day in the same area from which it was collected and using the procedures described above. Each desert tortoise will be handled with new disposable latex gloves. After use, the gloves will be properly discarded and a fresh set used for each subsequent desert tortoise handling.

1.k. Project activities that may endanger a desert tortoise shall cease if a desert tortoise is found on the project site. Project activities will resume after an authorized desert tortoise biologist removes the desert tortoise from danger or after the desert tortoise has moved to a safe area.

1.l. An equal number of translocated, resident, and control desert tortoises, as well as all unhealthy resident desert tortoises shall be monitored. Translocated desert tortoises must be monitored within 24 hours of release and at least twice weekly for the first 2 weeks. Starting the third week after release, desert tortoises must be monitored at least once a week during the active season (approximately March through early November) and once every other week from November to February for a minimum of 5 years. Resident and control desert tortoises must be monitored at least once a week during the active season (approximately March through early November) and once every other week from November to February. Periodic assessments of condition (*i.e.*, measurements of body mass and carapace, visual health assessment, calculation of body condition) will be required. These assessments will be required minimally pre- and post-emergence from over-wintering site (as specified by the Service).

RPM 2: *The BLM, or other jurisdictional Federal agencies as appropriate, shall ensure that translocation of desert tortoises does not result in spread of disease, or injury or mortality of translocated or resident desert tortoises; and mortality of monitored translocated, resident, and control animals are similar.*

Terms and Conditions:

2.a. If the desert tortoises will be monitored *in situ* (*i.e.*, in place) rather than removed during the survey, a tracking device (*e.g.*, transmitter) shall be affixed to each desert tortoise encountered during clearance the survey. If *ex situ* quarantine is chosen, the project proponent shall coordinate with a desert tortoise husbandry and disease prevention expert to design a facility and develop operating protocols to ensure that proper care and quarantine will be maintained. Quarantine facilities for individual desert tortoises removed during the clearance surveys must securely hold the desert tortoises from time of collection to ultimate disposition and provide for their health and wellbeing. The proponent must secure a certified

caretaker and be approved by the Service and the state wildlife agency. Desert tortoises shall be monitored a minimum of once each month while awaiting translocation.

2.b. Health assessments shall be performed on all desert tortoises encountered during the population and clearance surveys for the project area, recipient areas, and the control area. All health assessments will include a physical inspection (*i.e.*, notation of clinical signs of acute disease infection; evidence of emaciation or dehydration; palpation for bladder stones; body mass and carapace measurements). Further disease surveillance via blood work shall be done for all desert tortoises that will be moved greater than 500 m (or from the opposite side of a barrier to dispersal) and on all desert tortoises on sites that will receive translocated desert tortoises from greater than 500 m away (or from the opposite side of a barrier to dispersal). No resident desert tortoises will be removed from the population unless requested by the Service. Health assessments must be conducted by individuals certified by the Service and state wildlife agency to conduct such assessments. If a desert tortoise being monitored *in situ* has a positive blood test result, all desert tortoises within 500 meters of the positive tortoise's initial and current locations must be retested in case it came into contact with the unhealthy desert tortoises while initial test results were pending. The positive desert tortoise must be removed from the project site and sent to the recovery center as described in Translocation Guidance (Service 2010b). The project proponent will pay the recovery center $9,000 for each tortoise sent to them for housing, care, treatment, and other services for 5 years ($3,000 for year one, $1,500 for years two-five). No additional funds will be requested from project proponents for tortoises remaining at the center after 5 years. The recovery center is operated by the San Diego Zoo under contract with the Service.

2.c. At the conclusion of the initial monitoring period, complete health assessments shall be conducted on all remaining monitored desert tortoises. Transmitters shall not be removed and monitoring concluded until the Service and the state wildlife agency have reviewed the health assessment data to determine that further adaptive management and monitoring are not required to ensure project impacts were minimized.

RPM 3: *The BLM, or other jurisdictional Federal agencies as appropriate, shall ensure implementation of measures to minimize predation on desert tortoises by ravens or other desert tortoise predators attracted to the project area.*

Term and Conditions:

3.a. A litter control program shall be implemented to reduce the attractiveness of the area to opportunistic predators such as desert kit fox, coyotes, and common

ravens. Trash and food items will be disposed of properly in predator-proof containers with re-sealing lids. Trash containers will be emptied and construction waste will be removed daily from the project area and disposed of in an approved landfill.

3.b. All project structures shall be designed to deter the perching and nesting of ravens.

3.c. A qualified biologist shall conduct monthly nest surveys of the transmission line during the raven breeding season and document the presence of all nests and the species using them. During these monthly surveys, the authorized biologist will also document any sign of predation of desert tortoises below the nest and in the vicinity of the transmission line. If sign of predation is found under a nest, it will be reported to BLM, who will immediately notify Wildlife Services personnel to handle the offender. All raven nests will be removed from the transmission line by authorized personnel and the nesting material will be disposed of at least once per year when desert tortoises are least active.

