United States Department of the Interior

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

IN REPLY REFER TO:
81440-2011-F-0580

July 17, 2012

Commanding General
Marine Corps Air Ground Combat Center
Marine Air Ground Task Force Training Command
Attention: Major W.M. Rowley
Natural Resources and Environmental Affairs Division
Building 1451, Box 788110
Twentynine Palms, California 92778-8100

Subject: Biological Opinion for Land Acquisition and Airspace Establishment to Support Large-scale Marine Air Ground Task Force Live-fire and Maneuver Training, Twentynine Palms, California (8-8-11-F-65)

Dear Commanding General:

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion based on our review of the Marine Corps' land acquisition and airspace establishment proposal for the Marine Corps Air Ground Combat Center (MCAGCC) and its effects on the federally threatened Mojave desert tortoise (*Gopherus agassizii*) and its critical habitat. This document was prepared in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.). The proposed action involves modification of existing training on MCAGCC and expansion of training activities onto 167,971 acres of public and private land to the west and southeast of the existing installation. Your February 18, 2011 request for consultation was received in our office on February 22, 2011.

The "Mojave desert tortoise" denotes individuals listed as threatened under the Act (55 Federal Register 12178; April 2, 1990). Use of "Mojave" in the common name distinguishes these animals from the Sonoran desert tortoise, which is a candidate for listing and is not addressed in this biological opinion. Throughout the remainder of the document, we use only the common name of "desert tortoise" in referring to the "Mojave desert tortoise."

We based this biological opinion on information that accompanied your February 22, 2011 request for consultation and additional information, provided at our request in July and December of 2011, regarding estimates of the number of desert tortoises affected, translocation, displacement of off-highway vehicles (OHV) from the Johnson Valley Off-highway Vehicle Management Area, and mitigation strategies. This information includes the final biological assessments (Department of the Navy [DoN] 2011a), desert tortoise translocation plan (Karl and Henen 2011), the draft environmental impact statement (DoN 2011b), and an analysis of OHV displacement (DoN 2011c). A record of this consultation is available at the Ventura Fish and Wildlife Office.

Consultation History

On February 18, 2011, the Marine Corps requested formal consultation on its land expansion and airspace establishment proposal (DoN 2011e). On April 1, 2011, we denied the Marine Corps' initial request for consultation due to insufficient information and provided comments (Service 2011a) on the initial biological assessment (DoN 2011d). On June 30, 2011, we met with the Marine Corps to discuss our comments. On July 11, 2011, the Marine Corps requested formal consultation (DoN 2011f) a second time and provided a final biological assessment (DoN 2011a). In August 2011, we met with the Marine Corps via teleconference to discuss the new biological assessment and the remaining pieces of information required for consultation (e.g., translocation plan).

On September 16, 2011, we denied the Marine Corps' second request for formal consultation and identified the remaining items needed for consultation, which primarily focused on translocation of desert tortoises (Service 2011b). Following revisions to the biological assessment and further discussion of additional information needed to complete consultation, the Service acknowledged the initiation of formal section 7 consultation on October 18, 2011; we considered consultation to have been initiated on September 21, 2011.

On November 9, 2011, we met with the Marine Corps to discuss the remaining information required for consultation and the development of a consultation agreement that would identify time lines for completion of our biological opinion. At this meeting, the Marine Corps agreed to finalize a desert tortoise translocation plan and we agreed to provide recommendations to offset the unavoidable effects of the proposed expansion.

On November 28, 2011, we met with the Marine Corps to discuss the framework for the translocation plan and to provide guidance on development of this document. On December 8, 2011, we received the Marine Corps' final desert tortoise translocation plan (Karl and Henen 2011). On December 9, 2011, the Marine Corps and the Service signed a consultation agreement that identified specific time frames for completion of the consultation (Service and DoN 2011).

On January 17, 2012, we provided the Marine Corps with a recommended strategy for offsetting the unavoidable effects of the proposed action (Service 2012a). On February 2, 2012, the Marine Corps responded to these recommendations (DoN 2012a) and identified portions of our recommendation that it would commit to implement.

On February 10, 2012, we provided the Marine Corps with a draft project description for the biological opinion and requested comments. On February 14 and March 2, 2012, the Marine Corps provided comments on the draft project description for the biological opinion (Henen 2012a, 2012b), which we have incorporated herein.

On February 29, 2012, the Marine Corps provided further clarification of the conservation actions it was proposing to offset the adverse effects of the proposed action (DoN 2012b). On March 12, 2012, we proposed changes to the Marine Corps' action that would reduce adverse effects to the desert tortoise. On March 22, 2012, the Marine Corps provided a follow-up letter, pursuant to its February 29, 2012 letter, that proposed additional conservation actions and provided details to its previous letter (DoN 2012c).

We met with the Marine Corps on April 5, 2012, to discuss the effects of the proposed action and recommended changes to the proposed action and conservation actions that would reduce and offset its effects. The Marine Corps provided further clarification and commitments regarding changes to its conservation strategy on April 12, 2012, to respond to the recommendations made at the April 5 meeting (Rowley 2012a).

On May 3, 2012, we provided the Marine Corps with a revised description of its conservation proposal that clarified what we would include in the biological opinion (Noda 2012). On May 10, 2012, the Marine Corps provided a finalized description of conservation measures to minimize and offset effects to the desert tortoise (Henen 2012c). On May 17, 2012, the Marine Corps provided a memorandum for the record, indicating that it would move the location of the staging area in the southern expansion area to the north into areas that contained a lower density of desert tortoises (Cottrell 2012). On May 21, 2012, the Marine Corps provided a description and map of the location of OHV exclusion barriers it would install to reduce effects to the Ord-Rodman DWMA (Henen 2012d).

We provided a draft biological opinion to the Marine Corps on June 25, 2012 (Service 2012d). The Marine Corps provided comments on the draft biological opinion via electronic mail, dated July 2, 2012 (Rowley 2012b); we have incorporated the comments, as appropriate.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

We summarized the following description of the proposed action from the biological assessment (DoN 2011a); the proposed action is training within the expanded boundaries of the MCAGCC. Expansion of the existing MCAGCC boundaries would occur through the withdrawal or purchase of 167,971 acres of public and private lands. These lands are to the west and south of the existing installation and include portions of the Bureau of Land Management's (Bureau) Johnson Valley Off-highway Vehicle Management Area (western expansion area; 146,667 acres) and the area north of Wonder Valley (southern expansion area; 21,304 acres) (DoN 2011a; Figure 1-2). The western expansion area would include a 108,530-acre exclusive military use area and a 38,137-acre restricted public access area (RPAA). The southern expansion area would be an exclusive military use area. In the western expansion area, the Marine Corps would allow continued public use of the RPAA for recreational purposes (e.g., OHV use, rock hounding, rocketry, film production, camping, etc.) when it is not being used for military training activities.

Military training would also continue on the existing installation and would include activities similar to those analyzed in the Marine Corps' biological opinion for base-wide operations (Service 2002; 1-8-99-F-41). The 2002 base-wide operations biological opinion analyzed the effects of the ten combined arms exercises (CAX) that occur annually on the existing installation. Following expansion of MCAGCC, the Marine Corps would modify training on the existing installation by reducing the number of CAX exercises and instituting the Marine Expeditionary Brigade exercises and Building Block exercises described below. Although this change would constitute a shift in the type of exercises on MCAGCC, the areas affected and the number of personnel and vehicles used annually would not substantially change.

We have described the Marine Corps' proposed use of the existing installation as it relates to the modified training scenarios on the expanded installation. The biological assessment (DoN 2011a) and draft environmental impact statement (DoN 2011b) provide a more detailed description of the proposed military training. The Service's 2002 biological opinion (1-8-99-F-41) provides a description of the CAX exercises that would also continue to occur at a lower frequency.

Description of Military Training Activities

Marine Expeditionary Brigade Exercises

Expanded training activities would involve air-ground, live-fire maneuvers within the existing installation and the expanded training areas. These work up and final training exercises are collectively termed Marine Expeditionary Brigade (MEB) exercises. Each MEB exercise would involve an entire MEB, consisting of 3 battalion task forces totaling approximately 15,000 Marines, 1,786 wheeled and tracked vehicles, and 1,657 aircraft sorties. Two MEB exercises, lasting 24 days each, would occur each year with 6 days of cleanup activities following each MEB exercise. The first 17 days of each MEB exercise would consist of work-up exercises in which individual battalion task forces (approximately 5,000 Marines; one third of the MEB) would take turns conducting live-fire maneuvers followed by a 2-day exercise where individual battalion task forces would defend and attack set objectives. The biological assessment provides a representative depiction of the type of maneuvers that MEB work-up exercises would involve (DoN 2011a; Figure 2-2).

Following these work-up scenarios, each MEB exercise would involve a final exercise, in which the entire MEB (i.e., 3 battalion task forces) would maneuver from 3 separate staging areas to converge on a single MEB objective over the course of a 48- to 72-hour period. During the transition to the MEB objective, the battalion task forces would maneuver along three separate maneuver corridors beginning at the three staging areas in the eastern portion of the existing installation and ending at the MEB objective in the western expansion area. Various units within each battalion task force would attack smaller company objectives during these maneuvers. Each battalion task force would re-supply several times during these maneuvers at different re-supply points that may change between MEB exercises. The biological assessment provides a representative depiction of the final MEB exercise, including staging areas, maneuver routes, firing zones, intermediate company objectives, and the MEB objective (DoN 2011a; Figure 2-3). As noted in the Consultation History, the Marine Corps has agreed to modify the location of the staging area in the southern expansion area to avoid areas of higher desert tortoise density.

During both work-up and final portions of the MEB exercise, the Marine Corps would implement a combined-arms training program that would include live-fire ordnance from tanks, aircraft, and artillery. The Marines would also fire at fixed targets, perform tank maneuvers, air operations, bombing, and strafing, use artillery and anti-tank warfare, and employ various vehicles (i.e., light-wheeled, heavy-wheeled, and tracked) both on and off of existing routes of travel. Marines would also set staging areas, camps, and fighting positions in various locations that would require clearing of vegetation, establishment of vehicle staging areas, installation of barbed wire, and trenching. All weapons systems employed by the Marine Corps would be used during military training, including small arms, armored vehicle cannon and automatic weapons, mortars, grenades, anti-tank missiles, artillery, and attack aircraft (DoN 2011a).

The single MEB objective, intermediate company objectives, and starting point staging areas used in the final MEB exercises would not change following establishment. Although re-supply points may change between exercises, these points would remain close to the maneuver corridors (see moderate-intensity disturbance in Figure 6-2 of the biological assessment; DoN 2011a). The Marine Corps would establish up to eight company objectives within the western expansion area for use in the MEB exercise. Two of these objectives would be within the RPAA and the other six would combine to form the single MEB objective. Each company objective would consist of permanent trench lines, obstacles, targets, and bunkers that the Marines would construct within a 984-by-984-foot area. Military training would result in severe ground disturbance in all portions of the company objectives. In addition, heavy ground disturbance would occur in all portions of the three starting point staging areas and re-supply points.

Outside of the areas identified in the previous paragraph, Marines would primarily use existing travel routes, but periodically would need to travel cross-country to react to training scenarios. Cross-country travel would be concentrated in the vicinity of the staging areas, MEB and intermediate objectives, and along the periphery of the main supply routes, and it would diminish in other portions of the installation and expansion areas that are farther away from these locations. In addition, training activities would require the establishment of temporary fighting positions and bivouacking areas in some locations that are outside of the MEB and company objectives. These positions would require the installation of barbed wire and excavation of bunkers, tank ditches, and personnel and vehicle trenches. Some excavations could be as much as 10 feet wide, 10 feet deep, and 33 feet long. The biological assessment provides a representative depiction of the varying intensities of ground disturbance associated with training maneuvers (DoN 2011a; Figure 6-2). As noted in the Consultation History, the Marine Corps has agreed to modify the location of the staging area in the southern expansion area to avoid areas of higher desert tortoise density.

Although military training would focus on the maneuver corridors and disturbance areas depicted in the biological assessment, cross-country maneuvers could occur in virtually any portion of the expanded installation except for special use areas (see below). In general, maneuvers would occur in areas of level to gently sloping terrain, with steeper and rockier areas and areas farther from the main maneuver corridors subjected to less surface disturbance. The Effects of the Action section of this biological opinion provides the Marine Corps’ estimates for high-intensity and moderate intensity habitat disturbance associated with expanded military training.

<u>Building Block Exercises</u>

When MEB exercises are not occurring, the Marine Corps would use the western expansion area's exclusive military use area to perform building block exercises that are consistent with the type of military training that currently occurs on the existing installation. These building block exercises may replace similar training activities that currently occur on the MCAGCC. Building block exercises would consist of 4-day training exercises repeated throughout the year for a total of approximately 160 days each year. Building block exercises would involve the same activities described above for the MEB exercises, but they would involve smaller units (i.e., 2,000 Marines), fewer vehicles (i.e., approximately 276 wheeled and tracked vehicles and 56 aircraft sorties), and a smaller and more localized footprint. The biological assessment provides a representative depiction of a typical building block exercise (DoN 2011a; Figure 2-4).

Training Range Maintenance

Following exercises, participating units would perform a sweep of the training ranges to remove discarded training equipment, trash, and other materials (DoN 2011a). Maintenance personnel would then use existing routes of travel to access various portions of the training range to reset targets, grade and repair existing travel routes, and dispose of unexploded ordinance. Unexploded ordinance disposal would likely require detonation of identified materials in place. Maintenance activities would require 2 vehicles and occasionally a tractor trailer, at a maximum of 10 days per MEB exercise, for a total of 20 days per year. Limited amounts of similar range maintenance would occur in association with building block exercises. Range maintenance activities, especially unexploded ordinance sweeps, would be more intensive in the RPAA.

RPAA

The RPAA encompasses a 38,137-acre area in the southern portion of the western expansion area where the Marine Corps would allow limited public access when the area is not being used for the MEB training exercises. The Marine Corps would control public access through a permit system. The Marine Corps estimates that the RPAA would be open to public use approximately 10 months out of the year. Public activities that would occur in this area include OHV travel, rock hounding, hiking, rocketry, film production, camping, and other desert activities. The Marine Corps would continue to permit organized recreational events (e.g., sponsored OHV races) and would allow marking of racecourses.

Proposed Measures to Avoid, Reduce, and Offset the Adverse Effects of the Proposed Action

The Marine Corps will implement measures to avoid and reduce the potential effects of military training on the desert tortoise and will perform conservation actions within the Western Mojave Recovery Unit to offset the adverse effects of military training. This biological opinion will focus primarily on the effects of those actions and activities that the Marine Corps has planned within the boundaries of MCAGCC and the expansion areas, and consider the general effects of proposed conservation actions outside those boundaries. We do not have sufficient information on the conservation actions to conduct a detailed analysis of their effects on the desert tortoise and its critical habitat. For example, without information on the timing and location of specific actions, we cannot estimate the number of desert tortoises or the amount of critical habitat that may be involved. Consequently, we will provide a general analysis of the effects of these actions, and the Marine Corps or other Federal agencies will consult with us as implementation of the conservation measures proceeds.

The Marine Corps will refine the proposed compensatory actions as a result of field work conducted in 2012 through 2014, analyses derived from the Service's spatial decision support system, and our recommendations (Rowley 2012a). Information gained from the fieldwork (e.g., the health and density of and risk or threats to desert tortoises in the project area) and the spatial decision support system will help the Service and Marine Corps adaptively manage the proposed conservation measures to specific issues as they arise.

Minimization Measures

To minimize adverse effects to the desert tortoise, the Marine Corps will implement the following protective measures during use of the expanded MCAGCC. (By "expanded MCAGCC," we mean the current MCAGCC and the proposed acquisition areas.) We developed these measures with the Marine Corps based on the measures in the biological opinion for base-wide operations and existing Service guidance (Service 2002, 2009a, 2011c). Through coordination with the Marine Corps, we have modified the wording of some measures from that provided in the biological assessment. We have done this to improve clarity and to incorporate more current Service guidance, but we have not substantially changed the intent of the measures identified in the biological assessment (DoN 2011a).

1. The Marine Corps will appoint an official representative to oversee compliance with all protective measures for the desert tortoise. This person will receive and investigate reports of non-compliance and will have the authority to stop all activities that may violate these measures.

2. The Marine Corps will continue to implement a desert tortoise education program for military and civilian personnel that train or work on MCAGCC. All personnel will receive this program prior to proceeding with training exercises, construction projects, or other activities that may affect desert tortoises. This program will also be required of RPAA users through the permitting system that the Marine Corps will establish. The program will include the following: a) information on the biology and distribution of the species, b) its sensitivity to human activities, c) legal protection for the species and penalties for violation of Federal laws intended to protect it, d) its general activity patterns, e) the required measures for minimizing effects during training and construction-related activities, f) reporting requirements and measures to take if a desert tortoise is encountered, and g) measures that personnel can take to promote the conservation of desert tortoises.

3. The Marine Corps will inform all personnel of their responsibility to report any form of injury or mortality of desert tortoises to the official responsible for overseeing compliance with the protective measures.

4. The Marine Corps will place signs promoting awareness of desert tortoises in key locations to encourage personnel not to stray off established main and secondary routes.

5. The Marine Corps will require all personnel on MCAGCC to remove or contain foodstuffs, trash, or other wastes that may attract predators. The Marine Corps will require the use of latching or locking lids on all trash receptacles used for extended stays.

6. The Marine Corps will concentrate training activities that cause increased surface disturbance to pre-designated hardened sites, or within 656 feet (200 meters) of main supply routes, once these sites and routes are established. The Marine Corps will limit off-road activity to that which is necessary to support the mission directly and will plan maneuvers to emphasize use of already disturbed sites.

7. During training maneuvers, the Marine Corps will limit “neutral steer” turns of tracked vehicles (i.e., running tracks in the opposite directions from each other, so that the vehicle pivots in place) to emergency situations. The Marine Corps will identify authorized areas for practicing “neutral steer” turns that are away from special use areas and other biologically sensitive areas.

8. The Marine Corps will require that temporary fighting positions and other types of temporary excavations are filled to original grade and excess material leveled after each training exercise.

9. Contractor and maintenance personnel will remain on main or secondary main supply routes whenever possible. Personnel will only travel off the supply routes when no other route exists to the objective.

10. The Marine Corps will post and enforce a 20-mile-per-hour speed limit for contractor, construction, and maintenance personnel on all roads within desert tortoise habitat.

11. The Marine Corps will require personnel to obtain approval of the G-3 Directorate and the Natural Resources and Environmental Affairs (NREA) Division prior to clearing land (grading) or conducting any other vegetation removal action in the training areas.

12. The Marine Corps will ensure that all personnel immediately report to a MCAGCC-authorized biologist (i.e., a biologist authorized by the Service) any desert tortoises if they are within or immediately adjacent to training exercises or construction projects that may kill or injure them.

13. The Marine Corps will ensure that only authorized biologists handle desert tortoises or their eggs except in circumstances where the desert tortoise is in immediate danger of injury and mortality or is impeding an active training exercise. Use of authorized biologists and biological monitors will be in accordance with the most recent Service guidance. The current guidance is Service (2008a). The Marine Corps will ensure that biologists do not perform specialized handling activities (e.g., transmitter placement, health assessments, or blood collection) for which they are not specifically authorized by the Service.

14. If a desert tortoise is in immediate danger, the Marine Corps will ensure that it is moved into adjacent undisturbed habitat and placed in a shaded area, out of direct sunlight. If a desert tortoise is not in danger but is impeding military training, Marine units will notify Range Control and request instructions. Only appropriately briefed Marines, with direct radio or telephone communication with Range Control and authorization from NREA authorized biologists, will move desert tortoises. In these instances, the Marine Corps will move desert tortoises only the minimum distance to ensure their safety.

15. The Marine Corps will ensure that personnel inspect beneath and around all parked vehicles, located in desert tortoise habitat, prior to moving the vehicle. If a desert tortoise is located beneath a vehicle and is not in immediate danger or impeding training, the Marines will allow the tortoise to move on its own or they will contact Range Control for instructions. Only appropriately briefed Marines, with direct radio or telephone communication with and authorization from Range Control, will move desert tortoises. In these instances, the Marine Corps will move desert tortoises only the minimum distance to ensure their safety.

16. When requesting authorization of biologists to handle desert tortoises, the Marine Corps will submit the credentials to the Service for review and approval at least 30 days prior to the need for the biologist to perform those activities in the field. For authorization of specialized handling activities (e.g., transmitter placement or health assessments), the Marine Corps will clearly define activities for which it is requesting authorization and provide credentials that are specific to those activities.

17. All handling of desert tortoise and their eggs will comply with the protocols outlined in the Desert Tortoise Field Manual (Service 2009a) unless specifically modified by this biological opinion. When performing tasks where tools and equipment may contact desert tortoises, the Marine Corps will ensure that biologists disinfect all tools via the Service's disease prevention protocols (Service 2011c) or most recent Service guidance.

18. The Marine Corps will ensure that desert tortoises are handled only when air temperature, measured at 2 inches above the ground (shaded bulb) is not expected to exceed 95 degrees Fahrenheit during the handling session. If air temperature exceeds 95 degrees

Fahrenheit during handling or processing, desert tortoises will be shaded in an environment where the ambient air temperatures do not exceed 91 degrees Fahrenheit. The Marine Corps will not release desert tortoises until the air temperature at the release site has declined to below 95 degrees Fahrenheit and is expected to remain below 95 degrees Fahrenheit for the remainder of that day.

19. The Marine Corps will ensure that authorized biologists follow the protocols outlined in Service (2011c) or the most current Service guidance when performing health assessments on the desert tortoise.

20. The Marine Corps will ensure that authorized biologists re-hydrate desert tortoises that void their bladder using epicoelomic injections of sterile saline or by nasal or oral administration of drinking water. If a desert tortoise smaller than 4 inches in carapace length voids its bladder, the Marine Corps will offer fluids nasally or orally.

21. The Marine Corps will not translocate or otherwise move wild desert tortoises that show clinical signs of disease. If the Marine Corps locates a desert tortoise that must be moved, and it has clinical signs of upper respiratory tract disease, they will quarantine this individual and contact the Service to determine appropriate disposition of the animal.

22. The Marine Corps will ensure that authorized biologists mark desert tortoises in accordance with the Desert Tortoise Field Manual (Service 2009a) or other Service-authorized method.

23. The Marine Corps will ensure that authorized biologists attach only transmitters of appropriate size to desert tortoises. Transmitter mass will not exceed 10 percent of the desert tortoise's mass.

24. The Marine Corps will ensure that authorized biologists attach transmitters to the fifth vertebral scute of adult male and juvenile desert tortoises. For female desert tortoises, the Marine Corps will attach transmitters to the anterior carapace in the most appropriate place to preclude interference with righting. The Marine Corps will attach an antenna sheath just above the marginal scutes of each desert tortoise's shell. The antenna sheath will be slightly larger diameter than the antenna and will be split at each scute seam to prevent interference with natural shell growth.

25. The Marine Corps will ensure that authorized biologists replace transmitters earlier than the recommended battery life of the transmitter to reduce the potential of losing desert tortoises.

26. The Marine Corps will ensure that desert tortoise exclusionary fencing complies with the Desert Tortoise Field Manual (Service 2009a). Fence material will be galvanized, one inch by two-inch vertical wire mesh and will incorporate tortoise-proof gates or cattle

guards at all entry points. In instances where temporary exclusion of desert tortoises is required, the Marine Corps may use a temporary exclusion fence design after receiving approval by the NREA Division.

27. The Marine Corps will inspect all permanent desert tortoise exclusion fencing monthly and after rainfall events (i.e., the same day or the morning after an evening rain). The Marine Corps will inspect all temporary desert tortoise exclusion fencing monthly and after rainfall events. Repairs will occur on all damaged exclusion fencing within two days; temporary fencing will be used to close gaps until the permanent fencing is repaired. If monitoring identifies gaps in exclusion fencing that cannot be adequately closed by temporary fencing, the Marine Corps will post a biological monitor at the gap until fence repairs are made.

28. During fence installations, the Marine Corps will employ at least one biological monitor for each construction team, such that no driving, trenching, fence pulling, or surface disturbance occurs without the presence of a biological monitor. The Marine Corps will supply these biological monitors with maps of burrows located during pre-project surveys to assist them in minimizing effects on desert tortoises. Biological monitors will have the authority to halt activities if a desert tortoise enters work areas, and they will contact an authorized biologist to move the animal out of harm's way prior to commencement of activities.

29. Following installation of any desert tortoise exclusion fence, the Marine Corps will ensure that an authorized biologist checks the fence alignment for desert tortoises that are exhibiting fence-pacing behavior. From April 1 to October 15 and during other unseasonably warm periods of the year, fence checks will occur two times daily for 2 weeks following completion of fence construction. If midday temperatures are likely to be above 105 degrees Fahrenheit, one of these checks will occur one hour prior to the forecasted temperature high. If a given fence alignment is installed in the winter, inspections will occur 3 times per day for the first 3 weeks of the next active season.

30. Desert tortoises exhibiting fence-pacing behavior on construction and maintenance projects will be moved to a safe location away from the fence and monitored. If temperatures are above 95 degrees Fahrenheit, an authorized biologist will construct an artificial burrow for the desert tortoise or hold it in a climate-controlled location until temperatures fall below 91 degrees Fahrenheit and are expected to remain below 95 degrees Fahrenheit for the remainder of that day.

31. When marking and flagging burrows, the Marine Corps will follow the guidance in the Desert Tortoise Field Manual (Service 2009a).

32. The Marine Corps will conduct surveys for desert tortoises in the earliest possible planning stages for construction and maintenance projects that require clearing of land within training areas. The Marine Corps will use the information gained from these

surveys to reduce adverse effects to desert tortoises to the greatest extent practicable in the project plan.

33. For maintenance or construction projects outside of the Mainside Cantonment Area and in areas known to support desert tortoises, the Marine Corps will install temporary desert tortoise exclusion fencing around work sites and/or use biological monitors.

34. Prior to ground disturbance on maintenance and construction projects, an authorized biologist will perform pre-construction clearance surveys for desert tortoises. The authorized biologist will mark all desert tortoises moved from the construction site.

35. If a construction or maintenance project does not use desert tortoise exclusion fencing, the Marine Corps will ensure that clearance survey timing reduces the likelihood that a desert tortoise could enter a work area between the time of surveys and the onset of work. If desert tortoises are unlikely to be active, clearance surveys may occur within 48 hours prior to ground disturbance. The Marine Corps will determine whether desert tortoises are likely to be active based on the biology of the species, time of year, and weather conditions.

36. During pre-construction clearance surveys for construction and maintenance projects, the Marine Corps will inspect all desert tortoise burrows for small and large desert tortoises and all mammal burrows that may host larger desert tortoises. The Marine Corps will flag and avoid all active burrows wherever feasible.

37. If training exercises or construction activities cannot avoid an active burrow, an authorized biologist will excavate the burrow according to the protocols in the Desert Tortoise Field Manual (Service 2009a). Authorized biologists will move all desert tortoises excavated from active burrows to the nearest unoccupied natural burrow, an artificially constructed burrow, or place it under a shrub if it can be released within specified temperature limits. The Marine Corps will ensure that further construction activities do not disrupt the release location.

38. If an inactive burrow is near a construction or maintenance activity but in no danger of disturbance, the Marine Corps will block it and flag it for avoidance. The Marine Corps will follow the guidance provided in the Desert Tortoise Field Manual (Service 2009a) when blocking and marking the burrow. After completion of construction activities, the Marine Corps will remove materials used to block and flag the burrow. The Marine Corps will collapse all inactive burrows that construction activities are likely to disturb.

39. The Marine Corps will only confirm a burrow as inactive if close inspection can locate all interior edges of the burrow, such that hidden chambers are not missed.

40. On construction and maintenance projects that require biological monitoring, the biological monitors will work with the construction supervisor to minimize disturbance. The Marine Corps will ensure that an adequate number of biological monitors are present to monitor all aspects of the activities that have the potential to injure or kill desert tortoises. Biological monitors will have the authority to halt construction activities if they locate a desert tortoise in the construction area. The Marine Corps will cease all construction activity if they identify a desert tortoise within a construction area following initial clearance surveys. Construction activities will not resume until an authorized biologist has marked the desert tortoise and moved it to a safe location. The Marine Corps may forego the use of biological monitors in fenced construction areas where clearance surveys have occurred. MCAGCC biological staff will make this determination based on site-specific circumstances.

41. During construction in areas that are not fenced with desert tortoise exclusion fencing, biological monitors will check open trenches at least two times a day, in the morning and evening, throughout the duration of construction. If midday temperatures are likely to be above 95 degrees Fahrenheit, one of these checks will occur one hour prior to the forecasted high temperature. The Marine Corps will leave open excavations only if they are temporarily fenced or covered to exclude desert tortoises. The Marine Corps will inspect all excavations for desert tortoises prior to filling.

42. The Marine Corps will require that personnel stake all camouflage netting 18 inches off the ground to prevent entanglement of desert tortoises.

43. The Marine Corps will prohibit accessing or departing the southeastern ranges of MCAGCC through the Cleghorn Lakes Wilderness Area. The Marine Corps will also prohibit access to Cleghorn Pass and Bullion or America Mine Training Ranges from a southerly direction. The Marine Corps will prohibit personnel from entering the Ord-Rodman Desert Wildlife Management Area (DWMA) except for the purposes of implementing the translocation program.

44. The Marine Corps will take necessary steps to reduce effects to the desert tortoises caused by feral or free-roaming dogs at MCAGCC. These steps may include increased public awareness, cooperation with other agencies, and other methods of control.

45. The Marine Corps will prohibit pets within the MCAGCC training areas, with the exception of pets in the Mainside Cantonment Area and military working dogs that are under the control of their handler.