RPM 4: *The BLM, or other jurisdictional Federal agencies as appropriate, shall ensure implementation of measures to minimize loss and long-term degradation and fragmentation of desert tortoise habitat, such as soil compaction, erosion, crushed vegetation, or introduction of non-native invasive plants or weeds as a result of project activities.*

Terms and Conditions:

4.a. All equipment, vehicles, and construction materials shall remain within the fenced ROW. Staging areas will be located in previously-disturbed areas whenever possible.

4.b. Cross-country travel and travel outside construction zones and fenced areas shall be prohibited.

4.c. Prior to surface-disturbing activities associated with the proposed project, BLM, or other jurisdictional Federal agencies as appropriate, shall collect remuneration fees for compensation of desert tortoise habitat loss. BLM estimates that 2,966 acres of habitat will be disturbed. Total fees for disturbance of desert tortoise habitat within the material site and expansion area will be $2,295,684 ($774/acre x 2,966 acres).

If fees are paid after March 1 of the year, the rate will be indexed for inflation based on the Bureau of Labor Statistics Consumer Price Index for All Urban Consumers (CPI-U). Information on the CPI-U can be found on the internet at: http://stats.bls.gov/news.release/cpi.nws.htm.

Desert tortoise compensation funds shall be used for the sole purpose of implementing action(s) that benefits desert tortoise over time, including management and recovery in Nevada. Compensation funding will be used to fund the highest priority actions in Nevada. BLM and the Service will identify and give priority to actions that directly tie to the impacts that lead to the need for compensation.

4.d. The BLM and project proponent shall coordinate to salvage and relocate cacti, yuccas, and shrubs for onsite and offsite restoration efforts.

4.e. Perennial and annual vegetation transects at representative locations within the recipient and control sites shall be sampled annually to capture changes in habitat.

RPM 5: *The BLM, or other jurisdictional Federal agencies as appropriate, shall ensure implementation of measures to ensure compliance with the Reasonable and Prudent Measures, Terms and Conditions, reporting requirements, and reinitiation requirements contained in this Biological Opinion.*

Terms and Conditions:

5.a. The authorized desert tortoise biologist shall record each observation of desert tortoise handled. Information will include the following: location, date and time of observation, whether desert tortoise was handled, general health and whether it voided its bladder, location desert tortoise was moved from and location moved to, and unique physical characteristics of each tortoise. Reports documenting effectiveness and compliance with the desert tortoise protection measures will be prepared every 6 months.

The reporting requirements would include the submission of an assessment after construction of each phase is completed. Each report would outline the schedule that was followed for implementing the minimization measures as well as biological observations (as stated above) and the general success of each of the minimization measures and the maintenance activities that occurred over that period.

A final report will be submitted to the Service's Nevada Fish and Wildlife Office in Las Vegas within 90 days of completion of construction of all three phases of the project.

5.b. The deaths of monitored desert tortoises shall be investigated as thoroughly as possible to determine the effectiveness of minimization measures and decide upon adaptive management measures. The Service and appropriate state wildlife agency must be informed (including data on desert tortoise identity, location, cause of death) verbally within 48 hours of a death and in writing (electronic mail is sufficient) within five business days. Fresh carcasses must be submitted for necropsy and the cost covered by the proponent. Necropsy results must be submitted to the Service and the appropriate state wildlife agencies.

5.c. Quarterly reports for monitoring and repair of tortoise-proof fencing shall be submitted to the Service's Nevada Fish and Wildlife Office in Las Vegas.

5.d. A comprehensive database of monitoring translocated, resident, and control site desert tortoises shall be maintained and submitted to the Service and the appropriate state wildlife agency monthly for the first year and submitted quarterly for the duration of the project and upon request. BLM shall ensure that all data are collected and synthesized over the duration of the project, rather than reported only on compiled raw data. Any problems observed (e.g., rapid declines in body condition, perceived outbreaks of disease, mortality events) must be reported immediately in writing to the Service and appropriate state wildlife agency such that implementation of approved adaptive management measures occurs in a timely fashion. As a minimum, written reports must be submitted monthly for the first year and submitted quarterly for the duration of the project.

D. CLOSING PARAGRAPH

The Service estimates that up to 38 sub-adult and adult desert tortoises, all undetected juvenile and hatchling desert tortoises within disturbed areas, and all undetected desert tortoise eggs within disturbed areas will be accidentally injured, killed, or destroyed (however, the Service estimates that no more than 129 juvenile desert tortoises and 97 hatchling desert tortoises will be accidentally injured or killed); 123 sub-adult and adult desert tortoises and an unknown number of juvenile desert tortoises may be taken by harassment or captured and moved out of harm's way during project activities; and an unknown number of desert tortoises taken in the form of indirect mortality through predation by ravens or other subsidized predators drawn to the project area. The RPMs, with their implementing Terms and Conditions, are designed to minimize the effect of incidental take that might otherwise result from the proposed actions. If, during the course of the action, the level of incidental take or loss of habitat identified is exceeded, such incidental take and habitat loss represents new information requiring reinitiation of consultation and review of the RPMs provided. The BLM, or other jurisdictional Federal agencies as appropriate, must

immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the RPMs.

E. REPORTING REQUIREMENTS

Upon locating a dead or injured desert tortoise within the action area, notification must be made to the Service's Nevada Fish and Wildlife Office in Las Vegas at (702) 515-5230. Care should be taken in handling sick or injured desert tortoises to ensure effective treatment and in handling of dead specimens to preserve biological material in the best possible state for later analysis of cause of death. In conjunction with the care of injured desert tortoises or preservation of biological materials from a dead animal, the finder has the responsibility to carry out instructions provided by the Service to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed. All deaths, injuries, and illnesses of desert tortoises, whether associated with project activities or not, will be summarized in an annual report.

The following actions should be taken for injured or dead desert tortoises if directed by the Service:

1. Injured desert tortoises shall be delivered to any qualified veterinarian for appropriate treatment or disposal.

2. Dead desert tortoises suitable for preparation as museum specimens shall be frozen immediately and provided to an institution holding appropriate Federal and State permits per their instructions.

3. Should no institutions want the desert tortoise specimens, or if it is determined that they are too damaged (crushed, spoiled, *etc*.) for preparation as a museum specimen, then they may be buried away from the project area or cremated, upon authorization by the Service.

4. The BLM, or other jurisdictional Federal agencies as appropriate, shall bear the cost of any required treatment of injured desert tortoises, euthanasia of sick desert tortoises, or cremation of dead desert tortoises.

5. Should sick or injured desert tortoises be treated by a veterinarian and survive, they may be transferred as directed by the Service.

CONSERVATION RECOMMENDATIONS

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

- *We recommend that BLM protect and manage desert tortoise translocation recipient sites for conservation of the desert tortoise and preclude further human-induced impacts in these areas in perpetuity. Managing these areas in this manner could help maintain the value of translocations as a minimization measure for large-scale projects as well as for recovery of the desert tortoise.*

REINITIATION

This concludes formal consultation on the actions outlined in your request. As required by 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over an action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

LITERATURE CITED

Avery, H.W. 1998. Nutritional ecology of the desert tortoise (*Gopherus agassizii*,) in relation to cattle grazing in the Mojave Desert. PhD dissertation, University of California, Los Angeles.

Averill-Murray, R. C. 2001. Program MARK survival analysis of tortoises voiding their bladders during handling. Proceeding of the 2001 Desert Tortoise Council Symposium. 48 pp.

Berry, K.H. (ed.). 1984. The status of the desert tortoise (*Gopherus agassizii*) in the United States. Desert Tortoise Council Report to the U.S. Fish and Wildlife Service. Order No. 11310 0083-81.

Berry, K.H. 1986a. Desert tortoise *(Gopherus agassizii)* research in California, 1976-1985. Herpetologica 42:62-67.

Berry, K.H. 1986b. Desert tortoise (*Gopherus agassizii*) relocation: implications of social behavior and movements. Herpetologica 42(1):113-125.

Berry, K. H. 1996. Summary of the results of long-term study plots for the desert tortoise in California. Letter to Molly Brady, Bureau of Land Management, Riverside, California. Riverside Field Station, U.S. Geological Survey. Riverside, California.

Berry, K. H. 1997. Demographic consequences of disease in two desert tortoise populations in California. Proceedings: conservation, restoration, and management of tortoises and turtles - an international conference. Pages 91-99.

Berry, K. H. 1999. Preliminary report from the 1999 spring survey of the desert tortoise long-term study plot in Chemehuevi Valley and Wash, California. Box Springs Field Station, Western Ecological Research Center, U.S. Geological Survey. Riverside, California.

Berry, K. H. 2003. Declining trends in desert tortoise populations at long-term study plots in California between 1979 and 2002: multiple issues. Abstract of paper presented at the twenty-eighth annual meeting of the Desert Tortoise Council.

Berry, K.H. and B.L. Burge. 1984. The desert tortoise in Nevada. Chapter 8 *In*: the status of the desert tortoise *(Gopherus agassizii)* in the United States. Report to U.S. Fish and Wildlife Service from the Desert Tortoise Council. Order No. 11310-0083-81.