46. The Marine Corps will prohibit the possession of otherwise legal captive desert tortoises on any portion of MCAGCC, with the exception of animals used for desert tortoise

awareness and education programs. The Marine Corps will prohibit the release of legal captive or wild desert tortoises from off base into the MCAGCC population.

47. The Marine Corps will prohibit the feeding of wildlife on MCAGCC.

48. The Marine Corps will prohibit recreational use of the MCAGCC training areas, with the exception of those specifically identified above in the RPAA.

49. The Marine Corps will prohibit the introduction of exotic plant species on MCAGCC.

50. The Marine Corps will prohibit open fires and the harvesting or cutting of native vegetation, with limited exceptions within the RPAA.

Special Use Areas

The Marine Corps would establish two special use areas (SUA) in the western expansion area (12,015 acres combined) and one SUA in the southern expansion area (2,935 acres) (DoN 2011a; Figure 3-2). Two of these SUAs are adjacent to existing protected areas (i.e., Ord-Rodman DWMA [adjacent to the western expansion area] and Cleghorn Lakes Wilderness [adjacent to the southern expansion area]). The third is located in the western portion of the western expansion area and is not contiguous with existing or proposed conservation areas. The Marine Corps would place all newly established SUAs off-limits to mechanized maneuvers, off-road vehicle travel, bivouac sites, and any other military training involving off-road vehicle activity. The Marine Corps would sign these SUAs, and fence them on the sides near proposed maneuver areas and the Johnson Valley Off-highway Management Vehicle Area, to reduce the potential for effects from training activities and unauthorized access. Some SUAs would serve as recipient sites for desert tortoises translocated from maneuver corridors and training objectives within the expansion areas (see below).

The Marine Corps will also create a new SUA within the Sunshine Peak Training Area (1,987 acres) and upgrade an existing SUA within the Sunshine Peak and Lavic Training Areas (8,901 acres; see attachment to electronic mail dated April 12, 2012, from Major Rowley) to increase the protection of desert tortoises within the boundaries of the existing installation.

Management of Adjacent Public Lands

The Marine Corps will coordinate with and support the Bureau to develop the appropriate plans, agreements or other documents, such as an amendment to the California Desert Conservation Area Plan, to change the management of two adjacent parcels of land to be more protective of desert tortoises (DoN 2012b, 2012c). This management could be the incorporation of these parcels into the Ord-Rodman DWMA. Specifically, the western expansion area would isolate the northeastern-most portion of the Johnson Valley Off-highway Vehicle Management Area from the remainder of the off-highway vehicle area; it would also isolate an area of Class M public land between the northwestern edge of the western expansion area, the Ord-Rodman DWMA, and the northwestern tip of the Johnson Valley Off-highway Vehicle Management

Area. The Marine Corps, in coordination with the Bureau, would complete the appropriate administrative procedures to implement this change within 24 months of publishing the record of decision for the proposed action. The Marine Corps and Bureau have begun preliminary coordination on this proposal (Rowley 2012a). The Marine Corps shall notify the Service if the proposed timelines cannot be met at the earliest possible time. If changes to this proposed timeline cause an effect to the desert tortoise that we have not considered in this biological opinion, the Marine Corps may need to re-initiate consultation (50 Code of Federal Regulations 402.16).

Law Enforcement

The Marine Corps would continue to implement its Conservation Law Enforcement Program with the purpose of patrolling and monitoring sensitive resource areas to curtail resource damage. The Marine Corps Conservation Law Enforcement Program enforces nine Federal conservation laws, including the provisions of the Act. The Marine Corps would sustain the current level of law enforcement and increase it based on identified needs and the availability of resources.

In addition, the Marine Corps would develop the appropriate agreements with the Bureau to provide for increased law enforcement presence and patrols in nearby sensitive resource areas, such as the Ord-Rodman DWMA (DoN 2012b, 2012c). The Marine Corps would do this through appropriate agreements with the Bureau and would provide sufficient resources for two additional officers to focus their efforts in these areas for a period of 30 years, or the term enacted via the necessary land withdrawal legislation.

Desert Tortoise Translocation

We have summarized the following information from the Marine Corps' general translocation plan for desert tortoises (Karl and Henen 2011). The Marine Corps is requesting an amendment to its existing section 10(a)(1)(A) recovery permit to provide legal authorization for its pre-translocation surveys, translocation of the desert tortoises in the expansion areas, and the post-translocation effectiveness monitoring and research. Although our authorization of these actions would occur through a separate process (i.e., section 10(a)(1)(A) of the Act), we are describing and analyzing these activities in this biological opinion to provide a more complete analysis of the effects of the proposed action. The Marine Corps will perform extensive pre-translocation surveys of recipient sites that will provide information that may result in modifications to the current translocation plan. The Marine Corps will develop a final plan that includes refinements to this translocation program. Substantial modifications may require re-initiation of consultation prior to the commencement of translocation activities.

The Marine Corps will translocate desert tortoises in accordance with the final translocation plan prior to initiating training activities in the high- and moderate-impact areas. The biological assessment provides a representative depiction of these high- and moderate-intensity training lands (DoN 2011a; Figure 6-2). While this depiction provides information for assessing the potential effects of the translocation, the precise area where MEB objectives and other training-related disturbances would occur may change prior to commencement of training within the expansion areas. The Marine Corps will translocate all desert tortoises it finds within areas identified for heavy and moderate disturbance to the nearest translocation recipient site as identified and supported by the final translocation plan. If changes to the MEB objective or other training-related disturbances cause an effect to the desert tortoise that we have not considered in this biological opinion, the Marine Corps may need to modify the translocation plan and re-initiate consultation (50 Code of Federal Regulations 402.16).

Translocation Recipient Sites

The Marine Corps has identified a larger area for the proposed recipient sites for translocated desert tortoises than it anticipates needing. Extensive pre-translocation surveys of these areas will provide information for refinement of the final translocation areas over the next three years.

The Marine Corps proposes to use seven recipient sites to accommodate translocated desert tortoises from the western expansion area (Table 1; see also Karl and Henen 2011; Figure 7). The two newly established SUAs in the western expansion area will serve as recipient sites. In addition, the Marine Corps identified three recipient sites within the Ord-Rodman DWMA. One of these areas is immediately south of the Rodman Mountains Wilderness Area and contiguous with the northern SUA in the western expansion area. The others are located to the southwest and to the east of the Rodman Mountains Wilderness Area, respectively. The final two proposed recipient sites are located in the Sunshine Peak Training Area, which the Marine Corps does not use for mechanized training, in the northwestern corner of the existing installation. In addition, the Marine Corps has identified an alternative translocation site for the western expansion area in the existing Emerson Lake SUA, located on the existing installation, near the southeastern corner of the RPAA. The alternative site would be used if pre-translocation surveys reveal the need for an additional or replacement translocation area.

The SUA would be the primary recipient site for the southern expansion area (Karl and Henen 2011; Figure 7). The alternative recipient site for the southern expansion area is in the Bullion SUA, located on the existing installation, immediately north of the Cleghorn Lakes Wilderness Area.

Table 1. Size and location of proposed recipient sites for desert tortoise translocation.

	Expansion Area	Recipient site	Size (acres)
Proposed Recipient Site	Western Expansion Area	North Special Use Area	6,822.0
		West Special Use Area	5,193.0
		Ord-Rodman Areas	19,199.0
		Sunshine Peak Areas	3,706.5
	Southern Expansion Area	Special Use Area	2,935.0
Total			**37,855.5**
Alternative Recipient Sites	Western Expansion Area	Emerson Lake Special Use Area	2,471.0
	Southern Expansion Area	Bullion Special Use Area	2,471.0
Total			**4,942**

Pre-translocation Surveys of Desert Tortoise Populations

For 3 years, following execution of the record of decision, the Marine Corps will collect baseline information on the density, distribution, and health status of desert tortoises and habitat within the recipient sites. The same information will be collected within areas from which desert tortoises would be translocated and on control plots that it will establish within portions of the Ord-Rodman DWMA (Karl and Henen 2011; Figure 7). The Marine Corps will use this information, along with a threats analysis of the recipient sites, to determine if the proposed translocation plan requires modification. This assessment will occur in coordination with the Service and require our approval prior to translocation of desert tortoises.

The Marine Corps will perform extensive surveys of the control and recipient populations using both the Service's pre-project survey protocol (Service 2010a) and the Tortoise Regional Estimate of Density (TRED) protocol (Karl 2002). In addition, the Marine Corps will establish up to 12 one-square-kilometer (247-acre) plots (4 in the control population and 6 to 8 in the recipient area population) for focused, mark-recapture surveys to assess population structure, trends in local population size, and other metrics. These mark-recapture surveys will require authorized biologists to handle desert tortoises, mark them with an identification tag, and attach transmitters in some instances.

The Marine Corps will also perform pre-translocation surveys of desert tortoises at the recipient, control, and translocation sites to assess disease prevalence. Population sampling will occur at a level that is sufficient to detect 10-percent disease prevalence at the 95-percent confidence limit. Disease sampling will require qualified biologists to handle desert tortoises, collect blood samples, and check animals for clinical signs of disease.

Lastly, the Marine Corps will perform surveys of the recipient and control sites to assess habitat attributes and anthropogenic threats. These surveys will include assessments of plant species composition, vegetation density, shrub cover percentage, shrub height, characterization of understory vegetation, identification of forage species, and characterization of soils, hydrology, and topography. In addition, the Marine Corps will perform literature searches and field surveys to assess current threats within the translocation recipient sites (e.g., predators, unauthorized OHV use, invasive species, proximity to major roadways and other human developments).

Following the collection and review of this baseline information and preliminary approval of the recipient sites by the Service, the Marine Corps will perform a final pre-translocation survey of the control and recipient population in the year prior to translocation. This survey will focus on attaching transmitters to a sufficient number of control and resident animals to facilitate post-translocation research and monitoring (see below) and to collect final data on the health status of these populations. The Marine Corps will submit these data to the Service for consideration in its decision regarding final translocation approval.

Translocation Process

Fence Line Translocations - Prior to translocation of desert tortoises from the expansion areas, the Marine Corps will install permanent desert tortoise exclusion fencing along portions of the translocation area boundaries that are near maneuver areas. Based on the location of recipient areas, the Marine Corps would likely install these fences along the southern boundary of the northern SUA and on the boundary of the Ord-Rodman translocation area where it would be adjacent to the Johnson Valley Off-highway Vehicle Management Area. It may also install desert tortoise exclusion fencing in portions of the recipient site and in parts of the expansion area or existing installation that are near high-use areas (e.g., OHV areas).

Within 24 hours prior to fence installation, authorized biologists will perform 100-percent coverage surveys of the proposed fence alignment and a 45-foot buffer on either side of the alignment in accordance with the pre-project survey protocols (Service 2010a). Surveyors will identify, mark, and map all burrows that desert tortoises may use and determine occupancy status to the extent possible using reflective mirrors, tapping, probing, or fiber-optic scopes. The Marine Corps will use this information to adjust fence alignments to avoid active burrows or burrows over 1.64 feet (0.5 meter) in length by placing the fence between the burrow and the training area. For all other burrows (i.e., inactive or shorter than 1.64 feet) on the side of the fence within the training area, an authorized biologist will carefully excavate the burrow.

Desert tortoises located along installed fence lines in the expansion areas will become part of the translocation research study according to the following criteria. If the animal is fenced within the recipient site, it will become part of the recipient site population. Conversely, if a fence alignment places a given desert tortoise in a portion of the training area where translocation will occur, it will become part of the translocated population. If a fence alignment places a desert tortoise in a portion of the training area where training effects are unlikely to occur or be substantial (i.e., not within highly or moderately disturbed areas), it will not become part of the translocation research study. Following fence installation, if an animal exhibiting a substantial amount of fence pacing behavior is attempting to enter the recipient site during post-installation fence checks, an authorized biologist will place it within the recipient site and it will become part of the recipient site population.

Acquisition Area Translocations – In the year prior to initiation of MEB exercises in the expansion areas, the Marine Corps will implement a clearance-level survey for desert tortoises and nests in the MEB medium- and high-intensity areas (DoN 2011a; Figure 6-2) according to current guidance (Service 2010k). ‘Clearance-level surveys’ are defined in measure 2 under the Translocation Minimization Measures section of this biological opinion. The Marine Corps will attach transmitters to all desert tortoises located during these surveys and perform full health assessments, including blood collection for ELISA testing. The Marine Corps will move located desert tortoises that are too small (less than 4.4 inches) to wear transmitters to its headstart facility (TRACRS: Tortoise Research and Captive Rearing Site) or to a similar temporary enclosure in the SUAs. Temporary enclosures would be small, about 9 square meters, enclose native food and refuge vegetation and suitable soil for burrowing, and use predator-proof design similar to TRACRS’ pens. The predator-proof design would use four 10-foot long chain-link panels, fitted with metal flashing and hardware cloth bent to prevent predator entry by digging underneath, and nylon or polypropylene netting to exclude avian predators. This design would obviate digging that disturbs the habitat. These animals will become part of the Marine Corps’ existing desert tortoise head-starting program or remain quarantined in predator-proof pens for later release into the identified translocation areas (see Translocation Minimization Measures, below). The Marine Corps will leave all other desert tortoises located during the clearance-level surveys in place and will monitor them *in situ* until it receives ELISA test results. The Marine Corps will follow the protocols outlined in the desert tortoise translocation guidance (Service 2010k) for *in situ* monitoring until translocation occurs.

The biological assessment states that the Marine Corps would survey high- and moderate-impact areas prior to each MEB exercise to clear remaining desert tortoises to translocation sites. MEB exercises could occur at times of the year that are not conducive to finding and translocating desert tortoises. Additionally, surveying the approximately 37,828 acres that are likely to be heavily and moderately disturbed may be of limited value because of the low density of desert tortoises in portions of the area. Consequently, as a result of discussions during the development of the biological opinion, the Marine Corps and Service agreed on the following procedure (Bransfield 2012):

1. Prior to the initial clearance survey, the Marine Corps will divide the survey areas into square kilometer grids.

2. Prior to the first MEB exercise, during a time of the year when desert tortoises are active, the Marine Corps will conduct the first clearance survey and carefully map where desert tortoises are found.

3. In subsequent years, during a time of the year when desert tortoises are active, the Marine Corps will conduct the additional clearance surveys of any square kilometer grid where three or more desert tortoises were found during the previous survey.

4. This procedure will continue until such time that fewer than three desert tortoises are found in any grid.

The Marine Corps will translocate all desert tortoises located during these surveys to the recipient sites identified above in accordance with the translocation guidance (Service 2010k) except as specifically modified in this biological opinion.

Post-translocation Effectiveness Monitoring

Mark-recapture and Tracking Surveys - Following translocation of desert tortoises, the Marine Corps will monitor a subset of the translocated population for 30 years to determine the effectiveness of the translocation effort and to adaptively manage the effort as needed. In addition to monitoring the translocated population, the Marine Corps will monitor the resident and control populations. The Marine Corps will establish control plots that are at least 6.25 miles from recipient areas. Effectiveness monitoring will focus on determining survival rates, gathering information on demography, identifying threats to the translocation area, measuring habitat stability and changes, and monitoring health and disease status.

The Marine Corps will monitor survival, demography, and population health status through a combination of mark-recapture plots and tracking. The mark-recapture studies will involve surveying 10 to 12 mark-recapture plots every 5 years for the 30-year monitoring period, using standard mark-recapture survey techniques. The Marine Corps will establish four of these plots within the control population and six to eight plots within the translocation recipient areas. During these surveys, the Marine Corps will mark and assess all desert tortoises that can be located on each plot. Field workers will perform basic measurements, photograph each individual, collect blood samples for *Mycoplasma*-ELISA tests, and perform visual health assessments on all desert tortoises that they locate during these surveys. In addition, they will collect qualitative and quantitative information related to threats within the translocation recipient areas (i.e., common raven (*Corvus corax*) and coyote (*Canis latrans*) activity, unauthorized OHV use, free-ranging or feral dogs, and other threats) and data on habitat stability (i.e., percent cover, plant density, frequency, species richness, species evenness, robustness of perennial plants, annual plant biomass and presence of non-native weeds). Data collection on threats, surface disturbance, and annual plants will occur each time the Marine Corps surveys the plot, while habitat stability surveys for perennial plants, soil, and hydrology metrics will occur every 10 years. The Marine Corps will also conduct additional research on these mark-recapture plots that is relevant to the use of translocation as a population augmentation tool in species recovery efforts (see below).

In addition to the mark-recapture effort, the Marine Corps will implement a long-term tracking study in which 20 percent of the translocated population will initially carry transmitters and be monitored. Of these, the Marine Corps will seek to ensure that a subset of the monitored population includes smaller juvenile desert tortoises. The Marine Corps will also track and monitor an equal number of larger desert tortoises in the control and resident population and juvenile desert tortoises found during searches of the control and recipient plots. The Marine Corps will monitor these desert tortoises for 5 years. During this period, the Marine Corps will monitor desert tortoises in the tracking study according to the frequency outlined in the translocation guidance (Service 2010k) for the first year. After the first year, monitoring will occur: 1) weekly in April, May, October, and the last half of September, 2) every other week from June to mid-September, and 3) monthly from November to February. At the end of 5 years, the Marine Corps will remove radio transmitters to reduce the size of the study group to 50 per cohort (i.e., 50 translocated, 50 recipient and 50 control animals) and monitor it for an additional 5 years. During the tracking study, the Marine Corps will collect data similar to that collected on the mark-recapture plots, including data on threats. Habitat stability surveys will not occur in combination with tracking surveys.

During mark-recapture and tracking studies, the Marine Corps will monitor body condition indices, clinical signs of disease, serology, and visual signs of injury. The Marine Corps will collect this information from all transmittered desert tortoises located during mark-recapture studies and from a subset (i.e., 50 from each cohort) of the translocated, recipient site, and control populations that it will monitor through tracking. Each desert tortoise involved in disease monitoring will undergo a full health assessment, including visual assessments and blood collection, in October of each year for the first 5 years following translocation. In addition, the Marine Corps will perform health assessments on all transmittered desert tortoises at the end of the 10-year tracking study.

Post-translocation Research

In addition to the translocation effectiveness monitoring described above, the Marine Corps will perform research with some desert tortoises involved in the translocation. These research studies will focus on disease and on answering critical questions that are relevant to future use of population augmentation as a species recovery tool (e.g., use of translocated or head-started desert tortoises to re-populate identified dead zones). This research is directly relevant to the current recovery strategy for the species. As with all other aspects of the translocation, the Marine Corps will conduct these activities under a section 10(a)(1)(A) recovery permit. Refinement of the research design is likely to occur during the 3 to 4 years prior to translocation. Substantial changes may require re-initiation of consultation.

<u>Vertical Transmission of Disease</u> – During translocation and post-translocation monitoring, the Marine Corps will move desert tortoises showing clinical signs of Upper Respiratory Tract Disease Syndrome (URTDS) to their head-start facility (i.e., TRACRS facility or the newly constructed enclosures). The Marine Corps will hold these desert tortoises in existing or newly constructed enclosures. These desert tortoises will undergo health assessments according to the techniques and frequency described above for desert tortoises in the mark-recapture and tracking studies. At least half of the quarantined adult females will be involved in research related to vertical transmission of disease from females to their progeny. Female desert tortoises will be ultrasonographed and radiographed to assess their reproductive status.

<u>Experimental Translocation Densities</u> – To answer questions on appropriate stocking densities for population augmentation, the Marine Corps will use the mark-recapture plots in the translocation recipient site (see above) to examine the effects of various post-translocation population densities. The Marine Corps will stock the plots with translocated desert tortoises, such that post-translocation densities are 1.5 times greater on 4 plots and 2 times greater on 4 plots than the density for the Ord-Rodman DWMA as has been determined through the Service's range-wide monitoring program. The Marine Corps will compare these data to control plots to determine the effects of stocking densities on individual survival and long-term population

density, structure, and health status. During the first 5 years after translocation, 100 percent coverage surveys of the mark-recapture plots will occur annually using a single pass of the plot to monitor mortality, presence of translocatees, and relative abundance. As described in the post-translocation effectiveness monitoring section (above), the Marine Corps will also perform full mark-recapture surveys of these plots every 5 years for 30 years.

Repatriation Research – The Marine Corps will also use translocated desert tortoises to conduct research on whether fencing translocation plots can improve home range establishment and integration into the recipient population's social structure. The Marine Corps will fence four to six one-square-mile release sites with desert tortoise exclusion fencing and release translocated desert tortoises on these plots so that post-translocation densities are approximately twice the current recipient population density. The Marine Corps expects these densities to approximate historical densities in the newly established SUAs where these repatriation plots will likely occur. Desert tortoises involved in the repatriation study will carry transmitters and will form a subset of the larger population used in the tracking portion of the post-translocation effectiveness monitoring (see above). The Marine Corps will implement the same monitoring program described above for the tracking surveys on desert tortoises in the repatriation study. Tracking of desert tortoises in the repatriation study will occur for 10 years. The Marine Corps will remove the desert tortoise exclusion fencing 2 years after release of translocated individuals on the repatriation plots.

Translocation Minimization Measures

In addition to the *General Minimization Measures* identified above, the Marine Corps will implement the following measures when translocating desert tortoises.

1. During translocation, the Marine Corps will comply with the translocation guidance (Service 2010k) unless specifically modified by the measures below, the translocation design discussed above, or more recent guidance agreed to by the Marine Corps and the Service.

2. The Marine Corps will utilize clearance survey transects that are spaced no more than 15 feet apart and will decrease the spacing of transects in areas of difficult terrain and dense vegetation. During the final translocation clearance surveys, in which desert tortoises are moved to the translocation area, the Marine Corps will not declare the area clear of desert tortoises until at least two consecutive clearance survey passes have found no new desert tortoises. Consecutive clearance survey passes will occur at differing angles. During each pass, the Marine Corps will collect all desert tortoise scat. If the Marine Corps discovers fresh scat on a subsequent clearance survey pass, it will implement additional focused searches of the area where the scat was located. Desert tortoises encountered by chance in the clearance areas will also be moved to the nearest identified translocation recipient site.

3. During translocation clearance surveys, the Marine Corps will only excavate and collapse active desert tortoise burrows. To determine the need for excavation of burrows where occupancy cannot be verified, the Marine Corps will gate the burrow (i.e., place small

sticks along the entrance of the burrows) and use other means to determine use by desert tortoises during clearance survey passes. If disturbance of the gate during a subsequent clearance survey pass indicates an occupied burrow, the Marine Corps will investigate it further. If this occurs during the final clearance surveys, in which desert tortoises are moved to the translocation area, an authorized biologist will excavate the burrow.

4. The Marine Corps will time final movement of desert tortoises to the translocation areas to avoid high ambient temperatures, and at least one week before daily, midday temperatures are expected to exceed 90 degrees Fahrenheit air temperature or 109 degrees Fahrenheit ground surface temperature.

5. The Marine Corps will release all translocated desert tortoises under shrubs.

6. The Marine Corps will release located desert tortoises smaller than 4.4 inches in length, and any translocated nests, to TRACRS or temporary predator-proof enclosures in the recipient sites (see Acquisition Area Translocations, above). For individuals in temporary enclosures, the Marine Corps will monitor these smaller desert tortoises and any hatchlings once a month until late November. At the end of this period, the Marine Corps will remove the predator-proof enclosure, permit passive translocation, or actively translocate the hatchlings to rodent burrows away from the enclosures, depending on common raven and other predator activity at or near the enclosures.

Desert Tortoise Head-starting Program

The Marine Corps will implement an experimental population augmentation within designated SUAs and/or Bureau lands using head-started desert tortoises from its existing head-start facility. The Marine Corps will also establish a new head-starting facility in the western most SUA in the proposed western expansion area. The Marine Corps will raise hatchling desert tortoises until they are of sufficient size to resist predation and then release them into areas that survey and analysis have identified. The Marine Corps will coordinate with the Service in development of the population augmentation strategy and cover this work under its existing section 10(a)(1)(A) recovery permit.

Control of Human Access

The Marine Corps will monitor, fence, erect barriers, and install signs in areas where high human use occurs in or near the project areas. The Marine Corps will install approximately 24 miles of fencing to prevent desert tortoises from returning to high- and medium-impacts areas, 5.5 miles of exclusion barrier to prevent human intrusion into the western SUA from the adjacent Bureau-designated OHV area, and 40 miles of exclusion barrier between the Ord-Rodman DWMA where it is adjacent to Bureau-designated OHV areas (i.e., Johnson and Stoddard Valley OHVA). The Marine Corps will coordinate with the Bureau, Service, and California Department of Fish and Game in identifying priority routes and areas for patrol by its Conservation Law Enforcement Officers; the results of future surveys and spatial decision support system will assist in informing this prioritization. The Marine Corps will emphasize areas near the project that may be vulnerable to displaced OHV activity that could affect the translocation.

ANALYTICAL FRAMEWORK FOR THE JEOPARDY AND ADVERSE MODIFICATION DETERMINATIONS

Determination of Jeopardy

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

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

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

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

Determination of Destruction or Adverse Modification of Critical Habitat

Section 7(a)(2) of the Endangered Species Act requires that Federal agencies ensure that any action they authorize, fund, or is not likely to result in the destruction or adverse modification of the critical habitat of listed species. This biological opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 Code of Federal Regulations 402.02. Instead, we have relied on the statutory provisions of the Act to complete the following analysis with respect to critical habitat.

In accordance with policy and regulation, the adverse modification analysis in this biological opinion relies on four components: (1) the Status of Critical Habitat, which describes the range-wide condition of designated critical habitat for the desert tortoise in terms of primary constituent elements, the factors responsible for that condition, and the intended recovery function of the critical habitat overall; (2) the Environmental Baseline, which analyzes the condition of the critical habitat in the action area, the factors responsible for that condition, and the recovery role of the critical habitat in the action area; (3) the Effects of the Action, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated and interdependent activities on the primary constituent elements and how that will influence the recovery role of the affected critical habitat units; and (4) Cumulative Effects, which evaluates the effects of future non-federal activities in the action area on the primary constituent elements and how that will influence the recovery role of affected critical habitat units.

STATUS OF THE SPECIES AND CRITICAL HABITAT

Status of the Desert Tortoise

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

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

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

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

In the 5-year review, the Service also discusses various means by which researchers have attempted to determine the abundance of desert tortoises and the strengths and weaknesses of those methods. The Service provides a summary table of the results of range-wide monitoring, initiated in 2001, in the 5-year review. This ongoing sampling effort is the first comprehensive attempt to determine the densities of desert tortoises across their range. Table 1 of the 5-year review provides a summary of data collected from 2001 through 2007; we summarize data from the 2008 through 2010 sampling efforts in subsequent reports (Service 2010b, 2010c, 2010d). As the Service notes in the 5-year review notes, much of the difference in densities between years is due to variability in sampling; determining actual changes in densities will require many years of monitoring. Additionally, due to differences in area covered and especially to the non-representative nature of earlier sample sites, data gathered by the range-wide monitoring program cannot be reliably compared to information gathered through other means at this time.

In the 5-year review, the Service provides a brief summary of habitat use by desert tortoises; more detailed information is available in the revised recovery plan (Service 2011e). In the absence of specific and recent information on the location of habitable areas of the Mojave Desert, especially at the outer edges of this area, the 5-year review also describes and relies heavily on a quantitative, spatial habitat model for the desert tortoise north and west of the Colorado River that incorporates environmental variables such as precipitation, geology, vegetation, and slope and is based on occurrence data of desert tortoises from sources spanning more than 80 years, including data from the 2001 to 2005 range-wide monitoring surveys (Nussear et al. 2009). The model predicts the probability that desert tortoises will be present in any given location; calculations of the amount of desert tortoise habitat in the 5-year review and in this biological opinion use a threshold of 0.5 or greater predicted value for potential desert tortoise habitat. The model does not account for anthropogenic effects to habitat and represents the potential for occupancy by desert tortoises absent these effects.

To begin integrating anthropogenic activities and the variable risk levels they bring to different parts of the Mojave and Colorado deserts, the Service completed an extensive review of the threats known to affect desert tortoises at the time of their listing and updated that information with more current findings in the 5-year review. The review follows the format of the five-factor analysis required by section 4(a)(1) of the Act. The Service described these threats as part of the process of its listing (55 Federal Register12178; April 2, 1990), further discussed them in the original recovery plan (Service 1994), and reviewed them again in the revised recovery plan (Service 2011e).

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

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

Some of the most apparent threats to the desert tortoise are those that result in mortality and permanent habitat loss across large areas, such as urbanization and large-scale renewable energy projects, and those that fragment and degrade habitats, such as proliferation of roads and highways, OHV activity, and habitat invasion by non-native invasive plant species. However, we remain unable to quantify how threats affect desert tortoise populations. The assessment of the original recovery plan emphasized the need for a better understanding of the implications of multiple, simultaneous threats facing desert tortoise populations and of the relative contribution of multiple threats on demographic factors (i.e., birth rate, survivorship, fecundity, and death rate; Tracy et al. 2004).

We have enclosed a map that depicts the 12 critical habitat units of the desert tortoise and the aggregate stress that multiple, synergistic threats place on desert tortoise populations (Appendix 2). The map also depicts linkages between conservation areas for the desert tortoise (which include designated critical habitat) recommended in the revised recovery plan (Service 2011e) that are based on an analysis of least-cost pathways (i.e., areas with the highest potential to support desert tortoises) between conservation areas for the desert tortoise. This map illustrates that areas under the highest level of conservation management for desert tortoises remain subjected to numerous threats and stresses. This indicates that current conservation actions for the desert tortoise are not substantially reducing mortality sources for the desert tortoise across its range.