Berry, K.H., E.K. Spangenberg, B.L. Homer, and E.R. Jacobson. 2002. Deaths of desert tortoises following periods of drought and research manipulation. Chelonian Conservation and Biology 4:436-448.

Bjurlin, C.D., and J.A. Bissonette. 2004. Survival during early life stages of the desert tortoise (*Gopherus agassizii*) in the south-central Mojave Desert. Journal of Herpetology 38(4): 527–535.

BLM (Bureau of Land Management). 1990. Draft Raven Management Plan for the California Desert Conservation Area. Prepared by Bureau of Land Management, California Desert District, Riverside, California. April 1990.

BLM (Bureau of Land Management). 2002a. Final Northern and Eastern Colorado Desert Coordinated Management Plan and Final Environmental Impact Statement (NECO) Amendment to the California Desert Conservation Area Plan. California Desert District. Moreno Valley, California. December 19, 2002.

BLM (Bureau of Land Management). 2002b. Final Northern and Eastern Mojave Desert Management Plan (NEMO), Amendment to the California Desert Conservation Area Plan. California Desert District. Moreno Valley, California. December 20, 2002.

BLM (Bureau of Land Management). 2010a. Draft Plan of Development Amendment for the Silver State Solar Project. Prepared by NextLight Renewable Power, LLC with technical assistance from CH2MHILL. January 2010. 305 pp.

BLM (Bureau of Land Management). 2010b. Biological Assessment for the Silver State Solar Project. Prepared by NextLight Renewable Power, LLC with technical assistance from CH2MHILL. February 19, 2010. 90 pp.

BLM (Bureau of Land Management). 2010c. Draft Environmental Impact Statement for the Silver State Solar Energy Project DO No. DES 10-21. Las Vegas Field Office. April 2010. 560 pp.

Boarman, W.I. 1993. When a native predator becomes a pest: a case study. For: conservation and resource management (S.K. Majumdar, *et al*., eds.), pages 186-201. Pennsylvania. Academy of Science, Easton, PA.

Boarman, W.I. 2002. Threats to desert tortoise populations: a critical review of the literature. Unpublished report prepared for the West Mojave Planning Team, Bureau of Land Management. Western Ecological Research Center, U.S. Geological Survey, Sacramento, California. August 9, 2002. 86 pages.

Boarman, W. I. and K. H. Berry. 1995. Common ravens in the southwestern United States, 1968-92. Pages 73-75 in E. T. LaRoe, G. F. Farris, C. E. Puckett, P. D. Doran, and M. J. Mac, editors. Our living resources: A report to the nation on the distribution, abundance, and health of U.S. plants, animals, and ecosystems. National Biological Service. Washington, D.C.

Boarman, W.I., and M. Sazaki. 2006. A highway's road-effect zone for desert tortoises (*Gopherus agassizii*). Journal of Arid Environments 65:94-101.

Boarman, W.I. and W.B. Kristan. 2006. Trends in common raven populations in the Mojave and Sonora deserts: 1968-2004. Draft report to U. S. Fish and Wildlife Service, Ventura CA 93003. Contract No. 814405M055.

Borysenko, M., and S. Lewis. 1979. The effect of malnutrition on immunocompetence and whole body resistance to infection in *Chelydra serpentina*. Developmental and Comparative Immunology 3:89-100.

Brooks, M.L. 1998. Alien annual grass distribution, abundance, and impact on desert tortoise habitat in the western Mojave Desert. Ph.D. Dissertation. University of California at Riverside.

Brooks, M.L., and T.C. Esque. 2002. Alien plants and fire in desert tortoise (*Gopherus agassizii*) habitat of the Mojave and Colorado deserts. Chelonian Conservation and Biology 4:330-340.

Brooks, M.L., T.C. Esque, and J.R. Matchett. 2003. Current status and management of alien plants and fire in desert tortoise habitat. Proceedings of the 2003 Desert Tortoise Council Symposium. Page 82.

Brown, D.E., and R.A. Minnich. 1986. Fire and changes in creosote bush scrub of the western Sonoran Desert, California. American Midland Naturalist 116(2):411-422.

Brown, M.B., I. M. Schumacher, P.A. Klein, K. Harris, T. Correll, and E.R. Jacobson. 1994. *Mycoplasma agassizii* causes upper respiratory tract disease in the desert tortoise. Infection and Immunity 62: 4580-4586.

Brown, D.R. , I. M. Schumacher, G.S. McLaughlin, L.D. Wendland, M.B. Brown, P.A. Klein, and E.R. Jacobson. 2002. Application of diagnostic tests for mycoplasmal infections of the desert and gopher tortoises, with management recommendations. Chelonian Conservation and Biology 4:497-507.

Bulova, S. J. 1994. Patterns of burrow use by desert tortoises: gender differences and seasonal trends. Herpetological. Monographs 8:133-143.

Bury, R.B. (ed.) 1982. North American Tortoises: Conservation and Ecology. U.S. Fish and Wildlife Service, Wildlife Research Report 12, Washington, D.C.

Bury, R.B. 1987. Off-road vehicles reduce tortoise numbers and well-being. U. S. Department of the Interior, Fish and Wildlife Service, National Ecology Research Center, Fort Collins, Colorado. Research Information Bulletin Number 87-6.

Bury, R.B. and D.J. Germano. 1994. Biology of North American tortoises: introduction. *In:* R.B. Bury and D.J. Germano, editors. Biology of the North American tortoises. National Biological Survey, Fish and Wildlife Research 13:1-7.

Christopher, M.M., K.H. Berry, B.T. Henen, and K.A. Nagy. 2003. Clinical disease and laboratory abnormalities in free-ranging desert tortoises in California (1990-1995). Journal of Wildlife Diseases 39:35-56.

Congdon, J.D., A.E. Dunham, and R.C. Van Loben Sels. 1993. Delayed sexual maturity and demographics of blanding's turtles (*Emydoidea blandingii*): Implications for conservation and management of long-lived organisms. Conservation Biology 7: 826-833.

Ernst, C.H., R.W. Barbour, and J.E. Lovich. 1994. Turtles of the United States and Canada. Smithsonian Institute Press, Washington and London. 578 pages.

Esque, T.C., K.E. Nussear, K. K. Drake, A.D. Walde, K.H. Berry, R.C. Averill-Murray, A.P. Woodman, W.I. Boarman, P.A. Medica, J. Mack, and J.S. Heaton. 2010. Effects of subsidized predator, resource variability, and human population density on desert tortoise

populations in the Mojave Desert. Endangered Species Research 12: 167–177.

Evans, R. 2001. Free-roaming dog issues at the United States Marine Corps Air Ground Combat Center, Twentynine Palms, California. Proceedings of the 2001 Desert Tortoise Council Symposium. p. 61.

Field, K.J., C.R. Tracy, P.A. Medica, R.W. Marlow, and P.S. Corn. 2007. Return to the wild: translocation as a tool in conservation of the desert tortoise (*Gopherus agassizii*). Biological Conservation 136: 232-245.

Gardner, T. J. and E.D. Brodie, Jr. 2000. The occupation of steep slopes by desert tortoises (*Gopherus agassizii*) in the western Mojave Desert: a description of occupied habitats, habitat use, and desert tortoise density. Final report.

GAO (General Accounting Office). 2002. Endangered species: research strategy and long-term monitoring needed for the Mojave desert tortoise recovery program. GAO-03-23. Washington, DC. 53 Pages.

Goodlett, G., and A.P. Woodman. 2003. Desert tortoise population survey at Virgin Slope desert tortoise study plot, spring 2003. Unpublished report prepared for Arizona Game and Fish Department, Nongame Branch, Contract G90040-K, Phoenix, Arizona.

Harless, M.L., A.D. Walde, D. K. Delaney, L.L. Pater, and W.K. Hayes. 2007. The effect of sampling effort on home range estimates of desert tortoises from the West Mojave Desert. Abstract of paper presented at the Thirty-Second Annual Meeting of the Desert Tortoise Council, Las Vegas, Nevada.

Hastey, E., L. K. Rosenkrance, B. R. Templeton, J. M. Parker, W. H. Radtkey, D. L. Harlow, B. D. Taubert, F. Worthley, W. A. Molini, R. D. Radantris. 1991. Compensation for the desert tortoise. A report prepared for the Desert Tortoise Management Oversight Group. November 1991. 16 pp.

Heaton, J.S., A. Karl, K. Nussear, R. Inman, and C. Everly. 2004. Estimation of numbers of desert tortoises in the additional training lands at Fort Irwin and the Western Mojave Recovery Unit. Unpublished calculations.

Henen, B.T. 1997. Seasonal and annual energy budgets of female desert tortoises (*Gopherus agassizii*). Ecology 78:283-296.

Hoff, K.v.S., and R.W. Marlow. 2002. Impacts of vehicle road traffic on desert tortoise populations with consideration of conservation of tortoise habitat in southern Nevada. Chelonian Conservation and Biology 4:4449-456.

Jacobson, E.R., T.J. Wronski, J. Schumacher, C. Reggiardo, and K.H. Berry. 1994. Cutaneous dyskeratosis in free-ranging desert tortoises, *Gopherus agassizii*, in the Colorado Desert of Southern California. J. Zoo and Wildlife Medicine 25(1):68-81.