Since the completion of the 5-year review, the Service has issued several biological opinions that affect large areas of desert tortoise habitat because of numerous proposals to develop renewable energy within its range. These biological opinions concluded that proposed solar plants were not likely to jeopardize the continued existence of the desert tortoise primarily because they were located outside of critical habitat and DWMAs that contain most of the land base required for the recovery of the species. The proposed actions also included numerous measures intended to protect desert tortoises during the construction of the projects, such as translocation of affected individuals. Additionally, the Bureau and California Energy Commission, the agencies permitting these facilities, have required the project proponents to fund numerous measures, such as land acquisition and the implementation of recovery actions intended to offset the adverse effects of the proposed actions. In aggregate, these projects resulted in an overall loss of approximately 30,180 acres of habitat of the desert tortoise; three of the projects (BrightSource Ivanpah, Stateline Nevada, and Desert Sunlight) constricted linkages between conservation areas that are important for the recovery of the desert tortoise. We also predicted that these projects would translocate, injure, or kill up to 1,621 desert tortoises (see table below); we concluded that most of the individuals in these totals would be juveniles. The mitigation required by the Bureau and California Energy Commission will result in the acquisition of private land within critical habitat and DWMAs and funding for the implementation of various actions that are intended to promote the recovery of the desert tortoise; at this time, we cannot assess how successful these measures will be.

Table 2 summarizes information regarding the proposed solar projects that have undergone formal consultation with regard to the desert tortoise. Data are from Service (2010e [Chevron Lucerne Valley], f [Calico], g [Genesis], h [Blythe]; 2011f [BrightSource Ivanpah], g [Desert Sunlight], h [Abengoa Harper Lake], i [Palen]; and Burroughs (2012; Nevada projects). Projects are in California, unless noted.

Table 2. The number of desert tortoises and acreage of habitat for solar projects having undergone formal consultation.

Project	**Acres of Desert Tortoise Habitat**	**Estimated Number of Desert Tortoises Onsite**	**Recovery Unit**
BrightSource Ivanpah	3,582	1,136	Eastern Mojave
Stateline Nevada - NV	2,966	123	Eastern Mojave
Amargosa Farm Road - NV	4,350	4	Eastern Mojave
Calico*			Western Mojave
Abengoa Harper Lake	Primarily in abandoned agricultural fields	4	Western Mojave
Chevron Lucerne Valley	516	10	Western Mojave
Nevada Solar One - NV	400	**	Northeastern Mojave
Copper Mountain North - NV	1,400	30 **	Northeastern Mojave
Copper Mountain - NV	380	**	Northeastern Mojave
Moapa K Road Solar - NV	2,152	202	Northeastern Mojave

Genesis Blythe	1,774 6,958	8 30	Colorado Colorado
Palen	1,698	18	Colorado
Desert Sunlight	4,004	56	Colorado
Total	30,180	1,621	

* The applicant has proposed changes to the proposed action; the Bureau has re-initiated formal consultation with the Service, pursuant to section 7(a)(2) of the Endangered Species Act, as part of its re-evaluation of the project (Service 2012e)
** These projects occurred under the Clark County Multi-species habitat conservation plan; we estimate that all three projects combined will affect fewer than 30 desert tortoises.

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

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

Global climate change is likely to affect the prospects for the long-term conservation of the desert tortoise. For example, predictions for climate change within the range of the desert tortoise suggest more frequent and/or prolonged droughts with an increase of the annual mean temperature by 3.5 to 4.0 degrees Celsius. The greatest increases will likely occur in summer (June-July-August mean increase of as much as 5 degrees Celsius [Christensen et al. 2007 in Service 2010b]). Precipitation will likely decrease by 5 to 15 percent annually in the region, with winter precipitation decreasing by up to 20 percent and summer precipitation increasing by 5 percent. Because germination of the desert tortoise's food plants is highly dependent on cool-season rains, the forage base could be reduced due to increasing temperatures and decreasing precipitation in winter. Although drought occurs routinely in the Mojave Desert, extended periods of drought have the potential to affect desert tortoises and their habitats through physiological effects to individuals (i.e., stress) and limited forage availability. To place the consequences of long-term drought in perspective, Longshore et al. (2003) demonstrated that even short-term drought could result in elevated levels of mortality of desert tortoises. Therefore, long-term drought is likely to have even greater effects, particularly given that the current fragmented nature of desert tortoise habitat (e.g., urban and agricultural development, highways, freeways, military training areas, etc.) will make recolonization of extirpated areas difficult, if not impossible.

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

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

Data from long-term study plots, which were first established in 1976, cannot be extrapolated to provide an estimate of the number of desert tortoises on a range-wide basis; however, these data indicate, "appreciable declines at the local level in many areas, which coupled with other survey results, suggest that declines may have occurred more broadly" (Service 2010b). Other sources indicate that local declines are continuing to occur. For example, surveyors found "lots of dead [desert tortoises]" in the western expansion area of Fort Irwin (Western Mojave Recovery Unit) in 2008 (Fort Irwin Research Coordination Meeting 2008). After the onset of translocation, coyotes killed 105 desert tortoises in Fort Irwin's southern translocation area (Western Mojave Recovery Unit); other canids may have been responsible for some of these deaths. Other incidences of predation were recorded throughout the range of the desert tortoise during this time (Esque et al. 2010). Esque et al. (2010) hypothesized that this high rate of predation on desert tortoises was influenced by low population levels of typical prey for coyotes due to drought conditions in previous years. Recent surveys in the Ivanpah Valley (Northeastern Mojave Recovery Unit) for a proposed solar facility detected 31 live desert tortoises and the carcasses of 25 individuals that had been dead less than 4 years (Ironwood 2011); this ratio of carcasses to live individuals over such a short period of time may indicate an abnormally high rate of mortality for a long-lived animal. In summary, the number of desert tortoises range-wide likely decreased substantially from 1976 through 1990 (i.e., when long-term study plots were initiated through the time the desert tortoise was listed as threatened), although we cannot quantify the amount of this decrease. Additionally, more recent data collected from various sources throughout the range of the desert tortoise suggest that local declines continue to occur (e.g., Bureau et al. 2005, Esque et al. 2010).

The distribution of the desert tortoise has not changed substantially since the publication of the original recovery plan in 1994 (Service 2010b) in terms of the overall extent of its range. Prior to 1994, desert tortoises were extirpated from large areas within their distributional limits by urban and agricultural development (e.g., the cities of Barstow, Lancaster, Las Vegas, St. George, etc.; agricultural areas south of Edwards Air Force Base and east of Barstow), military training (e.g., Fort Irwin, Leach Lake Gunnery Range), and off-road vehicle use (e.g., portions of off-road management areas managed by the Bureau and unauthorized use in areas such as east of California City). Since 1994, urban development around Las Vegas has likely been the largest contributor to habitat loss throughout the range. Desert tortoises have been essentially removed from the 18,197-acre southern expansion area at Fort Irwin (Service 2012c).

Table 3 depicts acreages of habitat (as modeled by Nussear et al. 2009) within various regions of the desert tortoise's range and of impervious surfaces as of 2006 (Xian et al. 2009). Impervious surfaces include paved and developed areas and other disturbed areas that have zero probability of supporting desert tortoises.

Table 3. Acreage of modeled desert tortoise habitat (Nussear et al. 2009) and impervious surfaces therein (Xian et al. 2009.

Regions1	Modeled Habitat (acres)	Impervious Surfaces within Modeled Habitat	Percent of Modeled Habitat that is now Impervious
Western Mojave	7,582,092	1,864,214	25
Colorado Desert	4,948,900	494,981	10
Northeast Mojave	7,776,934	1,173,025	15
Upper Virgin River	232,320	80,853	35
Total	20,540,246	3,613,052	18

[1]The regions do not correspond to recovery unit boundaries; we used a more general separation of the range for this illustration.

On an annual basis, the Service produces a report that provides an up-to-date summary of the factors that were responsible for the listing of the species, describes other threats of which we are aware, describes the current population trend of the species, and includes comments of the year's findings. The Service's (2011d) recovery data call report describes the desert tortoise's status as 'declining,' and notes that "(a)nnual range-wide monitoring continues, but the life history of the desert tortoise makes it impossible to detect annual population increases (continued monitoring will provide estimates of moderate- to long-term population trends). Data from the monitoring program do not indicate that numbers of desert tortoises have increased since 2001. The fact that most threats appear to be continuing at generally the same levels suggests that populations are still in decline. Information remains unavailable on whether mitigation of particular threats has been successful."

In conclusion, we have used the 5-year review (Service 2010b), revised recovery plan (Service 2011e), and additional information that has become available since these publications to review the reproduction, numbers, and distribution of the desert tortoise. The reproductive capacity of the desert tortoise may be compromised to some degree by the abundance and distribution of invasive weeds across its range; the continued increase in human access across the desert likely continues to facilitate the spread of weeds and further affect the reproductive capacity of the species. Prior to its listing, the number of desert tortoises likely declined range-wide, although we cannot quantify the extent of the decline; since the time of listing, data suggest that declines have occurred in local areas throughout the range. The continued increase in human access across the desert continues to expose more desert tortoises to the potential of being killed by human activities. The distributional limits of the desert tortoise's range have not changed substantially since the issuance of the original recovery plan in 1994; however, desert tortoises have been extirpated from large areas within their range (e.g., Las Vegas, other desert cities). The species' low reproductive rate, the extended time required for young animals to reach breeding age, and the multitude of threats that continue to confront desert tortoises combine to render its recovery a substantial challenge.

Status of Critical Habitat of the Desert Tortoise

The Service designated critical habitat for the desert tortoise in portions of California, Nevada, Arizona, and Utah in a final rule published February 8, 1994 (59 Federal Register 5820). The Service designates critical habitat to identify the key biological and physical needs of the species and key areas for recovery and to focus conservation actions on those areas. Critical habitat is composed of specific geographic areas that contain the biological and physical features essential to the species' conservation and that may require special management considerations or protection. These features, which include space, food, water, nutrition, cover, shelter, reproductive sites, and special habitats, are called the primary constituent elements of critical habitat. The specific primary constituent elements of desert tortoise critical habitat are: sufficient space to support viable populations within each of the six recovery units and to provide for movement, dispersal, and gene flow; sufficient quality and quantity of forage species and the proper soil conditions to provide for the growth of these species; suitable substrates for burrowing, nesting, and overwintering; burrows, caliche caves, and other shelter sites; sufficient vegetation for shelter from temperature extremes and predators; and habitat protected from disturbance and human-caused mortality.

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

The final rule for designation of critical habitat did not explicitly ascribe specific conservation roles or functions to the various critical habitat units. Rather, it refers to the strategy of establishing recovery units and DWMAs recommended by the recovery plan for the desert tortoise, which had been published as a draft at the time of the designation of critical habitat, to capture the “biotic and abiotic variability found in desert tortoise habitat” (59 Federal Register 5820, see page 5823). Specifically, we designated the critical habitat units to follow the direction provided by the draft recovery plan (Service 1993a) for the establishment of DWMAs. The critical habitat units in aggregate are intended to protect the variability that occurs across the large range of the desert tortoise; the loss of any specific unit would compromise the ability of critical habitat as a whole to serve its intended function and conservation role.

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

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

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

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

Within each critical habitat unit, both natural and anthropogenic factors affect the function of the primary constituent elements of critical habitat. As an example of a natural factor, in some specific areas within the boundaries of critical habitat, such as within and adjacent to dry lakes, some of the primary constituent elements are naturally absent because the substrate is extremely silty; desert tortoises do not normally reside in such areas. Comparing the acreage of desert tortoise habitat as depicted by Nussear et al.'s (2009) model to the gross acreage of the critical habitat units demonstrates quantitatively that the entire area within the boundaries of critical habitat likely does not support the primary constituent elements (Table 4). The acreage for modeled habitat is for the area in which the probability that desert tortoises are present is greater than 0.5. The acreages of modeled habitat are from Service (2010b); they do not include loss of habitat due to human-caused impacts. The difference between gross acreage and modeled habitat is 653,214 acres; that is, approximately 10 percent of the gross acreage of the designated critical habitat is not considered modeled habitat.

Table 4. Gross acreages of critical habitat units and of modeled desert tortoise habitat within the critical habitat units (Nussear et al. 2009).

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

Condition of the Primary Constituent Elements of Critical Habitat

Human activities can have obvious or more subtle effects on the primary constituent elements. The grading of an area and subsequent construction of a building removes the primary constituent elements of critical habitat; this action has an obvious effect on critical habitat. The revised recovery plan identifies human activities such as urbanization and the proliferation of roads and highways as threats to the desert tortoise and its habitat; these threats are examples of activities that have a clear effect on the primary constituent elements of critical habitat.

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

> Surface disturbance from OHV activity can cause erosion and large amounts of dust to be discharged into the air. Recent studies on surface dust impacts on gas exchanges in Mojave Desert shrubs showed that plants encrusted by dust have reduced photosynthesis and decreased water-use efficiency, which may decrease primary production during seasons when photosynthesis occurs (Sharifi et al. 1997). Sharifi et al. (1997) also showed reduction in maximum leaf conductance, transpiration, and water-use efficiency due to dust. Leaf and stem temperatures were also shown to be higher in plants with leaf-surface dust. These effects may also impact desert annuals, an important food source for [desert] tortoises.
>
> OHV activity can also disturb fragile cyanobacterial-lichen soil crusts, a dominant source of nitrogen in desert ecosystems (Belnap 1996). Belnap (1996) showed that anthropogenic surface disturbances may have serious implications for nitrogen budgets in cold desert ecosystems, and this may also hold true for the hot deserts that [desert] tortoises occupy. Soil crusts also appear to be an important source of water for plants, as crusts were shown to have 53 percent greater volumetric water content than bare soils during the late fall when winter annuals are becoming established (DeFalco et al. 2001). DeFalco et al. (2001) found that non-native plant species comprised greater shoot biomass on crusted soils than native species, which demonstrates their ability to exploit available nutrient and water resources. Once the soil crusts are disturbed, non-native plants may colonize, become established, and out-compete native perennial and annual plant species (DeFalco et al. 2001, D'Antonio and Vitousek 1992). Invasion of non-native plants can affect the quality and quantity of plant foods available to desert tortoises. Increased presence of invasive plants can also contribute to increased fire frequency.
>
> Proliferation of invasive plants is increasing in the Mojave and Sonoran deserts and is recognized as a substantial threat to desert tortoise habitat. Many species of non-native plants from Europe and Asia have become common to abundant in some areas, particularly where disturbance has occurred and is ongoing. As non-native plant species become established, native perennial and annual plant species may decrease, diminish, or die out (D'Antonio and Vitousek 1992). Land managers and field scientists identified 116 species of non-native plants in the Mojave and Colorado deserts (Brooks and Esque 2002).
>
> Increased levels of atmospheric pollution and nitrogen deposition related to increased human presence and combustion of fossil fuels can cause increased levels of soil nitrogen, which in turn may result in significant changes in plant communities (Aber et al. 1989). Many of the non-native annual plant taxa in the Mojave region evolved in more fertile Mediterranean regions and benefit from increased levels of soil nitrogen, which gives them a competitive edge over native annuals. Studies at three sites within the central, southern, and western Mojave Desert indicated that increased levels of soil nitrogen can increase the dominance of non-native annual plants and promote the invasion of new species in desert regions.

> Furthermore, increased dominance by non-native annuals may decrease the diversity of native annual plants, and increased biomass of non-native annual grasses may increase fire frequency (Brooks 2003).

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

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

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

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

Urban and agricultural development, concentrated use by off-road vehicles, and other activities of this nature completely remove habitat. Although we are aware of local areas within the boundaries of critical habitat that have been heavily disturbed, we do not know of any areas that have been disturbed to the intensity and extent that this primary constituent element has been compromised. To date, the largest single loss of critical habitat is the use of 18,197 acres of additional training land in the southern portion of Fort Irwin. In our biological opinion for that proposed action (Service 2012c), we stated:

> The proposed action would essentially eliminate the primary constituent elements from approximately 2.40 percent of the Superior-Cronese Critical Habitat Unit; additionally, the conservation role of the remainder of this critical habitat unit and the other critical habitat units has been compromised by substantial human impact on the second and sixth primary constituent elements. However, the conservation measures that the Army implemented as part of the proposed action offset, at least to some extent, the adverse effects of the use of the additional training lands in the southern expansion area. Consequently, we have concluded that, although the second and sixth primary constituent

> elements are not functioning appropriately throughout most of designated critical habitat of the desert tortoise and the proposed action would result in substantial disturbance to 18,197 acres of the Superior-Cronese Critical Habitat Unit, the change in the condition of critical habitat brought about by the Army's proposed action (i.e., use of the southern expansion area for training and implementation of the conservation actions) is not likely to cause an overall decrease in the conservation value and function of the Superior-Cronese Critical Habitat Unit.

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

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

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

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

This primary constituent element addresses the ability of critical habitat to provide adequate nutrition to desert tortoises. As described in the revised recovery plan and 5-year review, grazing, historical fire, invasive plants, altered hydrology, drought, wildfire potential, fugitive dust, and climate change/temperature extremes contribute to the stress of "nutritional compromise." Paved and unpaved roads through critical habitat of the desert tortoise provide avenues by which invasive native species disperse; these legal routes also provide the means by which unauthorized use occurs over large areas of critical habitat. Nitrogen deposition from atmospheric pollution likely occurs throughout all of the critical habitat units and exacerbates the effects of the disturbance of substrates. Because paved and unpaved roads are so widespread through critical habitat, this threat has compromised the conservation value and function of critical habitat throughout the range of the desert tortoise, to some degree. Appendix 3 depicts the routes by which invasive weeds have access to critical habitat; the routes shown on this map are a subset of the actual number of routes that actually cross critical habitat of the desert tortoise.

Suitable substrates for burrowing, nesting, and overwintering.

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

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

Burrows, caliche caves, and other shelter sites.

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

Sufficient vegetation for shelter from temperature extremes and predators.

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

In 2005, wildfires in Nevada, Utah, and Arizona burned extensive areas of critical habitat (Service 2010b). Although different agencies report slightly different acreages, table 5 provides an indication of the scale of the fires.

Table 5. Acreage of critical habitat units that burned in 2005 (Service 2010b).

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

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

Habitat protected from disturbance and human-caused mortality.

In general, the Federal agencies that manage lands within the boundaries of critical habitat have adopted land management plans that include implementation of some or all of the recommendations contained in the original recovery plan for the desert tortoise. (See pages 70 to 72 of Service 2010b.) To at least some degree, the adoption of these plans has resulted in the implementation of management actions that are likely to reduce the disturbance and human-caused mortality of desert tortoises. For example, these plans resulted in the designation of open routes of travel and the closure (and, in some cases, physical closure) of unauthorized routes. Numerous livestock allotments have been relinquished by the permittees; cattle no longer graze these allotments. Because of these planning efforts, the Bureau's record of decision included direction to withdraw some areas of critical habitat from mineral entry. Because of actions on the part of various agencies, many miles of highways and other paved roads have been fenced to prevent desert tortoises from wandering into traffic and being killed. The Service and other agencies of the Desert Managers Group in California are implementing a plan to remove common ravens that prey on desert tortoises and to undertake other actions that would reduce subsidies (i.e., food, water, sites for nesting, roosting, and perching, etc.) that facilitate their abundance in the California Desert (Service 2008b).

Despite the implementation of these actions, disturbance and human-caused mortality continue to occur in many areas of critical habitat (which overlap the DWMAs for the most part and are the management units for which most data are collected) to the extent that the conservation value and function of critical habitat is, to some degree, compromised. For example, many highways and other paved roads in California remain unfenced. Twelve desert tortoises were reported to be killed on paved roads from within Mojave National Preserve in 2011, and we fully expect that desert tortoises are being killed at similar rates on many other roads, although these occurrences are not discovered and reported as diligently as by the National Park Service. Employees of the Southern California Gas Company reported two desert tortoises in 2011 that were crushed by vehicles on unpaved roads.

Unauthorized off-road vehicle use continues to disturb habitat and result in loss of vegetation within the boundaries of critical habitat (e.g., Coolgardie Mesa in the Western Mojave Recovery Unit); although we have not documented the death of desert tortoises as a direct result of this activity, it likely occurs. Additionally, the habitat disturbance caused by this unauthorized activity exacerbates the spread of invasive plants, which displace native plants that are important forage for the desert tortoise, thereby increasing the physiological stress faced by desert tortoises.

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

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

Summary of the Status of Critical Habitat of the Desert Tortoise

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

Invasive plants have already compromised the conservation value and function of critical habitat to some degree with regard to the second primary constituent element (i.e., sufficient quality and quantity of forage species and the proper soil conditions to provide for the growth of these species). These effects likely extend to the entirety of critical habitat, given the numerous routes by which invasive plants can access critical habitat and the large spatial extent that is subject to nitrogen from atmospheric pollution. Appendix 3 demonstrates the extent of the threat of invasive plants; Appendix 2 illustrates the 12 critical habitat units of the desert tortoise and the aggregate stress that multiple threats, including invasive plants, place on critical habitat.

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

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

Land managers have undertaken actions to improve the status of critical habitat. For example, as part of its efforts to offset the effects of the use of additional training maneuver lands at Fort Irwin (Service 2004), the Army acquired the private interests in the Harper Lake and Cronese Lakes allotments, which are located within critical habitat in the Western Mojave Recovery Unit;

as a result, cattle have been removed from these allotments. Livestock have been removed from numerous other allotments through various means throughout the range of the desert tortoise. The retirement of allotments assists in the recovery of the species by eliminating disturbance to the primary constituent elements of critical habitat by cattle and range improvements.

ENVIRONMENTAL BASELINE

Action Area

The implementing regulations for section 7(a)(2) of the Act define the "action area" as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). For the purposes of this biological opinion, we consider the action area to include all areas that the Marine Corps may affect through management of the RPAA, military training on the expanded installation, and desert tortoise translocation. The action area also includes those regions of California where the Marine Corps predicted OHV recreation displaced from the Johnson Valley Off-highway Vehicle Management Area was likely to occur.

In its biological assessment, the Marine Corps also included the "new and modified airspace, and adjacent surrounding lands in San Bernardino County, California that underlie the proposed airspace establishment" as part of its action area. We did not include that area in our biological opinion because the use of the airspace will not affect desert tortoises. (See Bowles et al. 1999).

The Marine Corps provided estimates of the amount of OHV displacement that is likely to occur following expansion of the MCAGCC installation and provided information on the locations likely to receive this displaced recreation (DoN 2011c); table 8 of that document provides a list of the sites that the Marine Corps evaluated. All of these sites are within the action area for this biological opinion; however, for various reasons, we have not included all of these areas in our discussions of the Environmental Baseline and Cumulative Effects sections of this biological opinion. The reasons for defining the extent of the action area are to determine the status of the listed species and critical habitat that would be affected by the proposed action and to assess the potential for cumulative effects, as defined at 50 Code of Federal Regulations 402.02.

We did not include discussions of areas outside of the range of the desert tortoise in the Environmental Baseline section because these areas have no bearing on the status of the desert tortoise or its critical habitat. We have also determined that lands outside of the range of the desert tortoise either do not support other federally listed species or their critical habitat or that consultation has been completed for areas that support listed species and critical habitat.

We did not include discussions of these areas in the Cumulative Effects section because these areas are either so distant from the range of the desert tortoise that future non-federal actions will not affect desert tortoises or their critical habitat or the areas are on Federal lands. Future actions on Federal lands would not be considered cumulative to the proposed action because the Federal action agency would be required to consult with us under the provisions of section 7(a)(2) of the Act.

Table 6 lists the areas for which we have not carried forward additional analysis in this biological opinion and describes the rationale for our determination.

Table 6. OHV areas excluded from further analysis in the Environmental Baseline and Cumulative Effects sections of the biological opinion.

Area of Displaced OHV Use	**General Location**	**Reasons for Not Including in the Environmental Baseline or Cumulative Effects Analysis**
Keyesville Special Recreation Management Area	Kern County, near lake Isabella	Not within or near habitat of desert tortoise. No listed species or critical habitat present.
Imperial Sand Dunes Off-highway Vehicle Management Area	Southeastern Imperial County	Desert tortoises, threatened Peirson's milk-vetch present in a portion of this OHV area. Effects of the amount of displaced use would be indistinguishable from current use.
Plaster City	Southwestern Imperial County	Not within habitat of any listed species.
Superstition Mountain	Southwestern Imperial County	Not within habitat of any listed species.
Lark Canyon OHV Area	Southeastern San Diego County	Not within habitat of any listed species.
Bureau's West Mojave Route System	San Bernardino, Inyo, and Kern Counties	Effects of the amount of displaced use would be indistinguishable from current use. Biological opinion is in place for the effects of casual use of the route system.
Devil's Canyon	Southwestern Imperial County	Consultation is in place for the effects of OHV use on the endangered Peninsular bighorn sheep.
Rowher Flat OHV Area	Angeles National Forest, Los Angeles County	Not within habitat of any listed species.
Azusa Canyon	Angeles National Forest, Los Angeles County	Threatened Santa Ana sucker and its critical habitat present in this OHV area. Effects of the amount of displaced use would be indistinguishable from current use. Biological opinion is in place for the effects of OHV use on the Santa Ana sucker and its critical habitat.
Wildomar OHV Area	Cleveland National Forest	Not within habitat of any listed species.

Corral Canyon OHV Area	Cleveland National Forest	Potentially within habitat of the endangered arroyo toad. Effects of the amount of displaced use would be indistinguishable from current use. Biological opinion is in place for the effects of OHV use on the arroyo toad.
Ortega Trail	Los Padres National Forest	Not within habitat of any listed species.
Ballinger Canyon	Los Padres National Forest	The endangered Kern mallow and threatened Kern primrose sphinx moth were recently found in this region. The endangered San Joaquin kit fox and giant kangaroo rat have been found just below the system on private lands in the upper Cuyama Valley. The Forest Service is in the process of developing a biological assessment for recreational use in this area. Effects of the amount of displaced use would likely be indistinguishable from current use.
Divide Peak OHV Route	Los Padres National Forest	The threatened California red-legged frog and its critical habitat are near this area but unlikely to be affected because OHV use is away from the river. Effects of the amount of displaced use would be indistinguishable from current use.
Pozo La Panza	Los Padres National Forest	Effects of the amount of displaced use would be indistinguishable from current use. The threatened purple amole is protected by an extensive pipe barrier system. Habitat of the California red-legged frog is not adjacent to any trail system.
Figueroa Mountain	Los Padres National Forest	The California red-legged frog occurs near this area but not along the OHV trail. Effects of the amount of displaced use would be indistinguishable from current use.
Big Bear Lake	San Bernardino National Forest	Several listed plant species, their critical habitat, and the southwestern willow flycatcher occur in this area. Biological opinions are in place for the effects of OHV use on these species. Effects of the amount of displaced use would be indistinguishable from current use.
Lake Arrowhead	San Bernardino National Forest	Not within habitat of any listed species.

Cleghorn OHV Trail	San Bernardino National Forest	Near habitat of the arroyo toad. Effects of the amount of displaced use would be indistinguishable from current use. Biological opinion is in place for the effects of OHV use on the arroyo toad.
Kennedy Meadows	Sequoia National Forest, Tulare County	Not within habitat of any listed species.
Ocotillo Wells SVRA	Eastern San Diego County	Not within habitat of any listed species.
Heber Dunes SVRA	Southern central Imperial County	Not within habitat of any listed species.
Hungry Valley SVRA	Northwestern Los Angeles County	Not within habitat of any listed species.
Oceano Dunes	Western San Luis Obispo County	Within habitat of several federally listed species. The increase in visitors would probably go unnoticed based on existing limits on the numbers of campers (1,000 registered campers) and daily visitors. California Department of Parks and Recreation has measures in place to reduce interactions between listed species and OHV/visitor use.

We based the discussion in the previous table on the analysis conducted by the Marine Corps (DoN 2011c). We acknowledge that OHV use that is displaced from the Johnson Valley Off-highway Vehicle Management Area may occur in more places than we have discussed herein. However, because of all of the unknown factors that are involved in predicting where displaced use may occur, we consider the information provided by the Marine Corps to be the best scientific and commercial data available, which is the standard required by our regulations (50 Code of Federal Regulations 402.14(d)). The likelihood also exists that, if displaced use occurred in additional areas than the ones identified by the Marine Corps, the use of even more sites would further dilute its effects on listed species and their critical habitat. Consequently, we will restrict our analysis to areas within the range of the desert tortoise that are likely to receive displaced OHV use.

We used the information provided by the Marine Corps along with baseline recreation data (Schiffer-Burdet 2012) and information on areas of historically above average OHV use (Bureau et al. 2005) to define the action area as it relates to OHV displacement. Table 7, which we have developed from several sources (DoN 2011a, 2011c, Karl and Henen 2011, and Bureau et al. 2005), provides information on the acreages of the various portions of the action area.

Table 7. Acreages of areas within the action area.

Areas to be Affected by Military Activities and Desert Tortoise Translocation[1]	
Existing Installation	**~598,000**
Exclusive Military Use Areas	~598,000
Special Use Areas-Category 1	29,900
Special Use Areas-Category 2	29,800
Sunshine Peak Translocation Areas	3,706
Alternate Translocation Areas (Emerson Lake and Bullion)	4,942
Southern Expansion Area	**21,304**
Exclusive Military Use	21,304
Special Use Areas (i.e., translocation areas) Category 1	2,935
Western Expansion Area	**146,667**
Exclusive Military Use	108,530
Special Use Areas (i.e., translocation areas) Category 1	12,015
RPAA	38,137
Ord-Rodman DWMA	**276,756**
Translocation Areas	19,199
Control Areas	494
Areas to be Affected by OHV Displacement	
Bureau of Land Management OHV Management Areas[2]	
Stoddard Valley	91,720
Remaining Portions of Johnson Valley and RPAA	141,042
El Mirage	30,080
Rasor	36,357
Spangler	100,480
Jawbone Canyon/Dove Springs	24,920
Illegal OHV Use Areas[3]	
California City/Rand Mountains	107,520
Edward Bowl (south of Edwards Air Force Base)	19,840
East Sierra (north of Dove Springs OHV Management Area)	8,960
Coyote Corner (areas south of Fort Irwin)	24,960
Silver Lakes (areas north of Helendale, south of Highway 58, east of Highway 395)	23,680
Hinkley (areas north and northwest of Barstow)	19,840

We have chosen to incorporate the unauthorized OHV use areas from Bureau et al. (2005) in the action area because the Marine Corps (DoN 2011c) has predicted that some displacement was likely to occur on private lands and in unauthorized areas. However, OHV displacement is not

[1] All values provided in acres. The acreages under each bold-faced acreage overlap; for example, the special use areas described for the existing installation are also included in the total acreage for the existing installation.
[2] Values include size of OHV management area and areas of above average unauthorized OHV recreation in adjacent areas (Bureau et al. 2005; Table 3-26).
[3] Based on *High OHV Use Areas* and *Residential Vehicle Impact Areas* in Table 3-26 and Map 3-14 from (Bureau et al. 2005).

likely to occur evenly across the western Mojave Desert; additionally, its displacement to private lands or unauthorized-use areas is likely to concentrate in locations historically used for these activities. Because the areas identified above are based on extensive surveys of the western Mojave Desert, they encompass discrete locations historically used for these activities, which are likely to receive some proportion of the predicted OHV displacement.

In the following sections, we discuss those aspects of the environmental baseline that are relevant to the analysis of effects associated with this consultation. We have organized each subsection in the Environmental Baseline based on the following geographic regions of the action area: 1) Existing MCAGCC installation and expansion areas, 2) Ord-Rodman DWMA, and 3) areas likely to be affected by OHV displacement areas. In instances where we have not provided information for one of these geographic regions, we have done so because the information is either already adequately considered in the Status of the Species section or we have determined that we do not require the information to analyze the effects of the proposed action.

Existing Conditions in the Action Area

In this section, we discuss the anthropogenic effects and natural conditions within the action area as they relate to desert tortoises and their habitat. Unless we have noted otherwise by citing a biological opinion, the anthropogenic conditions present in the action area were present prior to the listing of the desert tortoise. The following discussion includes only the biological opinions for major actions that have likely had a long-term effect on the status of the desert tortoise and its critical habitat within the action area.

Smaller projects have also occurred within the action area. We have not provided a list or analysis of the biological opinions that addressed these actions because they did not measurably influence the overall status of the desert tortoise or its critical habitat in the action area. These additional biological opinions are available upon request from the Ventura Fish and Wildlife Office.

Existing Installation

The Department of Defense manages the existing installation and currently uses it for military training activities similar to those discussed in the proposed action for this biological opinion. Approximately 27.5 percent of the 600,000-acre installation is unavailable for training due to rough terrain (Service 2002; 1-8-99-F-41) and approximately 60,000 acres are within SUAs where training activities are limited. The remaining portions of the base are open to military training. Approximately 30 percent of MCAGCC has experienced at least 25 percent shrub loss due to mission-related activities. Areas that have experienced this degree of disturbance but which have been otherwise undisturbed for 40 to 50 years have experienced only partial recovery at best (Marine Corps 1999b in Service 2002; 1-8-99-F-41). Woodman et al. (2001) also noted that surveys could not locate desert tortoises on 6.6 percent of the base, probably partially due to a large amount of vehicle activity and limited habitat in the northeastern portions of MCAGCC, where tortoise sign were not found. Another 18.9 percent of the base had substantially decreased desert tortoise abundance, probably partially due to vehicle activity (Woodman et al 2001, Henen

2012e). Figure 5-2 of the biological assessment (DoN 2011a) depicts the areas of heaviest vehicle use on the existing installation.

In 2002, we issued a biological opinion for base-wide operations (Service 2002; 1-8-99-F-41) that analyzed the effects of the current training activities. We concluded that military use has degraded, and will continue to degrade, habitat quality and likely cause further declines in the number of desert tortoises on MCAGCC. However, we determined that desert tortoises were likely to persist in low numbers on the installation and concluded that the ongoing military training on MCAGCC was not likely to jeopardize the continued existence of the desert tortoise because habitat and populations on MCAGCC were not key to the long-term survival and recovery of the species.

Expansion Areas

The proposed western expansion area occurs within the existing Johnson Valley Off-highway Vehicle Management Area (DoN 2011a). Bureau (1980) designated this area for intensive multiple uses under the California Desert Conservation Area (CDCA) Plan. Historically, the area was used for mining and livestock grazing (DoN 2011a), but the primary land use in recent decades has been OHV recreation with the highest concentrations of use in the central, southern, and southwestern portions of the proposed western expansion area (Stow 1988 in Bureau et al. 2005, DoN 2011a). The Bureau et al. (2005) estimated that above-average OHV disturbance occurred over 205 square miles of the Johnson Valley Off-highway Vehicle Management Area with an additional 91 square miles of unauthorized OHV disturbance occurring outside but in the immediate vicinity. DoN (2011a) estimated that areas of high disturbance (i.e., areas containing race routes used for large OHV events, designated OHV routes, and camping areas) and moderate disturbance (i.e., areas containing 3 to 5 routes and lower vehicle traffic; Karl 2010b, as noted in DoN 2011a) currently occur on 105 and 53 square miles of the western expansion area, respectively. The difference in the size of the area surveyed (i.e., entire OHV area versus western expansion area) likely accounts for the lower amount of disturbance identified by the Marine Corps. Given the rate at which desert habitats recover from disturbance, the apparent decrease in the amount of land disturbed between 2005 and 2011 is highly unlikely to be due to recovery of disturbed areas.

In the biological opinion for the Johnson Valley Off-highway Vehicle Area Management Plan (Service 1991; 1-6-90-F-39), we concluded that OHV use in this area was not likely to jeopardize the continued existence of the species. We reached this conclusion because large portions of the area were already compromised by existing impacts, the area was unlikely to contribute to long-term survival and recovery of the species, and concentration of OHV activity in these areas was likely to reduce these activities in other areas to the northwest that were considered important to the species. In that biological opinion, we anticipated the loss of 136,320 acres of desert tortoise habitat (already in various stages of deterioration) and the injury or mortality of 1,000 desert tortoises over the life of the management plan.

Bureau-managed cattle and ephemeral sheep grazing allotments also overlap portions of the western expansion area, but sheep grazing has not occurred in this area since 1992 (DoN 2011a). Cattle grazing currently occurs on the Ord Mountain allotment at low levels (approximately 25 head per year; Chavez 2012a). Most of this allotment lies within the Ord-Rodman DWMA but the southern portion extends into the western expansion area.

Transmission lines traverse the northern portion of the Johnson Valley Off-highway Vehicle Management Area (DoN 2011a; Bureau 2008). Several existing mining operations (e.g., Bessemer Mine) currently occur on private lands within the western expansion area (Bureau 2008).

Little activity is occurring in the southern expansion area with the exception of minor prospecting and limited dispersed recreational use (Karl 2010a).

Ord-Rodman DWMA

The proposed action would result in translocation of desert tortoises into the Ord-Rodman DWMA (DoN 2011a) and would result in displacement of OHV recreation that would also affect the DWMA. Although the Marine Corps and Bureau have proposed specific areas where these effects would occur, the following information is relevant to the DWMA as a whole. We consider this approach reasonable because we do not have site-specific information regarding the localized effects of many activities and desert tortoises and habitat conditions are not static.

Two livestock allotments lie within the boundaries of the Ord-Rodman DWMA (i.e., Ord Mountain, Valley Well). Large portions of the Ord Mountain Allotment are located at or above 4,000 feet in elevation (Bureau 2004). Luckenbach (1982) states that most desert tortoises reside at elevations between 1,000 and 3,000 feet; during range-wide monitoring, we have regularly found desert tortoises up to 4,000 feet, although they are most common between 1,300 and 2,800 feet in elevation (Allison 2012). Two key grazing areas on the allotment are located below 4,000 feet in elevation, but these areas have historically had grazing utilization levels that the Bureau would characterize as light to non-use (Service 2006c). Between 1990 and 2003, the number of head of cattle within the allotment ranged from 145 to 385. In 6 of those years, more than 300 head were present; less than 200 were present during 4 years (Service 2006c). Currently, only 25 head of cattle typically occur on the allotment (Chavez 2012a). The Valley Well Allotment covers 520 acres and is grazed by a few horses (Service 2007, 1-8-07-F-37R).

Unless otherwise noted, the information in the following paragraphs is from LaPre (2005 in Service 2006c). The Ord-Rodman DWMA contains three active utility corridors. Corridor G, which is 2 miles wide, lies along Interstate 40 at the northern boundary; one 30-inch pipeline is located in this corridor. Corridor D is 2 miles wide; it contains two 287-kilovolt power lines and one 500-kilovolt power line. Corridor H contains one 34-inch pipeline; it is 2 miles wide.

Several off-highway vehicle routes occur within the Ord-Rodman DWMA, which is situated between the Johnson Valley and Stoddard Valley Off-highway Vehicle Management Areas. The Western Mojave Off-Road Vehicle Designation Project, completed by the Bureau in June 2003, designated all routes as open, closed or limited in use within the DWMA (Service 2003). Unauthorized off-highway vehicle activity occurs in the western portion of the DWMA along Highway 247. Bureau et al. (2005) documented above-average OHV use within portions of the

Ord-Rodman DWMA. Most of this unauthorized use is associated with recreation that emanates from the Stoddard Valley and Johnson Valley Off-highway Vehicle Management Areas.

In the biological opinion for the Bureau's West Mojave Plan, we evaluated the effects of route designation and livestock grazing throughout the western Mojave Desert (Service 2006c; 1-8-03-F-58). We concluded that the proposed revisions to the CDCA Plan were not likely to jeopardize the continued existence of the desert tortoise or result in adverse modification or destruction of its critical habitat. We reached these conclusions primarily because most of the actions proposed by the Bureau would result in fewer effects to desert tortoises and their critical habitat than had occurred under the previous CDCA Plan.

Berry (1996) documented evidence of disease, poaching, and environmental contaminants at the Stoddard Valley permanent study plot in the northwestern portion of the DWMA. Common ravens and feral or free-ranging dogs have also killed desert tortoises at the Lucerne Valley permanent study plot in the southwestern portion of the DWMA.

Areas Likely to be Affected by OHV Displacement

In the Existing Conditions in the Action Area – Expansion Areas section of this biological opinion, we provided information on the existing conditions within the portions of the Johnson Valley Off-highway Vehicle Management Area that the western expansion area would overlap. Much of the information on existing conditions described therein also applies to the portions of the OHV area outside of the western expansion area. We have provided additional information where appropriate to characterize the existing condition more fully.

OHV recreation currently occurs in all areas likely to be affected by OHV displacement. Table 8 lists data from Bureau et al. (2005), collected between 1998 and 2002, that provide information on the magnitude of OHV recreation effects within various portions of the action area. All of the areas identified below experience above-average OHV-related effects when compared to other portions of the western Mojave Desert.

Table 8. Average amounts of sign of human activity in areas of above-average OHV-related effects in the western Mojave Desert (Bureau et al. 2005).

Area[4]	Trails[5]	OHV tracks	Litter	Dumps[5]	Evidence of Target Shooting	Evidence of Hunting	Evidence of Camping
Stoddard Valley OHV Management Area	12	138.9	35.9	0	10.3	3	3.1
Johnson Valley OHV Management Area	22.5	179.6	41.1	0	17.4	1.6	1.9
El Mirage OHV Management Area	16.9	120.7	21.9	0	11.3	2.3	1
Spangler OHV Management Area	19.3	95.6	39.1	0	18	1.1	2.4
Jawbone Canyon/Dove Springs OHV Management Area	15.4	18.5	17.3	0	17.6	1	2.5
California City/Rand Mountains	8	52.3	21.1	0	6.5	1.5	1.5
Edwards Bowl	5.5	42.8	16.6	0	1.7	1.8	1
East Sierra	1.7	10.1	47.6	0	7.8	0	0
Silver Lakes	3.4	12.8	33.7	1	6.2	3.3	1
Hinkley	5.1	14.9	103.8	0	1.8	1.8	1.8
Coyote Corner	3.6	57	52.7	1.2	37.5	1.6	1.8

This information indicates that the effects and human uses associated with OHV recreation, especially the prevalence of OHV trails, tracks, and litter, were more common in the Bureau's OHV management areas and their adjacent areas of unauthorized use than in any of the other areas identified. Among the Bureau's OHV management areas, surveyors documented more OHV-related effects in Johnson Valley than any other portion of the action area. The Bureau concluded that the California City/RandMountains, Edwards Bowl, and East Sierra areas contained fewer OHV effects than the Bureau's OHV management areas, but more effects than the Silver Lakes, Hinkley, or Coyote Corner areas (Bureau et al. 2005). Among this group, the California City/Rand Mountains area contained the highest level of effects (Bureau et al. 2005). The Silver Lakes, Hinkley, and Coyote Corner areas all receive the lowest OHV-related effects within the action area (Bureau et al. 2005) but still at levels that are above average when compared with the entire western Mojave Desert. The fact that these portions of the action area are all located within DWMAs is of key importance. In addition, the Rand Mountains are located within a DWMA; the Bureau recognized the high levels of unauthorized use in this area (see Bureau et al. 2005) and instituted controls to manage recreational use (Bureau 2012).

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[4] Survey data cover both authorized and unauthorized (i.e., in adjacent areas) use associated with the Bureau's OHV management areas. No data exist for the Rasor Off-highway Vehicle Management Area. All units are the number of units divided by the number of square miles covered.

[5] Dumps encompass areas showing evidence of long-term illegal disposal of trash.

Outside of the OHV management areas, cross-country travel for recreation is unauthorized; vehicles may leave open routes to stop, park, and camp. The prescriptions for stopping, parking, and camping differ within and outside of the DWMAs; we analyzed the effects of these uses in our biological opinion for the amendment of the CDCA Plan for the western Mojave Desert (Service 2006c; 1-8-03-F-58).

We have issued four biological opinions that address the effects of the Bureau's OHV management areas on desert tortoises (Service 1990, El Mirage; 1991, Johnson Valley; 1992, Spangler; 1993b, Stoddard Valley). In each biological opinion, we concluded that the management of the OHV area was not likely to jeopardize the continued existence of the desert tortoise because all of the areas were degraded prior to the listing of the desert tortoise and were not necessary for its recovery. In total, we anticipated that approximately 3,018 desert tortoises would be killed or injured and 209,680 acres of habitat would be degraded. The biological opinions concluded that expanding recreational use of these areas would eventually extirpate desert tortoises from these areas. Clearly, at least in the case of the Johnson Valley Off-highway Vehicle Management Area, more desert tortoises persist in the area than we predicted in the biological opinion. One reason may be that recreational use has remained more concentrated in specific areas than we predicted in the biological opinions.

Livestock grazing has occurred in all areas that will receive OHV displacement, with the exception of the Rasor Off-highway Vehicle Management Area. Within recent years, livestock grazing has been removed from all of the allotments within DWMAs, except for the Ord Mountain and Valley Well allotments within the Ord-Rodman DWMA. Sheep and cattle allotments are still open within the remaining areas. Table 9, which provides information on the allotments that overlap this portion of the action area, is based on information in Bureau et al. (2005, Chavez 2012b, Fitton 2012).

Table 9. Livestock allotments within the action area.

Allotment	Action Area Location	Livestock Type
Cantil	California City and Rand Mountains Heavy OHV Use Area	Sheep (Ephemeral)
Boron	California City and Rand Mountains Heavy OHV Use Area	Sheep (Ephemeral)
Spangler Hills	Spangler Hills OHV Management Area	Sheep (Ephemeral)
Lava Mountain	Spangler Hills OHV Management Area	Sheep (Ephemeral)
Rudnick Common	Jawbone Canyon, Dove Springs, East Sierra	Cattle and Sheep
Walker Pass North	East Sierra Heavy OHV Use Area	Cattle
Walker Pass Middle	East Sierra Heavy OHV Use Area	Cattle
Walker Pass South	East Sierra Heavy OHV Use Area	Cattle
Middle Stoddard Mountains	Stoddard Valley OHV Management Area (Unauthorized OHV Use Area)	Sheep (Ephemeral)
Valley Well	Ord-Rodman DWMA	Horse
Shadow Mountain	El Mirage OHV Management Area/Edwards Bowl Heavy OHV Use Area	Sheep (Ephemeral)
Ord-Mountain	Ord-Rodman DWMA	Cattle

Utility corridors containing above ground transmission lines, natural gas pipelines, and/or telecommunication lines also cross several of these areas. These linear facilities have resulted in loss of habitat, mortality of desert tortoises during construction, and serve as an ongoing subsidy for common ravens by providing roosting and hunting perches.

Status of the Desert Tortoise in the Action Area

Existing Installation, Expansion Areas, and Ord-Rodman DWMA

The Marine Corps conducted surveys for desert tortoises in the western and southern expansion areas in October of 2009 using the TRED method (Karl 2002) and pre-project survey protocols (Service 2010a). Woodman et al. (2001) conducted strip transect surveys on the existing installation in 1997 and 1999. In addition, the Service conducts annual line distance sampling surveys of the Ord-Rodman DWMA to estimate the abundance of larger desert tortoises (Buckland et al. 2001 in Service 2010c).

Many documents characterize desert tortoises as ‘adult,’ subadult,’ or ‘juvenile.’ For the purposes of this biological opinion, when size matters, we will generally refer to larger (i.e., larger than 160 millimeters) and smaller (i.e., smaller than 160 millimeters) desert tortoises. We will use this convention because the size at which desert tortoises reach adulthood (i.e., sexual maturity) varies depending upon the gender and geographic location of the animal. We use 160 millimeters as the break between larger and smaller animals because experience has shown that workers generally do not detect desert tortoises smaller than 160 millimeters in length during surveys.

Table 10 summarizes the available information for larger desert tortoises on the existing installation, the expansion areas, and the Ord-Rodman DWMA. This table provides estimates from both the TRED and Service protocols for the western and southern expansion areas. The point estimates for both methods are comparable, but the confidence interval using the Service's protocol is wider.

Table 10. Estimates of the number of large desert tortoises.

Area	Large Desert Tortoises (Point Estimate and 95 Percent Confidence Intervals)							
	TRED Surveys (DoN 2011a)		Service Protocol (DoN 2011a)		Strip Transects (Woodman et al. 2001)		Line Distance Sampling (Service 2010c)	
	Point Estimate	Confidence Intervals	Point Estimate	Confidence Intervals	Point Estimate	Confidence Intervals	Point Estimate	Confidence Intervals
Existing Installation	-	-	-	-	9,593	1,482 - 13,908	-	-
Western Expansion Area	2,046	1,563 - 2,528	2,860	1,442 - 5,670	-	-	-	-
Southern Expansion Area	369	305 - 433	356	134 - 941	-	-	-	-
Ord-Rodman DWMA	-	-	-	-	-	-	6,453	3,911 - 10,646

Given the uncertainties associated with estimating desert tortoise population size (see below), a wider confidence interval will provide for a more conservative and encompassing analysis of effects. Consequently, we have chosen to use the estimates provided by the Service's protocol throughout the remainder of this biological opinion when addressing the western and southern expansion areas.

Because of the difficulty in locating smaller desert tortoises (i.e., animals under 160 millimeters), the estimates from these survey methods do not incorporate these smaller size classes. A methodology for estimating population size for smaller size classes through direct survey does not currently exist, so the Marine Corps employed indirect methods that use adult population estimates and a life history table that the Bureau employed in the revised biological assessment for the Ivanpah Solar Electric Generating System (Bureau 2011). This method incorporates numerous assumptions detailed in Appendix C of the biological assessment (DoN 2011a). We have also used indirect methods for estimation of population size for smaller size classes in previous biological opinions (Service 2011f). These methods incorporate information from Turner et al. (1987), which estimated the size-class distribution of desert tortoises on the Goffs permanent study plot in the early 1980s. The life history table provided in Turner et al. (1987) indicated that individuals smaller than 180 millimeters comprised approximately 87 percent of the total population.

Table 11 provides the estimates for smaller individuals from the biological assessment (DoN 2011a) and by using Turner et al. (1987) and the adult population estimates discussed above. For example, in the western expansion area, we provided a point estimate of 2,860 large desert tortoises. Given the proportion of the total population composed of smaller desert tortoises per Turner et al. (1987) (i.e., 87 percent), we assume that the larger desert tortoises in the population comprise 13 percent of the population. Consequently, if 2,860 large desert tortoises comprise 13 percent of the total population in the western expansion areas, then the total population there is 22,000 individuals and the number of smaller individuals (i.e., 87 percent of the total population) is 19,140. We estimated the number of larger desert tortoises with a cut-off size of 160 rather than 180 millimeters. Therefore, this method tends to overestimate the total population because it accounts for the individuals in size classes between 160 and 180 millimeters in the estimates for both the large and small individuals.

Table 11. Estimated number of smaller desert tortoises. The ranges are based on the 95 percent confidence limits for larger desert tortoises.

Area	Desert Tortoises in Smaller Size Classes			
	USMC Estimates using Bureau Life Table (DoN 2011a)		Service Estimates using Turner et al. (1987)	
	Point Estimate	Range	Point Estimate	Range
Existing Installation	45,281	-	64,199	9,918 - 93,077
Western Expansion Area	19,123	9,639 - 37,935	19,140	9,650 - 37,945
Southern Expansion Area	2,970	1,120 - 4,909	2,382	897 - 6,297
Ord-Rodman DWMA	-	-	43,185	26,174 - 71,246

For this biological opinion, we will use the estimates derived from the Turner et al. (1987) information because the life history table used in the Bureau's biological assessment is hypothetical and not based on demographic survey information.

We emphasize that, although we used the best available information, these numbers are only an estimate; the overall number of individuals may be different. For portions of the action area where direct survey occurred (i.e., existing installation, expansion areas, and Ord-Rodman DWMA), the survey data used for these estimates represent a single point in time and the number of individuals in these areas may change by the onset of activities. For example, desert tortoises may leave or enter the surveyed area, hatch, die, or been missed during the initial surveys.

In addition, population estimates for smaller size classes are based on a life-table distribution that has limited predictive ability because it assumes invariant schedules of reproduction and death and constant annual rates of increase or decrease in size. Use of this information for our estimates also assumes that current egg production and survival rates in our action area are similar to that on the Goffs study site in the early 1980s. However, differences in resource availability, threats, and a variety of other variables can result in differences in the overall mortality rate of individuals at different sites and times and thereby create differences in the proportion of the population composed of individuals in these smaller classes. The desert tortoise population on the Goffs study site may have been more robust in the early 1980s than that currently within our action area because of declines that have occurred since the time of that study; consequently, use of the Goffs data may overestimate the actual number of smaller desert tortoises. The magnitude of this overestimate is unknown.

The Goffs study relied on a survey that does not account for the dynamic changes in the number of juveniles that are present over the course of a year. Therefore, depending on the time of year, the number of desert tortoises could vary considerably. For example, many more desert tortoises will be present immediately following the hatching of multiple egg clutches in late summer or early fall than in the early spring when many juveniles from the previous reproductive season's cohort would likely have died.

We also derived all of the estimates for smaller size classes from adult population estimates that used different survey methods. Some of these methods are meant to estimate population size for a specific size range of larger desert tortoises (i.e., larger than 160 millimeters for the Service's pre-project survey protocol; larger than 180 millimeters for line distance sampling). Other methods, such as strip transects (e.g., Woodman et al. 2001), derive an estimate based on detection of sign that correlates to the abundance of adult desert tortoises. Because these estimates for larger animals are the basis for the calculation of smaller size classes, their inherent flaws also serve as sources of error in the population estimate for smaller size classes.

The preceding tables provide the best available information regarding the number of desert tortoises within this portion of the action area (existing installation, expansion areas, and Ord-Rodman DWMA); the data for the existing installation are over 10 years old. These numbers do not provide information to characterize trends in population size and distribution. The following discussion provides information on trends in the number and distribution of desert tortoises. This information is important in assessing whether the effects of the proposed action are affecting declining, stable, or recovering populations.

The Marine Corps maintains three study plots on three training areas (Henen 2012). One plot, established in the mid-1980s, is located in the Sand Hill Training Area in the southwestern portion of MCAGCC. The remaining two plots, established in the early 1990s, were in the southwestern portion of the Emerson Lake Training Area (western portion of MCAGCC), the southearn portion of the Bullion Training Area (southeastern portion of MCAGCC). The Marine Corps relocated the Lava Training Area plot to the southern portion of the Bullion Training Area (southeastern portion of MCAGCC). These plots are part of designated SUAs. Permanent study plots also occur in the western portion of the western expansion area, the southwestern portion of the Ord-Rodman DWMA, and the northwestern portion of the Ord-Rodman DWMA.

In addition to these permanent study plots, survey efforts from the late 1970s, early 1980s, late 1990s, and 2001 provide information on density and relative abundance of desert tortoises and their sign (Berry and Nicholson 1984, Bureau et al. 2005). Surveys from the late 1990s and 2001 also identify die-off areas. These data provide information on the relative condition of desert tortoise populations in different areas and at different times within this portion of the action area.

The current distribution of desert tortoises across MCAGCC consists of large areas of low density with scattered higher-density population centers. Woodman et al. (2001) found that 70 percent of the existing installation had desert tortoise densities of less than 21 per square mile in the late 1990s; higher density patches (51 to 100 desert tortoises per square mile) occurred in the Sand Hill, south-central West, southern Bullion, southwestern Emerson Lake, Sunshine Peak, Quackenbush, Gays Pass, and Prospect Training Areas. Based on work at the permanent study plots in 1997 and 1999 within the Emerson and Sand Hill Training Areas, Woodman et al. (2001) concluded that the number of desert tortoises seemed to be stable. Henen (2010 in DoN 2011a) notes, however, that "long-term studies on these plots indicate declines of 50 to 70 percent since the 1980s." The Marine Corps is resurveying other portions of MCAGCC.

Approximately 90 percent of the western expansion area has desert tortoise densities of less than 16 per square mile, with higher-density patches ranging from 18 to 31 desert tortoises per square mile in the northern and eastern portions (DoN 2011a). The higher density patches in the northern portion of the western expansion area (i.e., south, west, and north of Iron Ridge) overlap areas previously estimated to contain 20 to 100 desert tortoise per square mile in the late 1970s (Berry and Nicholson 1984). This population center is immediately east of areas noted as having densities of between 50 and 250 adults per square mile in the late 1970s (Berry and Nicholson 1984). However, this adjacent higher density patch, which extended from just south of Nellie Bly Mountain, south to the vicinity of the Rock Pile OHV staging area seems to have declined substantially since the late 1970s. Surveys of the Johnson Valley permanent study plot, located in this area, have shown declines of 77 percent since the early-1980s (Bureau et al. 2005). Current densities in this area are between 6 and 16 adults per square mile (DoN 2011a). The northern portion of the western expansion area supports a region of higher densities of desert tortoises that is contiguous with an area of the Ord-Rodman DWMA in which workers consistently located desert tortoises during range wide monitoring over the last 12 years (Bureau et al. 2005; Service 2006b, 2009b, 2010c, 2010d). We discuss trends in the number and distribution of desert tortoises in the Ord-Rodman DWMA later in this section.

Higher density patches (20 to 50 adults per square mile) in the eastern portion of the western expansion area are in locations mapped as having between 1 and 20 adults per square mile in Berry and Nicholson (1984). However, these areas are in close proximity to Emerson Lake, which contained densities of 20 to 50 adults per square mile in the late 1970s (Berry and Nicholson 1984). These higher density patches are also in areas identified as having above-average desert tortoise sign during surveys in the late 1990s (Bureau et al. 2005).

In addition to these locations, another location of apparent population change is between Soggy and Melville Lakes in the RPAA, which contained densities of 50 to 100 adults per square mile in the late 1970s (Berry and Nicholson 1984) (Bureau et al. 2005). Current densities are between 3 and 16 desert tortoises per square mile (DoN 2011a). Throughout the remainder of the western expansion area, current densities of 6 to 16 adults per square mile are not substantially different from the densities of 1 to 20 adults per square mile that the Bureau (et al 2005) estimated for the majority of the OHV area in the late 1970s.
No permanent study plots were located within or near the southern expansion area; consequently, we do not have any information on population trends in this area. Approximately 70 percent of the southern expansion area has desert tortoise densities of less than 16 per square mile, with higher-density patches ranging from 18 to 38 desert tortoises per square mile in the southwestern and northern portions of the southern expansion area.

Although desert tortoises are widely distributed throughout the Ord-Rodman DWMA (Tracy et al. 2004), extensive areas in the central portion of the DWMA exhibit low habitat potential (i.e., less likely to support desert tortoises; Nussear et al. 2009). Extensive survey work from the late 1990s to the present has documented four areas that consistently yield desert tortoise observations during the Service's range-wide monitoring surveys (Service 2006b, 2009b, 2010c, 2010d). These areas include the northwestern corner of the DWMA in Stoddard Valley, the southwestern corner of the DWMA in Lucerne Valley, the northwestern corner of the DWMA adjacent to the Sunshine Peak Training Area, and the southeastern portion of the DWMA adjacent to the northern portion of the western expansion area (Bureau et al. 2005). Permanent study plots in the northwestern (Stoddard Valley Plot) and southwestern portions (Lucerne Valley Plot) of the Ord-Rodman DWMA have shown declines of 5 percent and 30 percent since the early 1980s, respectively (Bureau et al. 2005). We cannot extrapolate information from permanent study plots across large areas, but it provides us with a general idea of the population trends in the areas containing these plots. Although these data seem to indicate that population declines have been low in the northwestern corner of the DWMA, sign-count surveys performed in the late 1990s identified a 5-square-mile die-off area in this region (Bureau et al. 2005).