Jennings, W.B. 1993. Foraging ecology of the desert tortoise (*Gopherus agassizii*) in the western Mojave Desert. Masters thesis. University of Texas, Arlington.

Jennings, W.B. 1997. Habitat use and food preference of the desert tortoise, *Gopherus agassizii*, in the western Mojave Desert and impacts of off-road vehicles. Proceedings: Conservation, Restoration, and Management of Tortoises and Turtles–An International Conference. Pages 42-45.

Karl, A.E. 2007. Tortoise regional estimates of density ("TRED") model. Unpublished report. August 2007. 3 pages.

Knight, R.L, H.A.L. Knight, and R. J. Camp. 1993. Raven populations and land-use patterns in the Mojave Desert, California. Wildlife Society Bulletin 22:469-471.

Liu, C., Berry, P. M., Dawson, T. P. and Pearson, R. G. 2005. Selecting thresholds of occurrence in the prediction of species distributions. Ecography 28: 385-393.

Longshore, K. M., J. R. Jaeger, and J. M. Sappington. 2003. Desert tortoise (*Gopherus agassizii*) survival at two eastern Mojave Desert sites: death by short-term drought? Journal of Herpetology 37:169–177.

Luckenbach, R. A. 1982. Ecology and management of the desert tortoise (*Gopherus agassizii*) in California. *In*: R. B. Bury, editor. North American tortoise: Conservation and ecology. U.S. Fish and Wildlife Service, Wildlife Research Report 12, Washington, D.C.

McLuckie, A.M. and R.A. Fridell. 2002. Reproduction in a desert tortoise population on the Beaver Dam Slope, Washington County, Utah. Chelonian Conservation and Biology 2002, 4(2):288-294.

McLuckie, A. M., M. R. M. Bennion, and R. A. Fridell. 2006. Regional desert tortoise monitoring in the Red Cliffs Desert Reserve (Draft), 2005. Salt Lake City: Utah Division of Wildlife Resources, Publication Number 06-06. 44 pp.

Morafka, D.J., K.H. Berry, and E.K. Spangenberg. 1997. Predator-proof field exclosures for enhancing hatching success and survivorship of juvenile tortoises: a critical evaluation. Pages 147-165 *in* Proceedings: conservation, restoration, and management of tortoises and turtles - an international conference (J. Van Abemma, ed.). New York Turtle and Tortoise Club, New York.

Mueller, J.M., K.R. Sharp, K.K. Zander, D.L. Rakestraw, K.P. Rautenstrauch, and P.E. Lederle. 1998. Size-specific fecundity of the desert tortoise (*Gopherus agassizii*). Journal of Herpetology 32:313-319.

Naegle, S. 1976. Physiological response of the desert tortoise, *Gopherus agassizii*. Master of Science thesis, University of Nevada, Las Vegas, Nevada.

Nagy, K.A. and P.A. Medica. 1986. Physiological ecology of desert tortoises in southern Nevada. Herpetologica 42:73-92.

NextLight (NextLight Power, LLC). 2010a. Desert Tortoise (*Gopherus agassizii*) Surveys on the Proposed Next Light Silver State Solar Project Sites: Phase 1 Construction Site, Proposed Relocation Site, and Proposed Translocation Site, Clark County, Nevada. June 22, 2010. 51 pp.

NextLight (NextLight Power, LLC). 2010b. Desert Tortoise Relocation/Translocation Plan Silver State Solar prepared for Bureau of Land Management Las Vegas Field Office with technical assistance from CH2MHILL. July 2010. 19 pp.

Niblick, H.A., D.C. Rostal, and T. Classen. 1994. Role of male-male interactions and female choice in the mating system of the desert tortoise, *Gopherus agassizii*. Herpetological Monographs 8:124-132.

Nussear, K.E., T.C. Esque, R.D. Inman, L. Gass, K.A. Thomas, C.S.A. Wallace, J.B. Blainey, D.M. Miller, and R.H. Webb. 2009. Modeling habitat of the desert tortoise (*Gopherus agassizii*) in the Mojave and parts of the Sonoran Deserts of California, Nevada, Utah, and Arizona. U.S. Geological Survey Open-File Report 2009-1102.

Origgi, R., C.H. Romero, P.A. Klein, K.H. Berry, and E.R. Jacobson. 2002. Serological and molecular evidences of herpesvirus exposure in desert tortoises from the Mojave Desert of California. Abstract of paper presented at the twenty-seventh annual meeting of the Desert Tortoise Council.

Peterson, C.C. 1996. Ecological energetics of the desert tortoise (*Gopherus agassizii*): effects of rainfall and drought. Ecology 77:1831-1844.

Peterson, C.C. 1994. Different rates and causes of high mortality in two populations of the threatened desert tortoise *Gopherus agassizii*. Biological Conservation 70:101–108.