Estimates of the desert tortoise densities in the areas containing these plots from the late 1970s were 50 to 100 and 20 to 50 per square mile, respectively (Berry and Nicholson 1984). Berry and Nicholson (1984) also noted a high-density area in the northeastern portion of the DWMA in the late 1970s, containing between 20 and 50 desert tortoises per square mile. The Service (1994) concluded that desert tortoise densities across most of the DWMA are much lower than that observed on the Stoddard Valley and Lucerne Valley permanent study plots and that the overall density for the DWMA as a whole was between 5 and 150 desert tortoises per square mile. Current DWMA-wide density estimates are approximately 19 desert tortoises per square mile (Service 2010c), with the highest-density areas occurring in the four locations identified above. All four of these higher density areas are continuous with areas of higher desert tortoise abundance outside of the DWMA. We have already described two of these areas (i.e., northern portion of the western expansion area and the Sunshine Peak Training Area). The two other areas are continuous with areas of higher relative abundance in the Stoddard Valley Off-highway Vehicle Management Area and the portion of the Johnson Valley Off-highway Vehicle Management Area that would remain following expansion. We have discussed the populations in the OHV areas as part of the discussion below.

Areas Likely to be Affected by OHV Displacement

To assess the status of the desert tortoise in the areas of the western Mojave Desert that the displacement of OHVs is likely to affect, we evaluated information in Berry and Nicholson (1984), Bureau et al. (2005), Keith et al. (2005), and Service (2006, 2009b, 2010c, 2010d). In reviewing the information in this reports, we encountered the same issues that the Desert Tortoise Recovery Plan Assessment Committee (DTRPAC) confronted in 2004. In the executive summary of its final report, the DTRPAC (Tracy et al. 2004) stated:

> The assessment provides a highly detailed meta-analysis of desert tortoise population status and trends. The DTRPAC found the data on status and population trends often to be statistically unwieldy due to inconsistencies in data collection, suboptimal data

collection design, and the truly daunting task of measuring animals that are difficult to detect and that occupy a harsh environment. Because much of the data currently available to address tortoise recovery was originally collected for purposes other than tortoise recovery, the DTRPAC analyses are meta-analyses using data of mixed quality. To adjust for very low statistical power in current data sets, DTRPAC used transect sampling carried out by various agencies and managers to derive tortoise occurrence data, then used spatial analysis of tortoise occurrence to map tortoise status and possible trends. Results are complex, but resulting maps suggest that in many areas tortoise populations appear be facing continued difficulty. Spatial analyses did not indicate zones of recovery. Kernel analyses of transect data – limited to only one year due to lack of additional sufficient data – identified several regions that may have experienced significant local die-offs. Statisticians consulting with DTRPAC derived an original analysis called "Conditional Probability of Being Alive" that spatially illustrated regions of low, intermediate, and high probability of encountering live tortoises during surveys. These analyses identified large regions within historic desert tortoise habitat as being associated with having a low probability of detecting live tortoises during surveys. In other words, probably few tortoises occur in these areas currently. The West Mojave recovery unit stood out within overall tortoise range as unambiguously experiencing continued population decline.

To illustrate the DTRPAC's findings, we have enclosed a graph that depicts trends in relative population density among permanent study plots in the western Mojave Desert and a map of the same area that depicts an analysis of the likelihood of finding a live desert tortoise (appendix 5; from Tracy et al. 2004). We have labeled the map to indicate the areas where we expect displaced OHV use to occur. We have also enclosed a table that summarizes the information from Berry and Nicholson (1984), Bureau et al. (2005), Keith et al. (2005), and Service (2006, 2009b, 2010c, 2010d) (appendix 4). Because the summary is composed of information compiled through several different methodologies, we cannot use this information to show trends at any given site. As the assessment by the DTRPAC noted, however, the trend for desert tortoises in the Western Mojave Recovery Unit as a whole is one of decline; we have no reason to believe that the trends in the localized portions of the action area for this biological opinion differ. Appendix 4 summarizes additional information regarding the status of desert tortoises in various portions of the action area that off-highway vehicle displacement may affect.

Summary of the Status of the Desert Tortoise in the Action Area

Desert tortoises occur in low densities throughout much of the action area when compared to historical levels. The declines observed on permanent study plots, a large number of die-off areas, low site-specific densities in many areas, and low DWMA densities are all consistent with the conclusions drawn by Tracy et al. (2004) that the Western Mojave Recovery Unit is in a state of overall population decline. However, the rate of decline, current population densities, and likelihood of maintaining viability are not uniform across the action area. Because a desert tortoise population's viability is primarily affected by its ability to maintain a threshold density within a given area (i.e., 10 adults per square mile; Service 1994), areas that show high densities, persistent evidence of occupation, lower population declines, and a lack of die-off areas have a greater chance of maintaining a density necessary to ensure viability. Areas with low densities, high rates of population decline, or areas showing evidence of substantial die-offs are at a higher risk of losing viability. We have summarized various pieces of information for the portions of the action area that would be affected by off-highway vehicle displacement in Appendix 4. Below, we use this information in combination with the information discussed previously for MCAGCC, the expansion areas, and the Ord-Rodman DWMA to assess the relative potential for the maintenance of population viability in various portions of the action area.

Specific areas of severe decline include the western portion of the western expansion area, the California City and Rand Mountains Heavy OHV Use Area, the southern portion of the Silver Lakes Residential Vehicle Impact Area, and some portions of MCAGCC. The areas in and around Johnson Valley, El Mirage, California City/Rand Mountains, Coyote Corner, and Hinkley experienced die-offs that encompassed approximately 222 square miles. The Ord-Rodman DWMA has experienced a slower decline.

Desert tortoises in the some areas seem to have a better chance of maintaining viability in comparison to the rest of the action area and the Western Mojave Recovery Unit. These areas are the: 1) northwestern portion of the Ord-Rodman DWMA and northern end of the Stoddard Valley Off-highway Vehicle Management Area, 2) southwestern portion of the Ord-Rodman DWMA, 3) northeastern portion of the Ord-Rodman DWMA and the Sunshine Peak Training Area, 4) northern portion of the western expansion area and southeastern portion of the Ord-Rodman DWMA, 5) the vicinity of Emerson Lake in the Emerson Lake Training Area and the eastern portion of the western expansion area, 6) Sand Hill Training Area, 7) Bullion Training Area, and 8) southern expansion area. Evidence of this consists of either high densities, above-average desert tortoise sign, consistent location of desert tortoises during range-wide monitoring, lower documented declines on permanent study plots, or some combination of these. All of the above areas also lack any substantial die-off areas with the exception of the northwestern portion of the Ord-Rodman DWMA, where a small die-off area was documented near Daggett. MCAGCC also has several other isolated areas of relatively high density in the south-central West, Quackenbush, Gays Pass, and Prospect Training Areas. It is important to note that 4 of these 8 areas are within or substantially overlap the Ord-Rodman DWMA, which is essential to recovery of the species and contains the highest density of desert tortoises of the 3 DWMAs in this recovery unit (i.e., 20 adults per square mile; Service 2010c).

The western portion of the western expansion area and areas of the Johnson Valley Off-highway Vehicle Management Areas that would remain following the MCAGCC expansion, 2) RPAA, 3) Edwards Bowl Heavy Use OHV Area, and 4) the Silver Lakes, Hinkley, and Coyote Corner Residential Vehicle Impact Areas seem to support viable populations that are declining in status at a faster rate and to be at a greater risk than the Western Mojave Recovery Unit as a whole. All of these areas continue to contain desert tortoises at low to moderate densities, they contain above average sign of desert tortoise occupation, or they consistently contain desert tortoises during range-wide monitoring. However, these areas also either contain major die-off areas or they contain permanent study plots that have shown severe population declines in at least some portion of the area of interest. All of the heavy use OHV areas and recreational vehicle impact areas identified above occur in the southern or eastern portions of either the Superior-Cronese or Fremont-Kramer DWMAs. Both of these DWMAs have densities (i.e., 6 to 7 adults per square mile) that are low when compared to the other DWMA (Ord-Rodman) in the recovery unit. Both

DWMAs have also experienced major die-offs in their northern (Fremont-Kramer) or northwestern (Superior-Cronese DWMAs) portions and have large areas with no evidence of desert tortoise occupation (Tracy et al. 2004).

The portion of the action area containing populations that are likely in the poorest condition and at the greatest risk is the California City and Rand Mountains Heavy Vehicle Use Area. Although this area once contained among the highest densities in the recovery unit, this portion of the western Mojave Desert has experienced precipitous declines (up to 90 percent on some permanent study plots) since the late 1970s. Large die-off areas have also been documented in this area and in adjacent areas located in the northern portion of the Fremont-Kramer DWMA. Surveys in the late 1990s did not note above average sign in this area.

The remaining portions of the action area (i.e., the Dove Springs, Jawbone Canyon, Spangler Hills, and Rasor Off-highway Vehicle Management Areas and the East Sierra Heavy Use OHV Area) do not support habitat with a high potential for occupancy or they do not currently contain large numbers of desert tortoises. All of these areas, with the exception of the southeastern corner of the Spangler Hills Off-highway Vehicle Management Area, have historically contained low desert tortoise densities when compared to other parts of the western Mojave Desert. More recent encounter rate data from the Spangler Hills OHV Management Area and density survey data from the Jawbone-Butterbredt ACEC indicate that population densities in these areas continue to remain low relative to other portions of the western Mojave Desert. (‘Encounter rates’ are the frequency at which desert tortoises are detected per unit distance of survey.) Because we have no information on population trends, we cannot determine if these low densities reflect a decline in desert tortoise numbers or maintenance of naturally low population densities. However, the southeastern portion of the Spangler Hills OHV Management Area was not identified as having above average desert tortoise sign in the late 1990s.

It is difficult to determine the status of the desert tortoise populations in the El Mirage OHV Management Area. Surveys of the OHV area in the late 1990s detected high encounter rates, but not above-average sign of desert tortoises. During this survey, relatively few transects were performed in the OHV area, so the information on the encounter rate and sign count is not likely representative of the status of the desert tortoise within the OHV area.

Status of Desert Tortoise Critical Habitat in the Action Area

The action area overlaps critical habitat in the Ord-Rodman, Fremont-Kramer, and Superior-Cronese critical habitat units. Table 12, which we modified from the table contained in the Environmental Baseline - Action Area section of this biological opinion and from Bureau et al. (2005; see table 3-26 and map 3-14), lists the areas of critical habitat that we expect would experience OHV use displaced by the expansion. The proposed action would also affect the portion of the Ord-Rodman Critical Habitat Unit that would receive translocated desert tortoises from the western expansion area.

Table 12. Areas within critical habitat likely to be affected by OHV displacement.

Unauthorized OHV Use Areas	**Critical Habitat Unit(s)**
California City/Rand Mountains	Fremont-Kramer/ Superior/Cronese
Edward Bowl (south of Edwards Air Force Base)	Fremont-Kramer
Silver Lakes (areas north of Helendale, south of Highway 58, east of Highway 395)	Fremont-Kramer
Hinkley (areas north and northwest of Barstow)	Fremont-Kramer/ Superior-Cronese
Coyote Corner (areas southwest of Fort Irwin)	Superior-Cronese
Ord-Rodman DWMA	Ord-Rodman

We expect that the condition of critical habitat within the action area generally resembles that of critical habitat range wide, as we described it in the Status of Critical Habitat section of this biological opinion. In the following paragraphs, we added additional information on the areas listed in the previous table.

California City/Rand Mountains. The area described as the California City unauthorized OHV use area is largely private land; recreationists have used this area for unregulated OHV play for decades. Most of this area is south of designated critical habitat; however, some use extends into critical habitat. The Rand Mountains lie north of the California City area; the Bureau manages almost all of the land in the Rand Mountains. This area experienced substantial unauthorized OHV use in the past but has been managed extensively by the Bureau in recent years, with a concomitant decrease in unauthorized OHV use. The Bureau's management actions have included designation of camping sites, closure of unauthorized routes, posting of open routes, increased enforcement, and institution of a permitting system for OHV riders (Bureau 2012). This area has been closed to sheep grazing since approximately 1990. To the east of Highway 395, the Bureau et al. (2005) also identified the Red Mountain area as a region of above average unauthorized OHV use.

A few small mines have eliminated the primary constituent elements of critical habitat from a small area in the steeper, eastern portion of the Rand Mountains. Highway 395 and a large transmission line cross through the eastern portion of this area.

We expect that, under current conditions, the primary constituent elements of critical habitat are generally functional. The ongoing effects of grazing and OHV use have likely caused some degradation of the second through fifth primary constituent elements of critical habitat; however, we expect that the Bureau's current management would allow for improvement of the biological and physical factors that support desert tortoises over time. The decreased level of OHV use, as intended by the Bureau's management goals, is not likely to cause human-caused mortality and disturbance at a level that would compromise the function of the sixth primary constituent element.

Edwards Bowl. This area straddles the Los Angeles/San Bernardino County line. Within Los Angeles County, most of the land is in private ownership; the San Bernardino County side of the county line is divided roughly equally between private and public lands. This area has experienced a high level of unauthorized OHV use for decades; numerous tracks and trails crisscross the area. The Bureau has closed the portion of the Shadow Mountain Allotment within San Bernardino County; the portion of this sheep allotment in Los Angeles County remains open (map 2-14 in Bureau et al. 2005). We are unaware of any other activities in this area that may be affecting the primary constituent elements of critical habitat.

Given the level of OHV use and the past and present (in the western portion) sheep grazing of this area, we expect that the primary constituent elements of critical habitat are not functioning at optimal levels in this portion of the Fremont-Kramer Critical Habitat Unit.

Silver Lakes. This area is composed of a patchwork of private and public lands. The Buckhorn and Stoddard Allotments overlapped this area in part; however, these areas have not been grazed by sheep since approximately 1990 (map 2-14 in Bureau et al. 2005). Other than the information on the level of unauthorized OHV use provided in Bureau et al. (2005), we are unaware of other activities in this area that may be affecting the primary constituent elements of critical habitat.

Given the level of OHV use and the past sheep grazing of this area, we expect that the primary constituent elements of critical habitat are not functioning at optimal levels in this portion of the Fremont-Kramer Critical Habitat Unit.

Hinkley. The Bureau manages approximately two-thirds of the lands in this area; the remainder is privately owned. The Superior Valley and Stoddard Allotments overlapped this area in part; however, these areas have not been grazed by sheep since approximately 1990 (map 2-14 in Bureau et al. 2005). A large transmission line crosses the area north of Barstow from east to west. Other than the information on the level of unauthorized OHV use provided in Bureau et al. (2005), we are unaware of other activities in this area that may be affecting the primary constituent elements of critical habitat.

Given the level of OHV use and the past sheep grazing of this area, we expect that the primary constituent elements of critical habitat are not functioning at optimal levels in this portion of the Superior-Cronese Critical Habitat Unit.

Coyote Corner. Most of the land in this area is managed by the Bureau and U.S. Department of the Army; the Army acquired these lands to mitigate for the effects of its expansion of Fort Irwin. The Superior Valley Allotment overlapped this area in part; however, this allotment has not been grazed by sheep since approximately 1990 (map 2-14 in Bureau et al. 2005).

Other than the unauthorized OHV use that the Bureau et al. (2005) identified, the northern portion of this area is affected by recreational prospecting and mining clubs that operate under the Bureau's casual use provisions. They may continue to do so as long as they reclaim their hand-dug pits and the cumulative disturbance does not cause more than "negligible" disturbance (Bureau et al. 2005). In its amendment to the CDCA Plan, the Bureau et al. (2005) proposed to close this area to mineral entry; to date, to the best of our knowledge, it has not initiated this process.

The Bureau has implemented numerous measures to control unauthorized OHV use in the northern portion of this area (i.e., Coolgardie Mesa). It has installed signing to describe the appropriate use of the area and post and cable barriers to prevent vehicles from leaving designated routes. The Bureau also physically closed unauthorized staging areas and increased law enforcement in this area.

Given the level of OHV use and the past sheep grazing of this area, we expect that the primary constituent elements of critical habitat are not functioning at optimal levels in this portion of the Superior-Cronese Critical Habitat Unit.

Ord-Rodman Critical Habitat Unit. The western edge of this critical habitat unit is composed of Bureau-managed and private lands in approximately equal amounts. The southern area of the critical habitat unit is primarily managed by the Bureau with some inclusions of private land. The Bureau et al. (2005) documented that portions of this critical habitat unit receive above-average levels of unauthorized OHV use.

We discussed the presence of grazing allotments in this area in the Existing Conditions in the Action Area – Ord-Rodman DWMA section of this biological opinion. The Valley Well Allotment, a small allotment for horses adjacent to Highway 247, does not provide any unique feature of critical habitat necessary for the conservation of desert tortoises in comparison with the remainder of the Ord-Rodman Critical Habitat Unit (Service 2007). Other than a small area near the water trough, the primary constituent elements of critical habitat are generally present within this allotment although grazing has likely altered the floral component to some degree (e.g,. potentially a decrease in native shrubs and annual plants and an increase in non-native annual plants).

The biological opinion for the West Mojave amendment to the CDCA Plan (Service 2006c) notes large portions of the Ord Mountain Allotment are located at 4,000 feet or higher in elevation. Although the areas over 4,000 feet in elevation are within the boundaries of the Ord-Rodman Critical Habitat Unit, they likely do not support the primary constituent elements of critical habitat on a widespread basis. The following information regarding current use of the allotment is from Chavez (2012a). The current stocking rate is 25 head. The exclusion area described in the CDCA Plan for West Mojave Plan has been in effect since March 15, 2012, due to the lack of ephemeral production; consequently, the eastern portion of the allotment is closed to grazing. Utilization studies over the last few years have determined that use is slight (less than 10 percent). We expect that the second through fifth primary constituent elements have likely been degraded to some degree by cattle grazing in this allotment. We cannot determine the extent to which they have recovered as a result of the low stocking rate in recent years but expect that areas around water sources likely exhibit heavy use, which decreases as the distance from the water sources increases.

A large transmission line and a gas line cross the western edge of the critical habitat unit. A second transmission and another gas line cross the southern portion of the critical habitat unit. Habitat disturbed during construction of these lines has, in large part and with the exception of access roads, recovered to the point where the primary constituent elements of critical habitat are functional. Transmission towers and pipelines need occasional repair; consequently, primary constituent elements are periodically disturbed during maintenance. The access roads also provide opportunities for recreationists to use the area legally and illegally.

In general, the primary constituent elements of critical habitat within the areas to be used for translocation and that are likely to experience elevated levels of unauthorized OHV use as a result of the proposed expansion have been compromised to some degree by past and present cattle grazing, the maintenance of gas and electrical transmission lines, and authorized and unauthorized OHV use.

EFFECTS OF THE ACTION

In the following section, we analyze the direct and indirect effects of the proposed action, including the effects of displaced recreation. In assessing the effects of military training, we have analyzed the modified training scenario (i.e., MEB-level training and building block exercises) that the Marine Corps would implement following expansion. CAX exercises on the existing installation occur at annual levels (numbers of personnel and vehicles) and in locations similar to those identified for use in the modified training scenario. However, the new training scenario would result in fewer CAX exercises and a concentration of activities into two large-scale exercises each year (i.e., two MEB exercises). To address this concentration of training activities, we analyzed the effects of the modified training scenario on the existing installation along with the effects that would occur within the expansion areas.

We have also analyzed the Marine Corps' translocation strategy for desert tortoises and the beneficial and adverse effects, if any, of conservation measures the Marine Corps has proposed to implement to avoid, minimize, and offset effects to desert tortoises. Although we would authorize desert tortoise translocation under a section 10(a)(1)(A) recovery permit, we have analyzed its effects because the translocation program is a result of the proposed action. Other agencies or individuals would implement several of the conservation actions; these actions would require future section 7 consultation. Because of the relative lack of detail and the future review required on these specific actions, our analysis of these actions is more general in nature.

Effects of Military Activities

Effects of the Preparation of Training Lands within the Expansion Areas

Prior to commencement of training activities, the Marine Corps would prepare the expansion areas by grading and improving roads, installing permanent features at the MEB objective, company objectives, and staging areas (i.e., bunkers, trenches, barbed wire, etc.), and installing additional fencing and signs at SUAs and other appropriate locations. The Marine Corps will perform clearance surveys of these areas and implement numerous measures to reduce the potential for injury or mortality. However, because of the difficulty in locating desert tortoises, it is likely that clearance surveys will miss some larger desert tortoises and most desert tortoises in smaller size classes. Construction would likely kill or injure these animals, but some potential exists that biological monitors or authorized biologists may locate and save a few animals during construction.

Accessing construction sites along existing paved and unpaved routes would likely result in injury or mortality due to vehicle strikes. The Marine Corps will implement protective measures, such as speed limits, to reduce the potential for vehicle strikes, but it is unlikely that use of the access roads and speed limits would avoid all desert tortoises. This is especially true of smaller individuals that are difficult to see.

The digging of permanent trenches and other excavations could kill or injure desert tortoises; once constructed, these features could entrap desert tortoises, which would likely kill these individuals if they are not rescued. The potential to kill or injure desert tortoises during construction is low because the Marine Corps will temporarily fence the construction site, employ authorized biologists to regularly inspect the excavations, and implement numerous other measures to reduce the potential for entrapment. However, following construction, the Marine Corps would remove fences and desert tortoises could become entrapped.

Although the Marine Corps will translocate all desert tortoises found during clearance surveys of construction sites, it may miss some that are hidden or off-site when surveys occur. Some of these desert tortoises are likely to have home ranges that incorporate habitat within the construction site. When fences are installed that block their access, animals may exhibit fence-pacing behavior that places them at a greater risk of injury or mortality due to exposure to temperature extremes and predators. The Marine Corps will implement specific minimization measures to address desert tortoises that exhibit this type of behavior (including regular patrols of the fences after they are installed). These measures are likely to reduce the potential for injury and mortality during construction.

Temporary fencing may prevent desert tortoises from using a portion of their home ranges for some time. Although construction inside the fencing would not direct affect these animals, project activities may damage their home ranges through loss of foraging and sheltering sites. This loss of habitat may result in a decreased chance of survival because of the diminished resources; desert tortoises may also die as they adjust their home ranges into new areas with which they are unfamiliar. This readjustment could also lead to adverse social interactions with desert tortoises in adjacent areas (e.g., increased fighting as males compete for females and resources).

The preparation of training lands would attract common ravens to construction sites. The Marine Corps will implement numerous measures to control common raven subsidies during construction that may reduce this effect. However, construction activities are still likely to result in some increase in predation of desert tortoises. Given that common ravens will fly great distances for water, they could affect a substantial area of adjacent lands. If construction sites are in locations that currently experience substantial human activities (i.e., MCAGCC and southern portion of western expansion area), the increase in the number of common ravens and the subsequent increase in predation attributable to the proposed expansion is likely to be marginal; the converse is also true.

We cannot quantify the precise number of desert tortoises that the preparation of training lands would kill or injure for the following reasons. First, we do not know the ultimate location where construction of training features would occur, so we cannot assess site-specific population size, baseline levels of human disturbance, or other variables. Second, we cannot quantify the extent to which the proposed minimization measures will reduce injury and mortality. Third, we cannot predict the proportion of available desert tortoises that clearance surveys would find. Finally, we cannot predict the number of desert tortoises with home ranges that may overlap construction site boundaries. Although, precise estimation of injury and mortality is not possible, we have provided a rough characterization of its magnitude below (see Quantification of Effects Related to Military Activities).

Effects of Expanded Training Activities

Training exercises would have similar effects to those discussed in the previous section, but these effects would likely be more intense and affect a larger portion of the action area over a longer period. Use of existing routes on MCAGCC and the expansion areas during training is likely to result in injury and mortality of desert tortoises due to vehicle strikes. Cross-country vehicle travel is also likely to injure or kill unobserved desert tortoises that are above ground or in their burrows; foot travel may injure or kill smaller desert tortoises (e.g., hatchlings) that are difficult to see. Excavation of temporary trenches and fighting positions would likely kill or injure desert tortoises in their burrows; desert tortoises may also be entrapped in these trenches when they are not in use.

The Marine Corps will implement several measures during training to reduce the magnitude of these effects. The primary measure for minimizing direct effects will be translocation of desert tortoises out of areas that would experience heavy and moderate levels of disturbance, such as the MEB objective, company objectives, main supply routes, staging areas, and areas around these features that training activities are likely to affect. The biological assessment provides a representative depiction of these areas (Figure 6-2; DoN 2011a), but the Marine Corps has not determined the final location of these features. Although training would be concentrated around these features, the training activities, including cross-country travel, could occur in most parts of the expanded installation at lower levels. As noted in the Consultation History section of this biological opinion, the Marine Corps has committed to locate the staging area in the southern expansion area to avoid areas of higher desert tortoise density.

Translocation will reduce the number of desert tortoises injured or killed due to training activities by removing them from areas where most direct effects would occur in the expansion areas. The Marine Corps is likely to translocate most of the larger desert tortoises (i.e., those larger than 160 millimeters). However, authorized biologists are unlikely to find and translocate most desert tortoises in smaller size classes. Because the Marine Corps would not translocate desert tortoises from the existing installation, this measure would not reduce injury and mortality in that portion of the action area.

Because the Marine Corps would not permanently exclude desert tortoises from cleared areas, individuals in adjacent habitat may be injured or killed when they enter these areas later. The Marine Corps will perform annual clearance-level surveys of areas that support three or more desert tortoises per square kilometer, which would reduce the magnitude of this effect. However, given the limitations of clearance surveys that we have previously discussed, the Marine Corps is unlikely to find all desert tortoises within these areas; additionally, if the training occurs during periods when desert tortoises are active, individuals could enter the training areas between the time the surveys are conducted and the conclusion of the military exercises.

In addition to translocation, the Marine Corps will implement numerous additional measures prior to and during training exercises (e.g., environmental awareness training, inspecting under vehicles prior to moving them, moving desert tortoises out of harm's way, etc.). These measures would likely reduce the potential for injury and mortality of desert tortoises that are missed by clearance surveys and that enter the area after clearance surveys are complete. However, because the focus of the Marine Corps during exercises will be training, desert tortoises are still likely to be injured or killed.

Training exercises are also likely to result in numerous indirect effects to desert tortoises. Cross-country travel would likely collapse unoccupied burrows and other cover sites, leaving desert tortoises prone to injury or mortality from exposure, predation, or other threats. Areas of concentrated use, such as staging areas, the MEB objective, company objectives, and re-supply points, are likely to attract common ravens that would prey on desert tortoises in the surrounding area.

Habitat degradation because of long-term use of the training lands would facilitate the spread of non-native weeds that may eliminate or reduce the prevalence of native forage species for the desert tortoise. The reduction in the amount of suitable of native plants could affect the reproductive success of desert tortoises remaining in these areas post-translocation, and may make them more susceptible to disease. The spread of non-native weeds may also increase the prevalence of wildfires, which could directly kill desert tortoises and further reduce resources (i.e., shrubs that animals use for shelter, forage species) within existing home ranges.

The identified effects to habitat would degrade resources within existing desert tortoise home ranges in these areas. Survival rates for desert tortoises on MCAGCC and the expansion areas would likely decrease because of reduced resources. The loss or degradation of habitat may also result in injury or mortality as desert tortoises adjust their home ranges into new areas with which they are unfamiliar because they would experience increased exposure to predators, temperature extremes, and aggressive interactions with resident animals.

The Marine Corps predicts the direct loss or heavy degradation of 28,790 acres of desert tortoise habitat and the moderate disturbance of an additional 96,537 acres on MCAGCC and the expansion areas (DoN 2011a). The following table provides information on how much of this habitat loss and degradation would occur in various portions of the action area. Many of these areas are already in various stages of habitat degradation due to existing military training or off-highway vehicle effects.

Table 13. Habitat disturbance associated with proposed areas at MCAGCC and proposed expansion areas.

Area	Habitat Loss or Heavy Degradation (acres)[6]	Moderate Disturbance (acres)[7]
MCAGCC Installation	18,231	69,206
Western Expansion Area	9,652	24,652
Southern Expansion Area	907	2,617

The Marine Corps will implement numerous measures to reduce the magnitude of the adverse effects of training. Environmental awareness programs, concentration of training activities within previously disturbed areas, filling of temporary excavations following training exercises, and containment of predator subsidies will reduce the magnitude and extent of these effects to some degree, but these effects are still likely to occur, albeit at a lower level than without the proposed measures.

We cannot precisely quantify the number of desert tortoises that training exercises would kill or injure for several reasons. First, we do not know the ultimate location of the MEB objective, company objectives, staging areas, or other features where the majority of training disturbance would occur, so we cannot assess site-specific population size, baseline levels of human disturbance, or other variables. Second, we cannot predict the number of desert tortoises that are likely to enter high- and moderate-disturbance areas from adjacent habitats after clearance surveys. Third, we have limited information on the anticipated magnitude of disturbance in areas away from the MEB objective and other primary training features. Finally, we cannot quantify the extent to which the proposed minimization measures would reduce injury and mortality during training. Although, precise estimation of injury and mortality is not possible, we have provided a rough characterization of its magnitude below (see Quantification of Effects Related to Military Activities).