RECON (Regional Environmental Consultants). 1991. Short-term habitat conservation plan for the desert tortoise in Las Vegas Valley, Clark County, Nevada. Prepared for Clark County, 225 Bridger Avenue, Las Vegas, Nevada 89155. January 1991. 143 pages.

RECON (Regional Environmental Consultants). 1995. Clark County desert conservation plan. Prepared for Clark County, 500 Grand Central Parkway, Las Vegas, Nevada 89155. 129 pages. plus appendices.

RECON (Regional Environmental Consultants). 2000. Clark County MSHCP. Prepared for Clark County, 500 Grand Central Parkway, Las Vegas, Nevada 89155.

Rowlands, P.G. 1995. Regional bioclimatology of the California desert. Pages 95-134 *in* J. Latting and P.G. Rowlands (eds.). The California desert: an introduction to natural resources and man's impact. Vol. 1. June Latting Books, Riverside, California.

Saethre, M.B., T.C. Esque, P.A. Medica, R. Marlow, and C.R. Tracy. 2003. Determining carrying capacity of desert tortoises. Abstract of a paper present at the 28th Annual Meeting and Symposium of the Desert Tortoise Council.

Sazaki, M., W.I. Boarman, G. Goodlett, and T. Okamoto. 1995. Risk associated with long distance movements by desert tortoises. Proceedings of the 1994 Desert Tortoise Council Symposium 1995. Pages 33-48.

Service (Fish and Wildlife Service). 1994. Desert Tortoise (Mojave population) Recovery Plan. Portland, Oregon. 73 pp. plus appendices.

Service (Fish and Wildlife Service). 2006. Range-wide monitoring of the Mojave population of the desert tortoise: 2001-2005 summary report. Desert Tortoise Recovery Office. Reno, Nevada.

Service (Fish and Wildlife Service). 2008. Draft revised recovery plan for the Mojave population of the desert tortoise (*Gopherus agassizii*). Pacific Southwest Region. Sacramento, California.

Service (Fish and Wildlife Service). 2009a. Desert tortoise field manual. *http://www.fws.gov/ventura/speciesinfo/protocols_guidelines/*

Service (Fish and Wildlife Service). 2009b. Range-wide monitoring of the Mojave population of the desert tortoise: 2007 annual report. Desert Tortoise Recovery Office. Reno, Nevada.

Service (Fish and Wildlife Service). 2010a. Preparing for Any Action That May Occur Within the Range of the Mojave Desert Tortoise (*Gopherus agassizii*). Revised for the 2010 Field Season. Desert Tortoise Recovery Office. Reno, Nevada. 18 pp.

Service (Fish and Wildlife Service). 2010b. Translocation of Desert Tortoises (Mojave Population) from Project Sites: A Technical Paper (Draft). Desert Tortoise Recovery Office. Reno, Nevada. April 2010. 17 pp.

Service (Fish and Wildlife Service). 2010c. Translocation of Desert Tortoises (Mojave Population) from Project Sites: Plan Development Guidance. Desert Tortoise Recovery Office. Reno, Nevada. August 2010. 11 pp.

Spotila, J.R., L.C. Zimmerman, C.A. Binckley, J.S. Grumbles, D.C. Rostal, A. List, Jr., E.C. Beyer, K.M. Philips, and S.J. Kemp. 1994. Effects of incubation conditions on sex determination, hatching success, and growth of hatchling desert tortoises, *Gopherus agassizii*. Herptological Monographs 8:103-116.

Tracy, C. R., R. Averill-Murray, W. I. Boarman, D. Delahanty, J. Heaton, E. McCoy, D. Morafka, K. Nussear, B. Hagerty, and P. Medica. 2004. Desert tortoise recovery plan assessment report. Unpublished report. 254 pages.

TRW Environmental Safety Systems Inc. 1997. Patterns of burrow use by desert tortoises at Yucca Mountain, Nevada. Unpublished report to U.S. Department of Energy. TRW Environmental Safety Systems Inc., Las Vegas, Nevada

Turner, F.B., K.H. Berry, D.C. Randall, and G.C. White. 1987. Population ecology of the desert tortoise at Goffs, California, in 1983-1986. Annual report to Southern California Edison Company, Rosemead, California. 101 pages.

Turner, F.B., P. Hayden, B.L. Burge, and J.B. Robertson. 1986. Egg production by the desert tortoise (*Gopherus agassizii*) in California. Herpetologica 42: 93-104.

Turner, F.B., P.A. Medica, and C.L. Lyons. 1984. Reproduction and survival of the desert tortoise *(Scaptochelys agassizii)* in Ivanpah Valley, California. Copeia 1984(4):811-820.