Effects of Training Range Maintenance

Following training exercises, the Marine Corps, and its civilian contractors would perform maintenance activities, such as range clean up, ordinance disposal, target maintenance, and road grading. These activities would occur primarily along existing routes or within areas that training activities have disturbed, but some low level of cross-country travel would occur occasionally. The Marine Corps will implement numerous measures designed to reduce the potential for injury and mortality of desert tortoises. Effects similar to those discussed above are likely to occur during training range maintenance, but these effects would be substantially less intense because of the lower scale of human activity within desert tortoise habitat, the lower level of cross-country vehicle travel, and the performance of most of these activities in previously disturbed areas.

We cannot precisely estimate the number of desert tortoises that training range maintenance is likely to kill or injure for the reasons we have identified previously in this biological opinion.

[6] Incorporates all areas of "High Intensity Habitat Disturbance" identified by the Marine Corps (DoN 2011a).
[7] Incorporates all areas of "Medium Intensity Habitat Disturbance" identified by the Marine Corps (DoN 2011a).

However, we anticipate that relatively few desert tortoises are likely to injured or killed because most maintenance activities would occur in areas where from which most, if not all, desert tortoises have been translocated, the maintenance activities are not as intense as training, and the Marine Corps will implement numerous minimization measures. Although we cannot precisely quantify the number of desert tortoises that are likely to be injured or killed, we have provided a rough characterization of its magnitude below (see Quantification of Effects Related to Military Activities).

Quantification of Effects Related to Military Activities

The various military activities discussed above would occur in the same areas over the life of the training program, which the Marine Corps estimates to be 50 years. Consequently, we have provided an estimate of the cumulative injury and mortality that would result from all of these effects, rather than try to assign specific numbers to each activity. This estimate accounts for injury and mortality associated with MEB and Building Block exercises and for future CAX exercises that would occur in the same areas at a decreased annual frequency. To arrive at our estimates, we have used the population estimates for various portions of the action area, information on the effectiveness of clearance surveys, the characteristics of populations of desert tortoises occurring on lands currently used for training on MCAGCC, and information on the intensity of training.

Table 14 provides the Marine Corps' estimates for the number of desert tortoises within areas that it would disturb through training activities (DoN 2011a). We based the estimates for larger desert tortoises on survey results and a GIS analysis of a representative training scenario (i.e., figure 6-2; DoN 2011a); we used a life table analysis to derive the numbers of smaller animals. For the purpose of our analysis, we have used the point estimates provided in these tables. As noted in the Consultation History section, the Marine Corps committed to moving the proposed staging area in the southern expansion area to avoid areas of higher desert tortoise density. Consequently, the number of desert tortoises estimated for disturbed portions of the southern expansion area is likely higher than will occur in the new staging area's location.

Table 14. Estimates of the number of desert tortoises in the expanded MCAGCC (based DoN [2011a]). The upper number represents the point count; the lower number is the 95 percent confidence interval.

Area	Disturbance Class	Population Estimate	
		Larger	**Smaller**
Existing Installation	Heavily Disturbed	312 23 – 602	1,471 108 - 2,838
	Moderately Disturbed	1,226 119 - 2,333	5,779 561 - 10,997
Western Expansion Area	Heavily Disturbed	276 139 – 547	1,301 655 - 2,578
	Moderately Disturbed	724 365 – 1436	3,413 1,077 - 6,769
Southern Expansion Area	Heavily Disturbed	26 10 – 70	66 47 – 85
	Moderately Disturbed	79 30 – 209	372 141 – 985
Total		2,838 686 - 5,197	9,564 2,589 - 24,252

Military Activities in Areas Identified for Heavy and Moderate Disturbance on the Existing Installation

The Marine Corps will not translocate desert tortoises from training areas on the existing installation, so military activities will affect all animals within areas identified for heavy and moderate disturbance on MCAGCC (Figure 6-2; DoN 2011a). We anticipate that injury and mortality will be greater in heavy disturbance areas than in moderate disturbance areas, but we anticipate that desert tortoises would continue to occupy all but the most heavily disturbed locations, albeit at lower densities.

Woodman et al. (2001) found that abundance of desert tortoises was lower in areas where more than 400 vehicle tracks per mile were present; approximately 18.9 percent of MCAGCC exhibited such track density. Desert tortoises were absent from the approximately 6.6 percent of MCAGCC that had more than 700 tracks per mile. When contemplating the portions of MCAGCC that no longer support desert tortoises, bear in mind that a substantial portion of the base [approximately 27.5 percent] is too mountainous to allow training; these areas also likely support few, if any desert tortoises. Also, low elevation areas had little or no sign, regardless of vehicle activity, suggesting that desert tortoises did likely did not use these areas extensively (Woodman et al 2001). Henen (2012e) also noted a relationship between high numbers of vehicle tracks and lower desert tortoise densities when re-analyzing these data. However, this analysis indicated that desert tortoises continued to occupy areas of existing heavy use. Table 15 provides density estimates from the Henen (2012e) analysis.

Table 15. Desert tortoise densities in relation to track counts within the MCAGCC.

<table>
<tr><th>Disturbance Level</th><th>Track Count</th><th colspan="2">Mean Density (larger individuals per square mile)[8]</th><th>Density Range (larger individuals per square mile)</th></tr>
<tr><td>Very High</td><td>> 700 per mile</td><td>2</td><td rowspan="2">8.5</td><td>0.7 to 3.3</td></tr>
<tr><td>High</td><td>400 to 699 per mile</td><td>12.5</td><td>6.9 to 18.1</td></tr>
<tr><td>Moderate</td><td>100 to 399 per mile</td><td colspan="2">15.6</td><td>12.4 to 18.8</td></tr>
<tr><td>Low</td><td><100 per mile</td><td colspan="2">12.6</td><td>10.9 to 14.3</td></tr>
</table>

Woodman et al. (2001) observed that large amounts of denuded or partially denuded habitat were associated with areas containing large numbers of vehicle tracks. Of 17 transects that were completely or partially denuded, 16 contained more than 700 vehicle tracks. In the biological assessment, the Marine Corps anticipates that the "high intensity disturbance" portions of the representative training scenario will result in a complete or near complete loss of vegetation and disruption of the soil surface. Because this definition closely approximates previous observations of denuded areas in locations with more than 700 tracks per mile, observed desert tortoise densities in these areas are likely to approximate what we would see within areas that are heavily disturbed under the proposed action. Consequently, we anticipate that all portions of the representative training scenario identified for heavy disturbance will decrease to a density of between 0 and 2 larger desert tortoises per square mile over the next 50 years due to the effects of military activities.

Prior to beginning our analysis, we would like to make two key points. First, we cannot attribute the low densities that Woodman et al. (2001) observed solely to military activities. (We note, however, that Woodman (2012) states that the Marine Corps' increased protection of the Sand Hills plot over the last 5 years seems to have resulted in a more stable population.) Although military training is responsible, at least in part, for the lower densities in some areas, these desert tortoises are also subject to many of the same stresses that animals face elsewhere in the Western Mojave Recovery Unit. Second, we expect that the rate of decline in the density of desert tortoises would be greater at the onset of training and then slow over time; we do not expect the decline to occur at a linear rate. In the following analysis, we will not attempt to predict how many desert tortoises would be affected within any specific period.

Areas that would receive heavy disturbance cover approximately 28.5 square miles within MCAGCC and currently contain approximately 312 large desert tortoises (11 per square mile). A decrease in density from 11 to 2 large desert tortoises per square mile would result in an 81.8 percent decline; this decline equates to the loss of 255 individuals. If training extirpated desert tortoises from these areas, this 100 percent decline would equate to the loss of 312 individuals. The magnitude of the decline does not directly equate to anticipated mortality. To equate the two directly, we would need to assume that the current population of 312 individuals would remain stable in the absence of military activities (i.e., recruitment rate would equal natural mortality rate and that the immigration rate balanced that of emigration) and that military activities would be the only source of added mortality.

[8] We provided both the individual and combined values for mean density for the very high and high disturbance levels.

We anticipate that the existing populations in areas identified for heavy disturbance are currently declining given the current effects on MCAGCC and the status of most populations in the Western Mojave Recovery Unit. We also anticipate that military activities are likely to be the greatest source of mortality in the heavily disturbed areas. Consequently, we anticipate that mortality of 255 to 312 adults is a reasonable estimate of the maximum number of adults that military activities are likely to kill in areas identified for heavy disturbance on MCAGCC.

We have no data on the degree to which the number of small desert tortoises could decrease. However, if the number of large animals decreases as we predict, the number of small desert tortoises is also likely to decrease at a similar rate because fewer reproductive females will occur in the population, which will result in a lower reproductive output. If the number of individuals in the two size classes decreases by the same magnitude, the current number of smaller desert tortoises would decrease by 81.7 to 100 percent in heavily disturbed areas. This would equate to a decline in the current population size of 1,202 to 1,471 juveniles. This decline would result from mortality rates and/or recruitment rates among smaller animals exceeding reproductive output of the adult females.

Equating this decline with mortality or lost reproductive output caused by the proposed military activities assumes that the juvenile population would have remained at a constant size from year-to-year (i.e., annual reproductive output would equal annual mortality/recruitment) in the absence of military training. Consequently, use of this number assumes a currently stable juvenile population and assumes that the effects of military activities would be the only source of added juvenile mortality and decreased reproductive output within the population. As stated previously, we anticipate that the existing population is declining, and we anticipate that military activities would be the greatest source of mortality in the heavily disturbed areas. Consequently, we anticipate that loss of 1,202 to 1,471 juveniles in these populations will be the result of mortality or loss of reproductive output associated with the proposed military activities.

The Marine Corps defined “moderately disturbed” areas in its representative training scenario as areas where distance between plants would be noticeably increased, plants would have smaller canopies, and soil surface disruption would be present but not extensive. We anticipate that this change in vegetation would affect desert tortoise abundance in higher density areas. As discussed above, the abundance of desert tortoises decreased substantially in areas where the density of vehicle tracks per mile exceeds 400 (Woodman et al. 2001, Henen 2012e).

Henen (2012e, see Table 15 above) determined that areas of MCAGCC containing more than 400 vehicle tracks per mile contained a density of 8.5 large desert tortoises per square mile. Although this density is an average across all transects containing more than 400 tracks per mile, including those with more than 700 per mile, it provides a reasonable estimate of the density that is likely to occur under the moderate disturbance training scenario presented by the Marine Corps.

Based on this information, we estimate that the current number of larger desert tortoises within the portions of MCAGCC identified for moderate disturbance would decrease from 1,226 to 919 (= 8.5 per square mile x 108.1 square miles) for a loss of 307 larger desert tortoises. As discussed previously, we cannot attribute this decline solely to military activities and the magnitude of the decline does not directly equate to the amount of anticipated mortality that is likely to result from the expanded training. In areas where moderate disturbance is likely to occur, other sources of mortality, unrelated to military activities, are likely to play a more pronounced role in population declines than they will in heavily disturbed areas. Therefore, the proportion of the decline that we can attribute to mortality from military activities will be lower than in the high intensity disturbance areas. Consequently, as a reasonable worst-case scenario, we anticipate that military activities will kill 307 larger desert tortoises in moderately disturbed areas of MCAGCC; this amount is likely an overestimate.

We have no data on the degree to which the population of smaller desert tortoises could decrease in moderately disturbed portions of MCAGCC. However, if they decrease by the same magnitude as the larger animals, the number of smaller animals would decrease by 25 percent in moderately disturbed areas of MCAGCC. This decrease would equate to a loss of 1,445 (= 25 percent of 5,779; see Table 14) individuals. As in the heavily disturbed areas, this decline would result from mortality rates and/or recruitment rates that exceed the reproductive output of the adult females. In moderately disturbed areas, we anticipate that military activities are likely to contribute to this decline by decreasing the number of reproductive females and directly killing some smaller desert tortoises. However, other sources of mortality, unrelated to military activities, are likely to play a more pronounced role in the heavily disturbed areas than in those that are moderately disturbed.

Consequently, as a reasonable worst-case scenario, we anticipate that military activities will kill 1,445 smaller desert tortoises in moderately disturbed areas of MCAGCC; this amount is likely an overestimate. Table 16 depicts our estimates of the number of desert tortoises that training would likely kill within the current boundaries of the MCAGCC.

Table 16. Estimates of the number of desert tortoises likely to be killed within the current boundaries of the MCAGCC.

	Larger	**Smaller**
Heavily Disturbed Areas	255 to 312	1,202 to 1,471
Moderately Disturbed Areas	307	1,445
Total	562 to 619	2,647 to 2,916

Although the estimates in this table are the result of a reasonable application of the best available data, they contain numerous sources of potential error. First, we have based these estimates on survey data that are more than 10 years old. Second, the Marine Corps based its estimates of the current population size within areas identified for heavy or moderate disturbance on broad generalizations of density across the landscape that do not account for existing site-specific disturbances (e.g., existing road, staging area, areas of high cross-country vehicle travel) that may result in lower densities in specific locations. Third, estimates of juvenile population size derived using Turner et al. (1987) likely overestimate the current number of juveniles. Fourth, the Service estimates assume that the level of military training determines the density of desert tortoises, which likely ignores other sources of mortality that may influence density. Fifth, the Service's density estimates assume a stable state for populations of desert tortoises (e.g., 2 adults per square mile is a density indicative of an area with 700 tracks per mile). Our estimates, however, only reflect the density at the time the surveys were performed and ignore the potential that these populations were continuing to decline due to the level of disturbance. Sixth, the correlation of desert tortoise density to track counts is based on survey data collected at the same time that the population estimate surveys were performed. Therefore, it is more accurate to say that these densities reflect a fine-scale look at the disturbed portions of the area where population estimation occurred rather than the probable decline in density that may occur under the new training scenario. Although these sources of error only allow for a rough characterization of the injury and mortality that may occur from the proposed action, these sources of error would tend to overestimate the level of injury and mortality that military activities will cause.

Military Activities in Areas Identified for Heavy and Moderate Disturbance in the Expansion Areas

The Marine Corps will translocate desert tortoises from the areas identified for heavy and moderate disturbance within both expansion areas, so military activities will only injure or kill the animals that are not located during clearance surveys. The Marine Corps is not likely to detect all of the individuals that are present during clearance surveys because desert tortoises in general are difficult to find and smaller animals are very difficult to detect. Table 17 compares pre-project survey estimates and data on located desert tortoises for Units 2 and 3 of the Ivanpah Solar Electric Generating System (ISEGS) facility, which provides information that we use in our analysis for estimating the number of individuals that the Marine Corps is likely to miss during clearance surveys.

Table 17. Numbers of desert tortoises estimated and founds at the ISEGS facility.

<table>
<tr><th>Carapace Length (millimeters)</th><th>Pre-project Population Estimate [9]</th><th>Desert Tortoises Located During Clearance and Construction Monitoring [10]</th><th colspan="2">Percentage of Estimate Located</th></tr>
<tr><td>0 - 119</td><td>467/555</td><td>54</td><td>11.7/9.7</td><td rowspan="2">13.5/11.5</td></tr>
<tr><td>120 - 159</td><td>30</td><td>13</td><td>43.0</td></tr>
<tr><td>> 160</td><td>64</td><td>55</td><td colspan="2">85.9</td></tr>
</table>

Similar information is also available from Fort Irwin, where the Army predicted that its southern expansion area supported between 526 and 565 adult desert tortoises on approximately 22, 214 acres. To date, it has found 565 desert tortoises greater than 160 millimeters in length on approximately 19,643 acres. The Army also found 103 desert tortoises smaller than 160 millimeters in this area (Service 2012c). Given the number of individuals larger than 160 millimeters located during these clearance surveys, and the large proportion of the population that individuals smaller than 160 millimeters generally comprise, it is likely that the Fort Irwin clearance surveys located only a small proportion of the smaller individuals.

[9] Numbers based on Service 2011f (8-8-10-F-24R). This biological opinion grouped hatchlings (i.e., smaller than 49.7 millimeters) and eggs together into a single estimate. The first row of this column reports individuals 119 millimeters or smaller, which includes hatchlings and eggs. The larger number assumes that all individuals smaller than 49.7 millimeters are still in egg form, while the smaller number assumes that all viable eggs have hatched and become the hatchling portion of the population. The predicted number of hatchlings assumes a 55 percent egg-hatching rate per Turner et al. (1987).
[10] Numbers based on Jackson 2012.

Based on the information above, we expect that clearance surveys and subsequent construction monitoring generally locate most of the estimated number of larger individuals (i.e., >160 millimeters carapace length); the percentage of the estimate located decreases for smaller size classes. This outcome is logical because smaller desert tortoises are more difficult for surveyors to locate. We noted in the Environmental Baseline Section of this biological opinion that the use of Turner et al. (1987) likely causes us to overestimate the number of animals in the smaller size classes.

Because the Marine Corps would perform an initial clearance survey of heavily and moderately disturbed areas according to Service protocols, followed by annual clearance surveys of higher density areas (i.e., three or more desert tortoises per square kilometer) in the active season prior to each MEB exercise, we anticipate that it will locate most of the larger animals (i.e., at least 85.9 percent of the individuals larger than 160 millimeters; see table 17). Based on the results from the ISEGS project, we anticipate that the Marine Corps will also locate approximately 13.5 percent of the individuals smaller than 160 millimeters, which is the percentage of the estimated number of smaller animals that were detected at the Ivanpah site. Most of these animals will be in size classes that are larger and therefore closer to reproductive age.

We developed the following tables to indicate the number of desert tortoises that are likely to remain in the areas that would be heavily and moderately disturbed by training following translocation. We based our estimates on the current number of desert tortoises in these areas and the predicted efficiency of clearance surveys. We used the efficiency rates from the ISEGS project to develop the estimates because this clearance was the most-recent, large-scale clearance conducted and, as such, benefitted from work that preceded it (e.g., Fort Irwin). Despite the fact that the information from the ISEGS project comprises the best available data, several factors exist that are likely to cause the results to differ between that project and the proposed action. These factors are:

1. The proposed moderate and heavy disturbance areas in the expansion areas are more than four times the size of the ISEGS project; as the area to be cleared of desert tortoises increases, so does the difficulty in finding all of the desert tortoises that are present.
2. Biologists searched the ISEGS site more thoroughly than required by the Service's protocols and employed intensive search techniques to find smaller animals.
3. The removal of vegetation from the ISEGS site as construction progressed allowed for the discovery of additional desert tortoises; the Marine Corps will not remove vegetation from the training areas prior to military maneuvers.

Because we based the following tables in part on Turner et al. (1987), we remind the reader of the predictive limitations of this method of estimating the number of smaller animals, as we have mentioned previously in this biological opinion. By using Turner et al. (1987), we have likely overestimated the number of smaller desert tortoises; consequently, our estimate of the number of smaller desert tortoises remaining after clearance surveys is also likely an overestimate. Despite developing these tables with the best available information, we do not know the exact number of desert tortoises that would be present before and after translocation. We expect that the numbers in table 18 provide a reasonable worst-case scenario for our analysis because we have likely overestimated the number of smaller desert tortoises that are present.

Table 18. Estimates of the number of desert tortoises before and after translocation.

Larger Desert Tortoises - - Projected Clearance Efficiency = 85.9 percent	**Size (Square Miles)**	**Pre-Clearance**		**Post-Clearance**	
		Number of Animals	**Density (per square mile)**	**Number of Animals**	**Density (per square mile)**
Western Expansion Area					
Heavy Disturbance	15.08	276	18.3	39	2.6
Moderate Disturbance	38.52	724	18.7	102	2.7
Southern Expansion Area					
Heavy Disturbance	1.42	26	18.3	4	2.6
Moderate Disturbance	4.09	79	19.3	11	2.7

Smaller Desert Tortoises - - Projected Clearance Efficiency = 13.5 percent	**Size (Square Miles)**	**Pre-Clearance**		**Post-Clearance**	
		Number of Animals	**Density (per square mile)**	**Number of Animals**	**Density (per square mile)**
Western Expansion Area					
Heavy Disturbance Moderate Disturbance	15.08 38.52	1,301 3,413	86.3 88.6	1,125 2,952	74.6 76.6
Southern Expansion Area					
Heavy Disturbance	1.42	66	46.5	57	40.2
Moderate Disturbance	4.09	372	90.9	322	78.7

As we stated for our estimates of mortality within the existing installation, we cannot attribute all the declines in the following discussion solely to military activities. To the best of our knowledge, the overall population in the expansion areas is declining. We anticipate that military activities are likely to be the greatest source of mortality in the high intensity disturbance areas; other factors may influence desert tortoises more intensely in areas of moderate disturbance.

Areas of Moderate Disturbance. Based on the size of the areas, the estimated number of animals present, and the likely percentage of animals translocated, we anticipate that 102 larger desert tortoises and 2,952 smaller desert tortoises would remain in the portion of the western expansion area proposed for moderate disturbance prior to the commencement of military activities. For the southern expansion area, we anticipate that 11 larger desert tortoises and 322 smaller desert tortoises would remain after translocation.

We anticipate that the individuals remaining within these regions of the expansion areas would experience a similar magnitude of effects to those that we predict for moderate disturbance areas on the existing installation (i.e., >400 tracks per mile). Based on information from existing training on MCAGCC, we indicated that the density of larger desert tortoises was likely to decrease to approximately 8.5 per square mile in areas that will experience this level of disturbance. Because the post translocation density of larger desert tortoises will be below this, we do not anticipate that training within the moderate disturbance areas would result in a substantial decline in the number of larger desert tortoises that remain following clearance surveys.

We have no data on how training would affect the number of smaller desert tortoises in moderately disturbed areas. The best available information stems from the Marine Corps' work on the density of larger desert tortoises in training areas on base. Therefore, we will use the same predictions for smaller animals that we did for larger desert tortoises and assume that populations of smaller desert tortoises would decline in proportion to the decline in larger desert tortoises. Based on the size of the areas, the estimated number of animals present, and the likely percentage of animals translocated, we anticipate that 2,952 smaller desert tortoises would remain in the portion of the western expansion area proposed for moderate disturbance prior to the commencement of military activities. For the southern expansion area, we anticipate that 322 smaller desert tortoises would remain after translocation. Consistent with our predictions regarding larger desert tortoises, we do not anticipate that training within the moderate disturbance areas would result in a substantial decline in the number of larger desert tortoises that remain following clearance surveys.

Although use of the moderate disturbance areas would be infrequent and would overlap a low-density population (i.e., post-translocation), we cannot rule out all likelihood of injury and mortality because cross-country vehicle travel would still occur. We anticipate, however, that training in these areas would injure or kill relatively few desert tortoises; given the variables involved, we are unable to predict how many desert tortoises are likely to be killed by training in these areas.

Areas of Heavy Disturbance. For the same reasons we described in the previous section, we anticipate that 39 and 4 larger desert tortoises (table 18) would remain in the areas identified for heavy disturbance in the western and southern expansion areas, respectively. In contrast with the moderate disturbance areas, we expect that training would further reduce the number of animals in these areas. Based on information from existing training on MCAGCC, the density of larger desert tortoises is likely to decrease to between 0 and 2 per square mile [i.e., density reported by Henen (2012) and Woodman (2001) for areas experiencing more than 700 tracks per mile] in heavily disturbed areas as a result of military activities. Consequently, we anticipate that the mortality of 10 to 43 larger desert tortoises within areas identified for heavy disturbance in the expansion areas is a reasonable estimate of the worst-case scenario. This loss of individuals and the resultant density would comprise a 23 to 100 percent decline in the original post-translocation population in these areas (i.e., a decline in density from 2.6 larger individuals per square mile to either 2 per square mile or 0 per square mile). Subsequent clearance surveys would reduce densities and mortality further.

As with our estimates for the moderately disturbed areas, we have no data on how training would affect the number of smaller desert tortoises, so we assume that populations of smaller desert tortoises would decline in proportion to the decline in larger desert tortoises. For the same reasons we described in the previous section, we anticipate that 1,125 and 57 smaller desert tortoises would remain in the portions of the western and southern expansion areas, respectively, proposed for heavy disturbance prior to the commencement of military activities. We expect that training would likely further reduce the number of animals in these areas. If the numbers of smaller desert tortoises decreases between 23 and 100 percent, as predicted for the population of larger individuals, this would equate to the worst-case loss of between 272 and 1,182 smaller desert tortoises from heavily disturbed portions of the expansion areas.

Summary. As we stated previously, equating any of these declines with mortality caused by the proposed military activities assumes a stable population in the absence of military training and assumes that the proposed military activities would be the only source of added mortality. We anticipate that the existing population is likely declining and that military activities would be the greatest source of mortality in training areas (except for larger animals in moderately disturbed areas). Consequently, our quantification of the loss of desert tortoises in the training areas represents a reasonable worst-case scenario associated with the proposed military activities. As we have stated previously, the Marine Corps' movement of the staging area in the southern expansion area would further reduce effects and result in the loss of fewer juvenile desert tortoises.

Although our estimates result from a reasonable application of the best available data, they contain numerous sources of potential error. First, estimates of the number of smaller desert tortoises derived by using Turner et al. (1987) likely overestimate the current number of juveniles; this overestimate affects the estimate of population size and clearance survey efficacy. Second, these estimates assume that the level of military training determines the density of desert tortoises, which ignores other sources of mortality that may influence density. Third, these estimates assume the level of disturbance anticipated in the expansion areas will affect its population to the same extent as populations on the existing installation. Fourth, our density estimates assume a stable state for populations of desert tortoises under various levels of disturbance (i.e., 2 adults per square mile is a density indicative of an area with 700 tracks per mile), when they actually only reflect the density at the time the surveys were performed and ignore the potential that these populations were continuing to decline.

Military Activities in the Remaining Portions of the Existing Installation and Expansion Areas

In addition to the heavily and moderately disturbed areas, mortality of desert tortoises is also likely to occur in other portions of the existing installation and expansion areas due to military activities. On the existing installation, we do not anticipate that these areas will receive an increase in military training because the Marine Corps has indicated that the new training scenarios will focus within areas identified for heavy and moderate disturbance. Our biological opinion regarding the effects of the current level of military training on MCAGCC (Service 2002; 1-8-99-F-41) addresses these areas. As we describe in the following paragraphs with regard to future training in portions of the expansion areas that would undergo lighter use, we are unable to quantify the number of desert tortoises that are likely to be killed or injured in these areas.

Within the expansion areas, we also anticipate some level of injury and mortality in areas that are away from heavily and moderately disturbed locations. Disturbance in these locations would be substantially less; however, because the Marine Corps would not translocate desert tortoises from these areas, more animals would be subject to the effects of the disturbance. Henen (2012e) indicated that the portions of the existing installation that experienced low (i.e.,<100 tracks per transect) to moderate disturbance (i.e., 100 to 399 tracks per transect) supported densities between 12.6 and 15.6 adults per square mile. Although we cannot predict the intensity of military training in areas that would not be heavily and moderately disturbed, the disturbance in these areas is unlikely to exceed that identified as low to moderate.

We developed the table 19 using data on population size in the SUAs from Karl and Henen (2011) and other data that we have previously identified in other portions of this biological opinion (i.e., size of SUAs, expansion area population size, population size in areas proposed for heavy and moderate disturbance, and size of heavy and moderate disturbance areas). It provides information on the number and density of desert tortoises in portions of the expansion area that are open to cross-country vehicle travel but outside of areas identified for heavy and moderate disturbance.

Table 19. Desert tortoises in portions of the expansion area open to cross-country travel but outside of heavy and moderate disturbance areas.

Areas Open To Training outside of Proposed Heavy and Moderate Disturbance Areas	Size (Square Miles)[11]	Adult Population Size[12]	Adult Population Density (per square mile)	Juvenile Population Size[13]	Juvenile Population Density (per square mile)
Western Expansion Area	156.8	1640	10.5	10,975	70
Southern Expansion Area	23.2	169	7.3	1,131	49

Currently, our analysis indicates that the density of larger desert tortoises in the expansion areas is below that of similar disturbance regimes on MCAGCC. Therefore, the anticipated effects within these areas are unlikely to result in substantial declines in the overall number of desert tortoises that remains following clearance surveys. Although use of these areas would be infrequent, we cannot rule out all likelihood of injury and mortality of desert tortoises due to the cross-country vehicle travel that could occur. When the Marine Corps undertakes activities that would result in ground disturbance, it would move desert tortoises out of harm’s way if they are located. We anticipate that the relatively few desert tortoises are likely to be injured and killed. As with the analysis of effects on other portions of the existing installation and expansion area, numerous assumptions and potential sources of error exist; we have not re-stated those

[11] Size = expansion area size – (SUA size + size of heavily and moderately disturbed areas)

[12] Adult Population Size = Service point estimate from Environmental Baseline – (SUA population estimate from Karl and Henen 2011 + population size of heavily and moderately disturbed areas from DoN 2011a)

[13] We used the same method for calculating juvenile population size as was used for adult population size (see footnote above). However, Karl and Henen (2011) did not calculate juvenile population size in the SUAs. We estimated this by assuming that the juvenile population estimate comprised 87 percent of the total population per Turner et al. (1987).

assumptions or caveats here. Given the variables involved, we are unable to predict how many desert tortoises are likely to be killed by cross-country vehicle travel in these areas

Because heavily and moderately disturbed areas would not be fenced to exclude desert tortoises, some potential also exists that they would act as a mortality sink; therefore, military training would continue to injure or kill desert tortoises that disperse into these areas from adjacent locations. This movement of desert tortoises into these areas could occur as the result of animals reoccupying a portion of their former home range, adult males seeking females, and juveniles dispersing from their nests. We cannot reasonably predict the number of desert tortoises that this effect could kill or injure. However, the Marine Corps has proposed to implement annual clearance surveys of higher density areas (i.e., three or more desert tortoises per square kilometer), within areas to be moderately or heavily disturbed. Consequently, we anticipate that this effect would result in the injury and mortality of few, if any, larger desert tortoises.

Effects of Translocation

Effects to Desert Tortoises

Although we would later authorize desert tortoise translocation under a section 10(a)(1)(A) recovery permit, we have analyzed its effects here because they are part of the proposed action. The recovery permit will govern and authorize all activities performed as part of the translocation. Translocation will only proceed following the Service's approval of the Marine Corps' final translocation plan and research design.

Prior to the initiation of training activities, the Marine Corps will translocate desert tortoises from the areas identified for heavy and moderate disturbance in the expansion areas to release sites in the Ord-Rodman DWMA, Sunshine Peak Training Area, and the newly established SUAs within the expansion areas. We anticipate the Marine Corps will capture and translocate most of the larger animals, but it is unlikely to find most individuals in smaller size classes. As discussed previously, we anticipate that the clearance surveys will locate 85.9 and 13.5 percent of the larger and smaller desert tortoises, respectively. Based on the current number of animals within these areas, we anticipate the Marine Corps would translocate 949 adult and 696 juvenile desert tortoises, respectively. The Marine Corps' movement of the southern staging area to locations that contain fewer desert tortoises would result in a decrease in these estimates.

These estimates provide a rough characterization of the number of animals that the Marine Corps will translocate; we cannot precisely quantify the number of desert tortoises it would translocate for several reasons. First, we do not know the ultimate location of the MEB objective, company objectives, staging areas, or other features where clearance surveys would occur. Second, even if we knew the location of these features, the estimates provided for the representative design have wide confidence intervals that do not allow for precise quantification of effects. Finally, the Marine Corps will conduct annual clearance surveys of higher density areas that should find additional desert tortoises that may move into the heavy or moderate disturbance areas after the initial clearance surveys. The Marine Corps will conduct these clearances in the active season prior to MEB exercises.

In preparation for translocation, the Marine Corps will collect 3 years of baseline information on desert tortoise density, distribution, health status, and habitat within the areas occupied by the recipient and translocated populations. In addition, the Marine Corps will collect similar information from populations on control plots. The Marine Corps will use this information in refining its translocation plan and research design prior to moving desert tortoises. We do not know how many animals the Marine Corps would handle during this process, but it is unlikely that it would exceed the number of individuals associated with post-translocation monitoring.

Following translocation, the Marine Corps will monitor 20 percent of the translocated adult population (i.e., 190 adults), 5 percent of the translocated juvenile population (i.e., 35 juveniles) and an equal number of individuals that are resident to the recipient site (i.e., 225 individuals) and control site (i.e., 225 individuals). The Marine Corps will monitor these animals for 5 years using radio tracking, periodic health assessments, blood collection, and collection of other data. After 5 years, the Marine Corps will monitor 50 animals in each group (control, recipient and translocation; Karl & Henen 2011) In addition, the Marine Corps will monitor desert tortoises on 10 to 12 0.4-square-mile plots in the recipient and control sites every 5 years for 30 years. Based on the overall density of the Ord-Rodman DWMA (almost 20 per square mile), where most plots would be located, the number of desert tortoises monitored on study plots could be approximately 91 adults. However, the final location of the plots and their site-specific density could result in some variation from this estimate.

The Marine Corps will use some of the desert tortoises involved in translocation monitoring to answer specific research questions concerning desert tortoise repatriation and stocking densities. These studies will involve experiments that include stocking specific plots in the recipient site at varying levels to look at density effects and fencing of some plots to determine if short-term containment of translocated animals will increase the speed at which they adopt new home ranges. The Marine Corps will move translocated desert tortoises found to have clinical signs of disease to the MCAGCC head-start facility where it will use them in research on vertical transmission of disease.

This translocation strategy would involve the periodic handling, blood collection, marking for later identification, placement and replacement of transmitters, and movement of large numbers of desert tortoises over a 30-year period. Based on the frequency of monitoring described in the translocation strategy, the Marine Corps is likely to capture and perform these activities on most animals numerous times over the course of the monitoring period, with the number of animals subjected to these activities decreasing over time. Capturing and handling desert tortoises and performing blood collection and transmitter placement may cause elevated levels of stress that render them more susceptible to disease or dehydration from loss of fluids. Information from the Fort Irwin translocation project indicates that translocations in that study did not cause a measurable physiological stress response (Averill-Murray 2011, Drake et al 2012). Additionally, because the Marine Corps will use experienced biologists approved by the Service and approved techniques, we do not anticipate that these animals are likely to be injured or killed because of improper handling.

This translocation strategy would also involve short- and long-term quarantine of individuals to assess disease status or for disease research. Because the Marine Corps is proposing to leave animals in the field while awaiting blood test results, we anticipate that the number of individuals held for short-term quarantine would be small. We anticipate that short-term quarantine is unlikely to result in injury or mortality of desert tortoises because the Marine Corps will hold these individuals in an approved facility and use approved handling and husbandry techniques during the quarantine period.

Previous studies have documented desert tortoise mortalities at long-term quarantine and head-start facilities (Nagy 2010, Hillard et al. 2006). These studies have noted specific problems related to predation of juvenile desert tortoises by ground squirrels (*Spermophilus* spp.) and fire ants (*Solenopsis xyloni*) and potential predation by roadrunners (*Geococcyx cailfornianus*) and burrowing owls (*Athene cunicularia*). Based on 5 years of data on desert tortoise survivorship at the Marine Corps' head-start facility, Nagy (2010) reported that up to 80 percent of hatchlings survived their first year of life and yearly survival for individuals larger than hatchlings was up to 90 percent. This mortality rate is probably substantially less than what individuals in these size classes would experience in the wild. Adult desert tortoises that have lower natural susceptibility to mortality factors are likely to experience little, if any, mortality while in captivity.

Previous studies have documented numerous effects that could occur following translocation. Translocation studies have shown that straight-line movement distances following release can be over 3.73 miles in the first year for some desert tortoises (Berry 1986, Field et al. 2007, Nussear 2004). Mean dispersal distances observed on 3 study plots south of Fort Irwin ranged from 0.09 to 3.5 miles, with maximum dispersal distances of between 7.8 to 14.3 miles (Walde et al. 2008). For short-distance translocations, data seem to indicate shorter post-translocation dispersal distances (0.5 to 0.9 miles) (Walde et al. 2008). Translocated desert tortoises can also substantially expand the area they occupy in the first year following translocation (e.g., from 3.9 to 6.9 square miles at a Nevada site; from 0.2 to 10.3 square miles at a Utah site). The degree to which these animals expand the area they use depends on whether the translocated animals are released into typical or atypical habitat; that is, if the recipient site supports habitat that is similar to that of the source area, desert tortoises are likely to move less (Nussear 2004).

Some translocation studies have found that translocated animals seem to reduce movement distances following their first post-translocation hibernation to a level that is not substantially different from resident populations (Nussear 2004, Field et al. 2007). As time increases from the date of translocation, most desert tortoises change their movement patterns from dispersed, random patterns to more constrained patterns, which suggest an adoption of a new home range (Nussear 2004). However, translocation studies at Fort Irwin have found that desert tortoises that were released a substantial distance from their capture site moved greater distances than both resident and control groups over a 3-year period, but animals released a short distance from their capture site had similar movement patterns to those of resident and control groups (Averill-Murray 2011). This may indicate that some translocations result in translocated animals taking longer to settle into new home ranges after release, but the distance that the animals are moved from their capture site likely influences this result.

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

Studies have documented various sources of injury and mortality for translocated individuals, including predation, exposure, fire, disease, crushing by cattle, and flooding (Nussear 2004, Field et al. 2007, Berry 1986, U.S. Army 2009, 2010). Because of the post-translocation movements exhibited by desert tortoises, some potential also exists for desert tortoises to die on roads during the period when translocated individuals are seeking new home range locations. As with other translocations (Nussear 2004, Field et al. 2007, U.S. Army 2009, 2010), we anticipate that predation is likely to be the primary source of post-translocation mortality. The level of winter rainfall may dictate the amount of predation observed in desert tortoises (Drake et al. 2010). Study of translocated desert tortoises at Fort Irwin has documented a statistically significant relationship between decreased precipitation and increased predation. Specifically, predation by coyotes affected translocated, resident, and control desert tortoises at the same rate (Drake et al. 2010)

Based on this information, we anticipate that some of the translocated desert tortoises will move substantial distances after their release. However, the Marine Corps will perform studies of the recipient site to identify suitable desert tortoise habitat for the final release sites. Ensuring that desert tortoises are moved only into suitable habitat is likely to reduce post-translocation movement to some extent. Translocated desert tortoises may also exhibit homing behavior and orient their movement towards training lands. Animals released into fenced areas as part of the repatriation study would not move long distances because of their confinement, which would continue until these animals establish defined home ranges.

These predicted movement patterns are likely to place desert tortoises at risk of injury and mortality as they experience exposure to mortality sources while they are seeking new home ranges. Sources of injury and mortality during this period are likely to include those identified above, but predation is likely to affect translocated animals to the greatest degree (as it would control and resident desert tortoises, particularly during periods of drought). We anticipate that the fencing proposed by the Marine Corps to prevent desert tortoises from re-entering training areas from the translocation areas would be effective in reducing mortality. However, when desert tortoises encounter exclusion fencing, they often exhibit fence-pacing behavior that can increase their exposure to predators and temperature extremes; the Marine Corps has proposed to monitor new fences after they are installed to reduce the likelihood that desert tortoises would be killed while pacing fences.

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

The Marine Corps has proposed to conduct repatriation research that will involve the enclosure of resident and translocated populations in a confined space. In addition, the Marine Corps has proposed to investigate stocking rates for translocation through analysis of plots that they stock at varying densities. Installation fences for repatriation enclosures result in similar effects to those discussed previously for fence installation in other portions of the action area (i.e., handling of desert tortoises, home range effects, fence pacing, etc.). However, given the information above and the density levels proposed by the Marines for this study, post-translocation densities would not approach those where Saethre et al. (2003) observed adverse effects.

Translocation has the potential to increase the prevalence of diseases, such as upper respiratory tract disease, in a resident population. Stress associated with handling and movement or due to density-dependent effects could exacerbate this threat if translocated individuals with subclinical upper respiratory tract disease or other diseases begin to exhibit clinical signs of disease due to the stress associated with handling and movement. However, as we noted previously in this biological opinion, the study at Fort Irwin indicated that translocation did not cause a measurable physiological stress response (Averill-Murray 2011, Drake et al 2012). Because the Marine Corps will use qualified biologists and approved techniques to perform translocation tasks, we do not anticipate that these animals would experience increased stress during handling. Increased stress may occur after release while animals are seeking new home ranges, but we do not anticipate that post-translocation density would play a role. Finally, the Marine Corps will perform full health assessments on all desert tortoises associated with the translocation to determine if they carry disease. The Marine Corps will not translocate any animals showing clinical signs of disease and will only release individuals following review and approval of test results by the Service. For these reasons, we do not anticipate that translocation will result in an increase in disease prevalence in the translocation area.

Although we have qualitatively analyzed translocation effects, quantitative assessment of the magnitude of each effect is difficult for the following reasons. First, we cannot precisely quantify the number of desert tortoises that the Marine Corps would ultimately translocate. Second, we cannot quantify the degree to which protective measures will reduce adverse effects. Third, we cannot predict the current disease prevalence within the populations discussed above, which would affect the number of individuals released. Finally, we cannot predict the amount of time it will take for desert tortoises to settle into new home ranges, where they would be relatively safer from mortality sources. Although, we cannot provide a precise estimate of the level of injury and mortality for the proposed translocation, we have attempted to provide a rough characterization of its magnitude below.

During various studies, the observed levels of mortality in translocated desert tortoises have ranged from 0 to 24.9 percent (Field et al. 2007, Cook et al. 1978 in Nussear 2004). None of these studies compared mortality rates in resident and translocated populations to the mortality rate in populations not affected by translocation (i.e., controls); therefore, we cannot determine whether translocation or other factors caused these mortalities. Nussear (2004) found that mortality among translocated animals was not statistically different from mortality observed in resident populations. Esque et al. (2010) found that mortality in resident (29 of 140 desert tortoises; 20.7 percent mortality), control (28 of 149; 18.8 percent), and translocated (89 of 357; 24.9 percent) animals did not differ statistically and concluded that the translocation was not the cause of the observed mortality. All of the studies identified above are short-term studies that did not investigate the long-term effects of translocation. We currently have no information on the long-term effects of desert tortoise translocation.

Some aspects of the Marine Corps' translocation, such as the proposed repatriation and translocation density studies are different from the studies discussed above and could introduce sources of mortality that were not part of previous studies. Fence pacing within the repatriation research plots may result in exposure or predation risk. Increased densities on experimental plots may result in effects that are unforeseen. However, repatriation plots are also likely to reduce the movement distances of desert tortoises following translocation; in theory, reducing the amount of wandering would reduce mortality. Past density studies have also shown that the densities proposed by the Marines on experimental translocation plots are far below that in which desert tortoises would experience adverse effects.

We have already indicated that the Marine Corps would place some desert tortoises, in short- or long-term quarantine and may use them for future research, which the Marine Corps has not yet proposed. However, as we have already concluded, desert tortoises that are placed in quarantine are likely to have a mortality rate that is equal to or better than they would have experienced in the wild. If the Marine Corps proposes additional research in the future, we will evaluate in under the guidelines of section 10(a)(1)(A) of the Endangered Species Act to ensure that it results in information that would be useful in supporting the conservation of the desert tortoise and includes appropriate safeguards to protect individuals.

Drake et al. (2011) note that mortality rates among translocated, resident, and control animals in Fort Irwin's southern translocation area ranged from 34 percent in 2009 to 1.5 percent in 2011. Drake et al. (2011) also note other studies that demonstrate variable mortality rates in consecutive years and that "(d)rought) can also indirectly increase mortality through increased predation on adult (desert) tortoises as the result of a functional response (prey switching) of predators to a decrease in prey availability." Consequently, we cannot estimate the level of post-translocation mortality in the three groups because of regional factors that we cannot control or predict (e.g., drought, predation related to a decreased prey base during drought, etc.). Based on Esque et al. (2010), however, we anticipate that post-translocation mortality will be approximately equal among the resident, control, and translocated populations.

Consequently, based on this range of rates, we anticipate the mortality of 329 to 411 translocated desert tortoises. Because past studies have documented similar levels of mortality between translocated, recipient, and control site populations, we also estimate that a similar proportion of the control and recipient site populations would die. Because the Marine Corps will only monitor 225 individuals in each of the 3 populations (i.e., translocated, resident, and control), mortality within the monitored populations would be between 45 and 56 in each group. We do not anticipate this mortality will be the direct result of translocation; past studies indicate that predation influenced by drought may be an important driver of the mortality in the region, although individuals will also likely die from other causes. The monitoring of the control population will assist us in determining whether this prediction is realized. We have no information with which to predict the long-term population-level effects of this translocation. We acknowledge that other factors may affect mortality rates in the region; in such cases, we expect that mortality rates may vary widely between years and the key measure of the effects of translocation will be the comparison of the rates of mortality among translocated, resident, and control animals.

Effects to Critical Habitat of the Desert Tortoise

Installation of up to 24 linear miles of desert tortoise exclusion fence for 6 one-square-mile repatriation pens could disturb habitat in certain locations within the Ord-Rodman Critical Habitat Unit; these fences would be in place for 2 years. The Marine Corps has not identified the final location of these pens, but the potential exists that some or all of them could occur within the Ord-Rodman Critical Habitat Unit. To address the potential worst-case scenario, our analysis assumes that the Marine Corps would construct all pens within the critical habitat unit. On the ISEGS project, BrightSource Energy estimated the need for a 10-foot-wide disturbance area for installation of desert tortoise exclusion fencing (Service 2010j, 8-8-10-F-24). A similar right-of-way associated with repatriation pens would disturb approximately 29 acres of critical habitat. We will consider how the installation of the fencing would affect the primary constituent elements of critical habitat.

The first primary constituent element of critical habitat is sufficient space to support viable populations within each of the six recovery units and to provide for movement, dispersal, and gene flow. The installation of the fencing would not result in the long-term removal of habitat. Although the ability of the critical habitat unit to allow for the movement, dispersal, and gene flow of desert tortoises would be disrupted for a relatively short time, the fencing would not compromise the long-term conservation value and function of the Ord-Rodman Critical Habitat Unit because these functions would be restored upon the removal of the fence.

Depending on the exact manner in which the Marine Corps installs the fence, the effects on the second primary constituent element (sufficient quality and quantity of forage species and the proper soil conditions to provide for the growth of these species) would vary. For example, a bladed road would remove most of the forage species from the right-of-way and disrupt soil conditions for a relatively long time; these effects would diminish if the Marine Corps uses less intrusive means of installation. We expect that, even in the worst-case scenario of a bladed right-of-way, the loss of the forage plants and disruption of soil conditions on 29 acres distributed in a linear manner would not compromise the long-term conservation value and function of the Ord-Rodman Critical Habitat Unit. We have reached this conclusion because, over time, forage plants and soil conditions would return to a more functional condition; additionally, the disruption of forage and soil on such a small area would not measurably affect the critical habitat unit as a whole.

The third primary constituent element, suitable substrates for burrowing, nesting, and overwintering, would likely undergo short-term impacts because of the installation of the fence. Again, depending on the nature of the installation, the effects to these substrates would vary from negligible to rendering them non-functional. Even in this worst-case situation, the disruption of substrates on such a small area would not measurably affect the critical habitat unit as awhile.

The fourth primary constituent element is burrows, caliche caves, and other shelter sites. We expect that the installation of the fence along the right-of-way would not any caliche caves because these structures are likely sufficiently rigid to withstand the equipment that would the Marine Corps would likely use. Burrows and other shelter sites may be destroyed if the Marine Corps does not avoid them during construction. We expect that the installation of the fence would not compact substrates to the degree that desert tortoises would be unable to construct new burrows and shelter sites; thus, this work is unlikely to affect this primary constituent element to a measurable degree.

The installation of the fence would affect the fifth primary constituent element (sufficient vegetation for shelter from temperature extremes and predators) in a more substantial manner because shrubs comprise its main component. If the Marine Corps removes shrubs during installation of the fence, they would require a relatively long time to grow to a size where they again provide shelter; drought would lengthen time required for them to grow back. Because the installation would affect a narrow band of habitat within a much larger critical habitat unit, we do not expect that the long-term conservation value and function of the Ord-Rodman Critical Habitat would be measurably affect as a result of effects to the perennial vegetation along the right-of-way.

The last primary constituent element, habitat protected from disturbance and human-caused mortality, would experience short-term effects during construction and removal of the fence. Otherwise, the fence will not measurably affect the level of disturbance and human-caused mortality within the right-of-way.

Given the total size of the Ord-Rodman Critical Habitat Unit (i.e., 184,155 acres, see Status of Critical Habitat section), this level of disturbance to the primary constituent elements would not result in measurable change in the conservation value and function of the critical habitat unit as a whole. Additionally, over time, at least some of the disturbances caused by the installation and removal of the fence would likely diminish.

We expect that all other activities related to the translocation of desert tortoises to the Ord-Rodman Critical Habitat Unit would have little, if any, effect on the primary constituent elements. We have reached this conclusion because most activities associated with the translocation would be conducted on existing roads, which do not support the primary constituent elements. A small amount of critical habitat adjacent to roads may be temporarily disturbed; we expect the size of this disturbance to be minimal and its effects on the function of critical habitat to not be measurable. We do not expect translocated desert tortoises to affect critical habitat.

Effects of Reduced Densities and Population Fragmentation on Population Viability

In previous sections, we discussed habitat loss and several sources of injury and mortality of desert tortoises that are associated with military activities. We anticipate that the predicted level of habitat loss and mortality will reduce desert tortoise densities and fragment desert tortoise populations to some degree. Extensive habitat loss or installation of impermeable barriers to movement can reduce population connectivity, which can reduce or eliminate the exchange of genetic information or place populations at risk from demographic imbalances. If isolated populations are small or have a low density, long-term population viability is unlikely.

The Service (1994) recommended a viable population density threshold of 10 desert tortoises per square mile because male and female desert tortoises were less likely to locate one another and reproduce below this density. At a minimum density of 10 individuals per square mile, desert tortoise populations require at least 500 square miles of area to maintain evolutionary potential. The maintenance of evolutionary potential requires a population of at least 5,000 adult individuals to maintain sufficient genetic diversity for long-term genetic potential and a density of at least 10 desert tortoises per square mile is needed to protect against genetic deterioration and demographic stochasticity (Service 1994). To protect against demographic consequences of small population size and buffer population size so the population persists, population size must be at least 10,000 adult animals (Service 1994). A population that has a high density (i.e., well above 10 adults per square mile) and is relatively stable requires less contiguous area because individuals are able to find one another to mate; such a population is more likely to maintain the minimum size necessary for long-term viability. Low-density populations require more contiguous area to meet the minimum viable population size. Loss of individuals from a low-density population in a smaller area that is not connected to other blocks of occupied habitat could mean that it drops below the threshold density necessary to ensure mating and reproduction. This would result in loss of population viability due to the effects of genetic deterioration and demographic stochasticity.

The Marine Corps did not provide information on the percentage of the existing installation that is at or below the minimum density threshold, but we know that 71 percent of the installation, primarily in areas used for training, have densities of between 0 and 20 per square mile based on surveys from the late 1990s (DoN 2011a). We do not know what portion of MCAGCC currently contains desert tortoises at a density of less than 10 per square mile, but Henen (2012e) showed that areas with more than 400 vehicle tracks per transect (i.e., moderately to heavily disturbed) contained approximately 8.5 adults per square mile; this density decreased as the density of tracks increased. Approximately 52 percent of the western expansion area contains densities of less than 10 desert tortoises per square mile (DoN 2011a). Approximately 20 percent of the southern expansion area contains densities below 10 desert tortoises per square mile.

We have provided extensive information in the Environmental Baseline section to show that desert tortoises occur throughout MCAGCC and the expansion areas. In addition, desert tortoises occur adjacent to these areas (Bureau et al. 2005). Habitat potential across MCAGCC, the expansion areas, and into adjacent areas like the Ord-Rodman DWMA indicate a large contiguous block of desert tortoise habitat that connects low-density portions of MCAGCC and the expansion areas to other areas containing more desert tortoises (Nussear et al. 2009). Although populations are declining, this contiguous expanse of occupied habitat contains substantially more desert tortoises (more than19,000 adults) than is required to maintain population viability, and numerous concentrations of desert tortoises at densities that well exceed 10 desert tortoises per square mile. We have estimated a substantial loss of individuals within areas that would be heavily and moderately disturbed by military activities, but this reduction in population size is unlikely to reduce the overall population size or density to a level that would threaten population viability within the expanded installation.

Despite our conclusion about the overall population viability of the expanded installation, the potential exists that habitat loss associated with military activities could result in isolation or near isolation of desert tortoises in some portions of the expanded installation. Large expanses of denuded habitat that separate a low density of desert tortoises from those in adjacent areas could reduce connectivity and create isolated or near-isolated groups of animals that are below the minimum density and number of animals necessary to maintain population viability. Loss of population viability in these instances could result in loss of desert tortoises from localized areas within the expanded installation. However, the magnitude of effects associated with military activities indicates that habitat within the moderately disturbed areas is likely to still be conducive to some level of desert tortoise occupation. As we have indicated, denuded areas associated with heavy disturbance (e.g., MEB objective) may lose desert tortoises completely, but these areas occupy relatively small discrete locations that would not isolate populations. Consequently, we anticipate that the disturbance associated with military activities is unlikely to result in loss of population viability as a result of isolation.

On a regional scale, loss of population connectivity can affect the viability of populations in areas that we have identified as important to recovery of the species (e.g., DWMAs, national parks, etc.). Ensuring connectivity between these areas is important to allow for climate change adaptation, to provide sufficient area for viable populations, and for the maintenance of gene flow across the range (Service 2012b).

We have identified linkage areas that connect the Ord-Rodman DWMA to other desert tortoise conservation areas (Service 2012b). Current training on the MCAGCC installation and expanding training into the western expansion area would have adverse effects on one of these linkages that connects the southeastern portion of the Ord-Rodman DWMA to the northern end of Joshua Tree National Park. This linkage incorporates areas occupied by desert tortoises in the Johnson Valley Off-highway Vehicle Management Area, the western portion of the existing installation, and portions of the Morongo Basin that are south of the existing installation. Existing anthropogenic disturbances that affect desert tortoises and their habitat within this linkage include OHVs, predation by common ravens, urban development, military training, and a variety of other human uses. Because of extensive development in Landers, Yucca Valley, and Joshua Tree, we anticipate that this linkage is likely to be heavily affected on its southern end.

We have already concluded that the effects of military activities will injure and kill desert tortoises in the portions of the linkage that it would occupy (i.e., MCAGCC and the western expansion area). However, we also concluded that these activities would not extirpate desert tortoises from the linkage as a whole or from large portions of it. Consequently, the proposed action is unlikely to appreciably affect connectivity. Based on this information, we anticipate that the proposed action is likely to result in increased effects to this linkage by increasing population declines on its northern end.

Effects of Off-highway Vehicle Displacement

In general, off-highway vehicle effects include mortality of desert tortoises, collapsing of desert tortoise burrows, destruction of plants needed for cover and forage, soil erosion and compaction that reduces the ability for desert tortoises to construct burrows, proliferation of weeds, and increases in the number and location of wildfires. The 5-year review, which we have appended and incorporated by reference, provides an extensive discussion of these effects, so we have not re-stated that information. In this section, our analysis focuses on where and to what extent these identified effects would occur in the action area and seeks to characterize the level of injury and mortality we anticipate

Effects to Desert Tortoises

The Marine Corps predicts that 70 percent (195,797 visitor-days) of the existing use at the Johnson Valley Off-highway Vehicle Management Area would remain in this area and become concentrated into the RPAA and the portions of the OHV area that would remain after the expansion. The Marine Corps anticipates displacement of 30 percent of the current OHV use (83,913 visitor-days[14] per year) to other areas in southern California (DoN 2011c). This would equate to the displacement of 1,053 OHV users to other portions of southern California on an average weekend day during the most active OHV season. We anticipate that the Stoddard Valley OHV Management Area would receive the largest single share of this displacement (40 percent), based on estimates provided by the Marine Corps (DoN 2011c). The El Mirage, Spangler, Rasor, and Jawbone/Dove Springs Off-highway Vehicle Management Areas would receive 20 percent of the estimated displacement. We anticipate that displaced OHV use would affect both the areas of authorized use within these OHV areas and adjacent areas where the use of OHVs off of designated routes is not authorized.

The Marine Corps also predicts levels of authorized and unauthorized use of public and private lands not associated with designated OHV areas. Although it did not provide specific locations where this would occur, we have defined these areas based on surveys of above-average OHV use (Bureau et al. 2005). These areas would receive approximately 9 percent of the predicted displacement. We have assumed an even distribution of this displacement across these areas. For these areas, we have no information on the current level of use, so we cannot quantify the increase in OHV effects that would occur. However, surveys in the late 1990s indicate that observations of OHV related effects (see Environmental Baseline section) were lower within these areas than in the Bureau's designated OHV areas. This indicates that, although OHV use

[14] One visitor-day equates to one person visiting a given area for a 12-hour period or a 12-hour cumulative total from multiple visitors spending shorter periods of time in a given area (i.e., 4 people spending 3 hours each equates to 1 visitor-day).

in these areas is still above average relative to the western Mojave Desert as a whole, the baseline use is likely lower than in designated OHV areas or at least results in fewer effects.

The remaining 30 percent of the predicted displacement would go to areas identified by the Marine Corps where either listed species do not occur, the displacement to these areas would not result in a measureable increase in effects, or the predicted increase would result in effects already adequately analyzed in previous biological opinions. Table 20, developed using information from DoN (2011c), Shiffer-Burdett (2012), and Bureau et al. (2005), provides estimates for the distribution of the displaced visitor-days and the resultant increase in use at each location.

Table 20. projected changes in visitor use resulting from displaced OHVs.

Area	Affected Area (Acres)	Annual Visitor-Days Displaced to this Area	Baseline Annual Visitor-Days in each Area	Baseline Annual Visitor-Days per Acre[15]	Annual Visitor-Days per Acre Increase
Stoddard Valley	91,720	33,985	151,520	1.7	0.4
El Mirage	30,080	5,287	119,591	4.0	0.2
Rasor	36,357	5,287	8,997	0.2	0.1
Spangler Hills	100,480	3,021	1,821	0.02	0.03
Jawbone Canyon/Dove Springs	24,920	3,020	285,916	11.5	0.1
Cal City/Rands	107,520	1,259	Unknown	Unknown	0.01
Edwards Bowl	19,840	1,259	Unknown	Unknown	0.1
East Sierra	8,960	1,259	Unknown	Unknown	0.1
Silver Lakes	23,680	1,259	Unknown	Unknown	0.1
Hinkley	19,840	1,259	Unknown	Unknown	0.1
Coyote Corner	24,960	1,259	Unknown	Unknown	0.1
Other Areas[16]	-	25,759	-	-	-

Given the Marine Corps' predictions, we anticipate that the RPAA and the portions of the Johnson Valley Off-highway Vehicle Management Area remaining after the land acquisition would experience increased OHV-related effects due to 70 percent of the current use concentrating into an OHV area that has decreased in size by 56 percent (i.e., 188,160 acres to 82,802 acres). As discussed in the Environmental Baseline section, much of the historical and current use of the OHV area concentrates in its central, southern, and southwestern portions. Large portions of the southern and southwestern portions of the OHV area would remain open, including popular staging, camping, and riding areas, such as Cougar Buttes, Anderson Lake, and Soggy Lake (DoN 2011b). However, closure of the remainder of the OHV area and closure of some popular areas, such as areas previously used as race routes for the "King of the

[15] Size includes both authorized and unauthorized areas of OHV use in each location.
[16] These areas are those discussed in the Environmental Baseline section that either do not contain listed species, the displacement to these areas would not result in a measureable increase in effects, or the predicted increase would result in effects already adequately analyzed in previous biological opinions

Hammers" race would result in a concentration of use and an increase in OHV-related effects in the RPAA and the remaining portions of the OHV area.