U.S. Army. 2009. Fort Irwin annual permit report for 2008. Submitted to the Desert Tortoise Recovery Office, Reno, Nevada. Fort Irwin, California.

U.S. Army. 2010. 2009 Annual reports for Fort Irwin biological opinions and desert tortoise permit for the Fort Irwin translocation project. Submitted to the Desert Tortoise Recovery Office, Reno, Nevada. Fort Irwin, California.

Van Devender, T.R. 2002. The Sonoran desert tortoise, natural history, biology, and conservation. The University of Arizona Press and Arizona-Sonora Desert Museum, Tucson, Arizona. 388 pages.

Walde, A.D., A.P. Woodman, and W.I. Boarman. 2008. desert tortoises surveys and research in the southern and western expansion areas of Fort Irwin. 2008 summary report. ITS Corporation. Prepared for the Department of the Army. Fort Irwin, California.

Walde, A., L. Bol, D. Delaney, and L. Pater. 2003. The desert tortoise: a preliminary analysis of operative and environmental temperatures. Unpublished report submitted to the U.S. Fish and Wildlife Service July 25, 2003.

Walker, M. and P. Woodman. 2002. Desert tortoise population survey at Beaver Dam Slope exclosure desert tortoise study plot; spring, 2001. Report to Arizona Game and Fish Department, Phoenix, Arizona

Webb, R.H., J.S. Heaton, M.L. Brooks, and D.M. Miller. 2009. Introduction. Pages 1-6 *in* R.H. Webb, L.F. Fenstermaker, J.S. Heaton, D.L. Hughson, E.V. McDonald, and D.M. Miller (eds.). The Mojave Desert: Ecosystem Processes and Sustainability. University of Nevada Press, Reno.

Wilson, D.S., K. A. Nagy, C. R. Tracy, D.J. Morafka, and R.A. Yates. 2001. Water balance in neonate and juvenile desert tortoises, *Gopherus agassizii*. Herpetological Monographs 15:158–170.

Woodman, P. 2004. Summary report for line distance transects conducted in spring, 2003 in the Mojave Desert, California. Prepared for U.S. Fish and Wildlife Service, Las Vegas, Nevada. Inyokern, California.

Woodman, P. 2005. Summary report for line distance transects conducted in spring, 2004 in the Mojave Desert, California. Prepared for U.S. Fish and Wildlife Service, Reno, Nevada. Inyokern, California.

Young, R., C. Halley, and A.P. Woodman. 2002. Desert tortoise population survey at Littlefield desert tortoise study plot, spring 2002. Unpublished report prepared for Arizona Game and Fish Department, Nongame Branch, Contract G40088-001, Phoenix, Arizona.

Zimmerman, L.C., M.P. O'Connor, S.J. Kemp, and J.R. Spotila. 1994. Thermal ecology of desert tortoises in the Eastern Mojave Desert: seasonal patterns of operative and body temperatures and microhabitat utilization. Herpetological Monographs 8:45-5

SECTION 7 LAND DISTURBANCE FEE PAYMENT FORM

Biological Opinion File Number: 84320-2010-F-0208

Biological Opinion Issued By: Nevada Fish and Wildlife Office, Las Vegas, Nevada

Species: Desert Tortoise (*Gopherus agassizii*) (Mojave population)

Project Name: Silver State Solar Project

Project Proponent: NextLight Renewable Power, LLC

Phone Number: _____

Payment Calculations:	Clark County		_____ County		_____ County	
	Critical habitat	Non-critical habitat	Critical habitat	Non-critical habitat	Critical habitat	Non-critical habitat
# acres anticipated to be disturbed on federal land	0	2,966				
Fee rate (per acre)	n/a	$774.00				
Total cost/habitat type (per county)	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Total cost per county	**$ 2,295,684**		**$ -**		**$ -**	

Total payment required (all counties): $ -

Amount paid: _____ **Date:** _____ **Check/Money Order #:** _____

Authorizing agencies: Bureau of Land Management, Las Vegas Nevada

Make check payable to: Bureau of Land Management

Deliver check to:

Physical Address
Bureau of Land Management
Attn: Information Access Ctr
1340 Financial Blvd.
Reno, NV 89502

PO Box
Bureau of Land Management
Attn: Information Access Ctr
PO Box 12000
Reno, NV 89520-0006

For BLM Public Room

Process check to:
Contributed Funds-All Other
WBS: LVTFF1000800
7122 FLPMA
All other Res. Dev. Project and Management
Remarks: LLNV9300000 L71220000.JP0000 LVTFF1000800 Desert Tortoise Conservation Program

Please provide a copy of this completed payment form and the payment receipt to NV-930, Attn: T&E Program Lead
***T&E Program Lead will provide a copy to the appropriate District Office(s)*