Based on the existing use of the Johnson Valley Off-highway Vehicle Management Area and the Marine Corps predictions regarding displacement, approximately 195,796 visitor-days would remain after the expansion. We have estimated the area of effect to be 141,042 acres (i.e., authorized and unauthorized historical use associated with the RPAA and the remaining portions of the OHV area), which equates to approximately 1.4 annual visitor-days per acre. We do not have baseline information on the current use in these areas, so we cannot quantify how the concentration of OHV use would increase the magnitude of effects. However, as discussed above, a substantial proportion of the current use already concentrates in these areas. Based on this information, we anticipate that concentration of OHV use into these areas will result in a small increase in use from existing levels, which may result in a small increase in the level of injury and mortality to desert tortoises due to the effects of OHV recreation. The biological assessment (DoN 2011a, figure 6-1) illustrates that high levels of disturbance already exist within large areas of the RPAA; these areas overlap, at least to some degree, the areas of estimated lowest density of desert tortoises in this area (DoN 2011a, figure 6-2). The existing low densities likely result mostly from existing recreational use (see also Karl 2010a,b).

As noted in the Environmental Baseline section, the area associated with this concentration of use includes areas of unauthorized use in the southwestern portion of the Ord-Rodman DWMA. This area contains a population that is essential to recovery of the species and is more stable than populations in other portions of the western Mojave Desert. The Marine Corps has proposed to install barriers to control human access along the boundary between the Johnson Valley Off-highway Vehicle Management Area and the Ord-Rodman DWMA, which will reduce the level of direct effects to this population.

Other non-DWMA portions of the affected area include populations that seem to be at a greater risk of losing viability based on the information discussed in the Environmental Baseline section. Although these areas are not essential to recovery of the species, they include areas containing desert tortoises that form a continuous population with animals in the southwestern portion of the Ord-Rodman DWMA. We anticipate that the other populations in the non-DWMA portions of this area will continue to decline in status based on existing sources of mortality. The small level of increased mortality that we identify above will add to this decline, but we anticipate that it will not appreciably accelerate the decline that is already occurring.

Based on baseline visitor use data and predicted levels of OHV displacement (see table above), we anticipate that use of the Stoddard Valley OHV Management Area would increase by 22 percent and result in a visitor use level of 2.1 visitor-days per acre. This increase is likely to result in effects that substantially increase injury and mortality of desert tortoises within the Stoddard Valley Off-highway Vehicle Management Area and the areas of unauthorized use associated with it. However, we cannot quantify the magnitude of this increase or the absolute number of individuals that would be killed or injured because we do not have specific information on current population size, mortality rates, or rates of decline.

The northern portion of the Stoddard Valley Off-highway Vehicle Management Area is contiguous with the northwestern portion of the Ord-Rodman DWMA and both areas contain desert tortoises that comprise a relatively stable population when compared to other portions of the western Mojave Desert. The northwestern portion of this DWMA supports a high-density group of desert tortoises. (Because the center of the Ord-Rodman DWMA contains large areas with low potential to support desert tortoises, the higher densities are found around its periphery.) Desert tortoises that reside adjacent to DWMAs are sometimes important to maintain evolutionary potential; see the previous section of this biological opinion (Effects of Reduced Densities and Population Fragmentation on Population Viability) regarding the required densities and areas needed. In this situation, however, the Ord-Rodman DWMA currently has a density (i.e., 20 per square mile) that is twice that required to maintain population viability and the population in its northwestern portion has historically shown low population declines relative to other areas. In addition, the Marine Corps would install barriers to control vehicular access along portions of the boundary between the Stoddard Valley Off-highway Vehicle Management Area and the Ord-Rodman DWMA and would provide law enforcement officers to reduce the current effects of unauthorized OHV use within the DWMA. These measures would result in a reduction in the current level of effects to this portion of the DWMA and would likely reduce the current mortality rates in this area. Although the increase in OHV effects predicted for the Stoddard Valley Off-highway Vehicle Management Area could affect desert tortoises in that area, we do not anticipate that it would compromise the viability of the desert tortoise population in the northwestern corner of the Ord-Rodman DWMA that is essential to recovery of the species.

Based on the information provided above (see table), we anticipate that the visitor-days in the Rasor, Spangler Hills, and Jawbone Canyon/Dove Springs Off-highway Vehicle Management Areas will increase by 59, 165, and 1 percent, respectively. This will result in a post-displacement increase use for these areas of 0.4, 0.5, and 11.5 annual visitor-days per acre, respectively. None of these OHV sites would affect desert tortoises in areas that are essential to recovery of the species.

Based on this information, the Jawbone Canyon/Dove Springs Off-highway Vehicle Management Areas and the unauthorized use areas associated with them will receive marginal increases in OHV effects in an area that is already heavily used for OHV recreation. These areas contain desert tortoises at low numbers and in low densities. Consequently, the small predicted increase in effects will result in little if any additional injury or mortality of desert tortoises.

The Rasor and Spangler Hills Off-highway Vehicle Management Areas would receive a substantial increase in OHV recreation from baseline levels. However, the current levels of use in these areas are low so the percent increase would result in an annual number of per acre visitor-days that is still relatively low. This use would occur within areas that do not contain habitat with a high potential to support desert tortoises or evidence of their occupancy (i.e., Rasor Off-highway Vehicle Management Area) or in areas that do not support large numbers of desert tortoises (i.e., Spangler Hills). Based on the low amount of post-displacement use and the low number of desert tortoises, we anticipate that OHV displacement will result in a small amount of injury and mortality in these areas.

We do not have information on number and density of desert tortoises in the El Mirage Off-highway Vehicle Management Area; existing information does not provide a clear picture of the status of the desert tortoise in this area. We anticipate that OHV displacement would result in less than a one percent increase in use. Consequently, we anticipate that OHV displacement will result in injury or mortality of few, if any, desert tortoises in this portion of the action area because the increase in OHV use is likely to be minor.

Based on the information provided by the Marine Corps and the assumptions we have described previously, we anticipate that the East Sierra Heavy OHV Use Area will receive an annual increase in use of 0.1 visitor-days per acre. Based on this low level of use and the low density of desert tortoises in this area, OHV displacement is likely to result in the injury and mortality of few, if any, desert tortoises.

We have provided detailed information on populations in and in the vicinity of the Edwards Bowl Heavy OHV Use Area and the Silver Lakes, Hinkley, and Coyote Corner Residential Vehicle Use Areas. Although we do not have information on current population size or density, these areas likely support more desert tortoises relative to other portions of the western Mojave Desert that are important to the recovery of the species. Displacement of OHV recreation to these areas would result in an increase of 0.1 visitor-days per acre in each area, which is unlikely to result in an appreciable change in the existing effects associated with OHV recreation. Consequently, OHV displacement to these areas is likely to result in injury and mortality of few desert tortoises.

In the Environmental Baseline section, we indicated that the California City and Rand Mountains Heavy OHV Use Area was an area that previously contained high densities of desert tortoises, but that precipitous declines in this portion of the desert had likely resulted in low overall densities at present. Based on this information and the very small amount of displacement per acre that we anticipate for this area, OHV displacement is likely to injure or kill few, if any, desert tortoises.

In the preceding analysis of OHV displacement effects, we have assumed that the predicted levels and locations of displaced OHV use provided by the Marine Corps are correct. However, this information is largely conjectural. We included several areas of potential displaced OHV use, based on information in the Bureau’s West Mojave Plan (Bureau et al. 2005), in our analysis that the Marine Corps did not. Although those results are based on survey data that shows them to be areas of historically above-average OHV use, the OHV use patterns in the western Mojave Desert may have changed since the collection of the data for these areas. The anticipated displacement may also create new areas of increased OHV effects that we are unable to predict with the available information. Finally, the available information does not allow for quantification of injury and mortality in any of these areas, so our analysis is largely qualitative and based on the predicted level of increased use and various pieces of information that indicate the importance of desert tortoises in a given area to recovery of the species. Despite these caveats, we based our analysis on the best available information, which provides a reasonable prediction of the effects that are likely to occur due to the proposed action.

Effects to Critical Habitat of the Desert Tortoise

As discussed previously, the Marine Corps' acquisition of the western expansion area would result in OHV displacement to various portions of the western Mojave Desert, including areas of desert tortoise critical habitat. Displacement to the Edwards Bowl Heavy OHV Use Area and the Silver Lakes, Hinkley, and Coyote Corner Residential Vehicle Impact Areas would result in effects to desert tortoise critical habitat. In addition, unauthorized use adjacent to the Stoddard Valley, Spangler Hills, and Johnson Valley Off-highway Vehicle Management Areas would also affect critical habitat. In the previous section, we provided information on the anticipated level of increased use that these areas would experience under the proposed action. Activities within these areas would affect the Fremont-Kramer, Superior-Cronese, and Ord-Rodman Critical Habitat Units.

Based on this information, we anticipate that displaced recreation would affect large areas within the Superior-Cronese and Fremont-Kramer Critical Habitat Units, but the intensity of effects across these areas would be low because the amount of recreation displaced to these areas would be small or would result in a marginal increase over existing use. Displaced recreation is likely to affect smaller areas of the Ord-Rodman Critical Habitat Unit, but the level of increased use is likely to be greater. However, we anticipate that vehicle barriers and law enforcement officers, which the Marine Corps will fund, will control much of the unauthorized use within the critical habitat unit and reduce effects to the primary constituent elements.

We listed the primary constituent elements of critical habitat in the Status of Critical Habitat section of this biological opinion. We conducted the following analysis by generally using the primary constituent elements as the basis for our discussion.

The first primary constituent element (sufficient space to support viable populations within each of the six recovery units and to provide for movement, dispersal, and gene flow) addresses the issue of maintenance of evolutionary potential. We discussed this issue previously in the Effects of Reduced Densities and Population Fragmentation on Population Viability section of this biological opinion.

As discussed in the Status of Critical Habitat section, the Superior-Cronese and Fremont-Kramer Critical Habitat Units, which are contiguous, have a combined size of 2,007 square miles and contain 1,915 square miles of habitat with a high potential to support desert tortoises. The Ord-Rodman Critical Habitat Unit is 395 square miles in size and contains approximately 288 square miles of habitat with a high potential to support desert tortoises. Although the Ord-Rodman unit is smaller than needed to maintain evolutionary potential and long-term population persistence at a minimum density of 10 per square mile, we have previously indicated that the Ord-Rodman DWMA, which encompasses this critical habitat unit, has densities of almost 20 larger desert tortoises per square mile. However, its current population size is smaller than that recommended for maintenance of long-term population persistence.

Displacement of OHV recreation has the potential to remove habitat from small, localized areas within the critical habitat units. However, it would not appreciably reduce the space available to desert tortoises. We have reached this conclusion because the increase in use in the Superior-

Cronese and Fremont-Kramer Critical Habitat Units would be small and would not completely remove habitat that can support desert tortoises from large areas. Within the Ord-Rodman Critical Habitat Unit, the anticipated area of effects would be small and the use of vehicle barriers and law enforcement is likely to result in a level of effects that would not completely remove habitat from large areas. Consequently, displaced recreation is unlikely to reduce space available to desert tortoises within these critical habitat units to a point that they cannot maintain viable populations or provide for movement, dispersal, and gene flow.

We have combined a discussion of the second and fifth primary constituent elements (sufficient quality and quantity of forage species and the proper substrate conditions to provide for the growth of these species; and sufficient vegetation for shelter from temperature extremes and predators) because they both deal with the plant communities that support desert tortoises. Additionally, the effects are similar in that the disturbance or removal of annual and perennial plants often occurs as a result of the same activities.

As discussed in the 5-year review, which we have incorporated by reference, OHV activity can destroy shrubs, reduce the prevalence of annual forage plants, exacerbate erosion, and spread non-native plant species. These changes would adversely affect the quality and quantity of forage species, the proper substrate conditions to provide for the growth of these species, and vegetation for shelter from temperature extremes and predators. Disturbance or removal of annual plants and shrubs reduces the ability of the desert tortoise to find food and shelter. Without a diverse assemblage of plant species upon which to forage, desert tortoises cannot maintain an appropriate nutritive balance (Oftedal 2005); without the cover of shrubs, desert tortoises are more vulnerable to predators and the temperature extremes that are common in the desert.

These effects are likely to occur within the action area. However, given the low level of displacement predicted and the conservation measures proposed by the Marine Corps (i.e., vehicle barriers and law enforcement in the Ord-Rodman Critical Habitat Unit), the direct effects are unlikely to eliminate forage species or vegetation cover from a sufficient portion of the critical habitat unit to compromise the conservation value or function of the critical habitat units.

Disturbance associated with OHV use can exacerbate the spread of invasive non-native plant species. OHVs can import weeds from outside of critical habitat on the vehicles and on the trailers that transport them. These weeds initially colonize the areas where they are dropped and then spread to adjacent areas by wind, storm flows, and transport by other OHVs; therefore, invasive weeds can degrade habitat that is distant from the point of introduction.

As discussed in the 5-year review, OHV recreation can accelerate the spread of invasive non-native plant species, which in turn, can compete with the native plant species that the desert tortoise requires for nutrients and shelter. Non-native plants can also increase the ability of the desert to carry wild fires. The plant species upon which desert tortoises depend are not adapted to fire; consequently, fires could severely alter the plant community structure by removing species upon which the desert tortoise is dependent and facilitating the spread of fire-tolerant taxa.

Of all of the threats to critical habitat posed by displaced OHV use, increasing the spread of non-native invasive plants has the potential to compromise the conservation role and function of critical habitat. The areas that would receive displaced OHV recreation because of the proposed action currently experience above-average levels of OHV use. Consequently, these areas already experience the effects of non-native plants. Additionally, because displaced vehicles would be coming from the Johnson Valley Off-highway Vehicle Management Area, they would be less likely to transport new species of weeds. Given the small amount of displaced recreation that critical habitat would receive and the measures that the Marine Corps has proposed to control human access within the Ord-Rodman Critical Habitat Unit, we do not anticipate that the proposed action would increase the prevalence of non-native plants in critical habitat to an appreciable degree.

The third and fourth primary constituent elements are suitable substrates for burrowing, nesting, and overwintering and burrows, caliche caves, and other shelter sites. We have combined a discussion of these two primary constituent elements because they both deal with shelter sites; additionally, the potential effects to these primary constituent elements are similar in that the disturbance or removal of shelter sites or the substrates in which they are constructed often occurs as a result of the same activities.

As discussed in the 5-year review, OHV recreation results in collapsing of burrows, soil erosion, and compaction. All of these effects could remove existing cover sites and make the areas unsuitable for the construction of new ones.

Although displaced recreation is likely to affect these primary constituent elements, it is unlikely to result in loss of shelter sites or loss of suitable substrates for shelter sites across large areas of the critical habitat units. Given the low level of displacement predicted and the conservation measures proposed by the Marine Corps (within the Ord-Rodman Critical Habitat Unit), increases in the current level of effects to these primary constituent elements would be small. Consequently, we do not anticipate that the proposed action would compromise the conservation value or function of the critical habitat units.

The displacement of OHV recreation will exacerbate the effects of unauthorized OHV recreation in the Superior-Cronese and Fremont-Kramer Critical Habitat Units in relation to the final primary constituent element, habitat protected from disturbance and human-caused mortality. Given the low level of displacement to these areas, unauthorized recreation that results in disturbance or mortality would not increase by a substantial amount. Within the Ord-Rodman Critical Habitat Unit, we also anticipate some small increase in human-caused disturbance and mortality, but this increase would be small because the Marine Corps has proposed to increase law enforcement and install vehicle barriers that would control human access. Consequently, displaced recreation would not reduce the amount of habitat protected from disturbances or human-caused mortality to a degree that would compromise the conservation value or function of these critical habitat units.

In summary, displacement of OHV recreation because of the MCAGCC expansion is likely to adversely affect all of the primary constituent elements of critical habitat. However, these effects would be minimal in the Superior-Cronese and Fremont-Kramer Critical Habitat Units because of the small increase above current OHV use. Although the predicted level of displacement to the Ord-Rodman Critical Habitat is greater, we anticipate that the conservation measures proposed by the Marine Corps will control human use in these areas and substantially reduce adverse effects to the primary constituent elements.

Effects of Conservation Actions

SUAs and Management of Adjacent Public Lands

The Marine Corps will establish five Category 1 special use areas within the expansion areas and portions of the existing installation adjacent to the Ord-Rodman DWMA. These areas will be off limits to training that requires cross-country travel and ground disturbance and will have a combined size of 25,844 acres. In addition, the Marine Corps will work with the Bureau to change land management designations of two areas adjacent to the Ord-Rodman DWMA to provide for increased conservation of the desert tortoise. These areas encompass approximately 14,214 acres that are contiguous with the Ord-Rodman DWMA and the SUA in the northern end of the western expansion area (Darst 2012). Several of the areas discussed above overlap areas of relatively high desert tortoise abundance (i.e., Sunshine Peak Training Area, northern end of Johnson Valley, portions of the southern expansion area).

These changes would result in a reduction in threats and mortality sources for desert tortoises in the newly protected locations. The proposed SUAs in the Sunshine Peak Training Area currently experience threats associated with military training. In addition, unrestricted OHV recreation currently occurs in the proposed SUAs in the western expansion area and one of the areas for which the Bureau would increase conservation. These areas are all currently open to unrestricted cross-country vehicle travel that can kill or injure desert tortoises and degrade desert tortoise habitat. The Marine Corps proposed action would reduce threats and mortality sources in these areas.

The Marine Corps proposed SUAs and the Bureau's proposed land use changes would increase the amount of conserved land that is contiguous with the Ord-Rodman DWMA by 31,980 acres. It would also increase the amount of conserved land associated with the Cleghorn Lakes Wilderness by 2,935 acres.

As we have discussed previously, at a minimum density of 10 individuals per square mile, desert tortoise populations require at least 500 square miles of area to maintain evolutionary potential. To protect against adverse demographic effects of small population size and to maintain the likelihood of population persistence, a desert tortoise population must contain at least 10,000 adults, which would require 1,000 square miles of area at the minimum viable population density of 10 adults per square mile.

Currently, the Ord-Rodman DWMA covers approximately 432 square miles, but contains some habitat with a low potential to support desert tortoises. The area contiguous to the Ord-Rodman DWMA containing desert tortoises in this region is much larger. This larger aggregation of desert tortoises currently allows for maintenance of population persistence within the DWMA despite its small size and declining population trend. However, our recovery strategy cannot rely on areas outside of the DWMA boundaries because they contain land uses that are not conducive to reversing declining population trends.

Although we have determined that the density of desert tortoises within the DWMA currently indicates a viable population, declines in the number of individuals could eventually decrease density to a point where the population cannot maintain the threshold for viability within the boundaries of the existing DWMA. The Marine Corps' proposal would increase the amount of conservation land associated with the Ord-Rodman DWMA to approximately 482 square miles. This increase would provide more area for achievement of population viability thresholds. In addition, the size of the protected lands would be close to that required for maintenance of evolutionary potential as recommended in the original recovery plan (Service 1994). In addition, the proposed SUA in the southern expansion area would increase the size of the protected lands adjacent to the Cleghorn Lakes Wilderness Area by approximately 4.6 square miles, which would increase the potential for long-term persistence of desert tortoises in these areas.

The western SUA in the western expansion area currently supports low densities of desert tortoises and is highly disturbed, most likely by OHV use. It is not adjacent to other lands being managed for desert tortoises. For these reasons, this area does not have substantial immediate value as a conservation area for desert tortoises. This area could assist in achieving recovery goals as a site to test various restoration techniques and conduct specific recovery-related experiments.

In summary, the proposed SUAs and Bureau's management changes would reduce threats to desert tortoises within several portions of the action area, which is likely to increase the potential for these populations to maintain or achieve stability. This increase in conservation area would offset some of the unavoidable effects associated with the proposed action. In addition, increasing the functional size of the Ord-Rodman DWMA would aid in the maintenance of population viability there by increasing the area across which desert tortoises are conserved. This measure will better ensure our ability to maintain population viability in the event that desert tortoise declines reduce densities further.

Head-starting and Population Augmentation

The Marine Corps will continue to conduct research into desert tortoise head-starting and will use desert tortoises produced by this program in population augmentation trials in some SUAs. These experiments are likely to provide important information for future recovery efforts that would use head-started animals for augmentation of depleted populations. It may also increase population growth and survivorship and decrease the time needed to recover populations in the locations where head-started animals are released. No information is currently available with which to analyze the effectiveness of population augmentation. The following information from (Henen 2012f) provides a summary of an assessment on how the proposed head-starting and population augmentation could affect desert tortoise populations. Henen (2012e) performed this analysis using information from Turner et al. (1987) and data on the effectiveness of head starting desert tortoises.

> Current growth and survivorship data indicate that head-starting may increase population growth rates, and decrease population recovery times, significantly. Compared to 1.9 percent annual population increases for model or life table for Goffs, head-starting would improve rates of annual increase from 2.9 to 7.3 percent per year, depending on how much protection is provided and growth rates are enhanced via head-starting. For these same head-start actions, the time required for a population to double is decreased from 36 years for the Goffs model, to 24 and 10 years, respectively.

Henen's projections may be overly optimistic. Reed et al. (2009) used the life table in Turner et al. (1987) to assess what management actions would be most effective in promoting recovery of the desert tortoise. Reed et al. (2009) found in their model that releasing adults had a greater effect on meeting target population numbers than did releasing juveniles and that "annual head-starting of 7-year old (presumably near raven-proof) animals is unlikely to be detectable at the population level after 5 years." Reed et al.'s comments regarding "near raven-proof' desert tortoises raises an important concern with head-starting; that is, until the threats that have caused the declines in the first place are defined and ameliorated, releasing additional desert tortoises into the wild is merely a stop gap measure.

In addition, Averill-Murray (2012) calculated that a head–start program would need to collect eggs from a minimum of 40 females annually for 20 years (15 cohorts including the initial 5 years to raise the first cohort) to produce 384 adult desert tortoises. Averill-Murray based his calculations on information from a variety of sources and assumed optimistic assumptions about survival, growth, and sexual maturity; that is, the annual cohort of 26 individuals assumes high survival rates and rates of growth that may not occur in all years. Averill-Murray also did not account for variation (and decreases) in growth rates observed in existing head-starting facilities that suggest over-crowding may alter the optimistic results described herein. To evaluate fully the net benefit of a head-starting program, one would also have to take into account desert tortoises that are not born into the wild because the collected adult females have laid their eggs in captivity. Assuming that 2 percent of eggs that would have been laid in the wild reach adulthood, desert tortoises would have produced approximately 29 adult animals over the same period absent the head-starting, for a net benefit of 355 adults.

Augmentation of desert tortoise populations through head-starting is still in a highly experimental stage. Although head-starting has the potential to increase the number of animals more rapidly than a wild population can, we have not resolved all issues related to its successful implementation and certainly have not removed threats from the environment that cause current declines. Additionally, several other facilities are pursuing research on head-starting. For these reasons, we do not consider the use of head-starting to be the most effective means of attempting to offset the long-term effects of the proposed expansion of MCAGCC.

Although population augmentation using head-started desert tortoises is experimental, the potential for decreasing the recovery times for desert tortoise populations could greatly increase the potential for recovery where it is applied.

Law Enforcement

The Marine Corps will use conservation law enforcement officers on the existing installation and expansion areas to enforce resource protections and ensure the integrity of the SUAs. In addition, it will work with the Bureau to increase the number of law enforcement officers present in the Ord-Rodman DWMA. We anticipate the current level of law enforcement on the existing installation will continue to provide a benefit in reducing effects to desert tortoises. The Marine Corps' proposal regarding law enforcement within the expansion areas will increase the current level of conservation protection provided by Bureau's rangers. Within the newly established SUAs, law enforcement will provide increased conservation benefits for the desert tortoise by ensuring the integrity of these areas . Conservation law enforcement within the Ord-Rodman DWMA will also result in benefits to desert tortoise conservation by reducing the amount of unauthorized human-caused disturbance (i.e., trespass OHV activity). We have no information with which to analyze quantitatively the decrease in injury and mortality of desert tortoises, the change in population trends, or the decrease in habitat disturbance that may occur due to implementation of this action.

Control of Human Access in the Ord-Rodman DWMA

The Marine Corps has proposed to implement actions in coordination with the Bureau to control human access into the Ord-Rodman DWMA and specific SUAs through installation of barriers and signs designed to reduce the level of adverse human effects to desert tortoise habitat. Although the location of private lands may prevent the installation of barriers in some limited areas, we anticipate that these actions will reduce the level of anthropogenic disturbance in the Ord-Rodman DWMA and reduce effects from trespass OHVs. It will also reduce or eliminate the effects of military training within SUAs. In addition, protection of these areas may allow restoration and regeneration of degraded habitats that would allow them to support higher densities of desert tortoises. Because we do not know the location or extent where all of these areas are needed or would be implemented, we cannot quantify the magnitude of their beneficial effects. However, we anticipate that in combination with the proposed law enforcement, proposed SUAs, and changes in Bureau management of some lands adjacent to the Ord-Rodman DWMA, this action will improve the potential for ensuring long-term population viability within the DWMA and reduce effects to desert tortoises within the action area.

Summary of Effects to the Desert Tortoise

Military activities will remove or heavily degrade up to 28,790 acres of desert tortoise habitat and moderately disturb an additional 96,475 acres within the expanded installation. These activities will also injure and kill desert tortoises. Although the Marine Corps would translocate approximately 949 larger desert tortoises (85.9 percent of the larger individuals) and 696 smaller animals (13.5 percent of the smaller animals) from the expansion areas, we anticipate military activities would kill approximately 662 larger desert tortoises in areas identified for heavy and moderate disturbance. We anticipate that military activities will also result in a decline in the current population of 4,098 smaller desert tortoises. This decline would result from direct mortality of juveniles or a loss of reproductive potential caused by mortality of adult females.

We also anticipate the mortality of a small number of additional individuals in other portions of the expanded installation.

MCAGCC and the proposed expansion areas currently contain an estimated population of 12,809 larger desert tortoises. Through its range-wide monitoring program, which only covers a subset of the occupied habitat across the species' range, the Service estimates that 96,140 adult desert tortoises reside in the portions of the range outside of MCAGCC and the expansion areas (Service 2010c). Of this total, the three DWMAs in the Western Mojave Recovery Unit contain 20,760 larger individuals (Service 2010c). Although we have no population estimates to cover other occupied habitat across the species' range, the Environmental Baseline section identifies additional areas within the recovery unit where desert tortoises occur. Similar occupied areas with no population estimates exist in other recovery units. Consequently, the estimated adult mortality associated with the proposed action comprises a small percentage of the adult population in the Western Mojave Recovery Unit and range wide. Given our admitted overestimate in the characterization of mortality, the actual loss of individuals will likely comprise an even smaller percentage. Although we have no range-wide estimates of the number of smaller desert tortoises, given the number of larger animals documented through range-wide monitoring and the information we have discussed regarding yearly female reproductive output, the loss of smaller desert tortoises associated with the proposed action would comprise a very small percentage of the recovery unit and range-wide populations.

We anticipate that desert tortoises will continue to persist in all but the most heavily disturbed areas of the existing installation. Although, desert tortoises could be lost from areas identified for heavy disturbance, these areas are localized relative within MCAGCC and the action area as a whole. Our analysis of population fragmentation indicates that the proposed action is unlikely to result in extirpation of desert tortoises from the expanded installation. We have indicated that these losses would not be of sufficient magnitude to result in genetic deterioration, demographic stochasticity, or other effects that could compromise population viability over a large area. Even if military activities resulted in the loss of desert tortoises from all 28,790 acres identified for heavy disturbance, this loss would not appreciably affect the distribution of the species given the extent of occupied habitat across the species' range.

We have reached this conclusion because the 28,790 acres that would be heavily disturbed comprise approximately 0.05 percent of the modeled desert tortoise habitat in the western Mojave Desert region. (See the calculations of modeled habitat and impervious surfaces in the Status of the Desert Tortoise section of this biological opinion.) Consequently, even if we assumed that training would eliminate all desert tortoises from within this area, the loss of this area would comprise a minor portion of the western Mojave Desert. Training would not eliminate desert tortoises from most of the heavily disturbed areas, the 28,790 acres are disbursed across a large area, and the range-wide modeled habitat of the species covers approximately 16,927,194 acres; again, see calculations in the Status of the Desert Tortoise section of this biological opinion. For these reasons, the proposed action would clearly not appreciably reduce the distribution of the desert tortoise.

We anticipate that the Marine Corps will handle approximately 2,186 desert tortoises during clearance surveys and post-translocation monitoring activities. Although we anticipate that this is an overestimate, it likely represents a reasonable worst-case scenario. Many of these animals will be part of post-translocation monitoring for up to 30 years and would be handled multiple times over this period. We have indicated that this handling is likely to kill few, if any, desert tortoises. Consequently, post-translocation mortality is unlikely to be the result of translocation and translocation is unlikely to increase the overall mortality rate of the population.

OHV displacement would result in injury and mortality of desert tortoises in several portions of the action area. With the exception of the Stoddard Valley Off-highway Vehicle Management Area, RPAA, the remaining portions of the Johnson Valley Off-highway Vehicle Management Area, and the areas of unauthorized OHV use associated with them, the amount of unauthorized use resulting from displacement is likely to be minor; consequently, we expect that this use would injure or kill few desert tortoises. In the Johnson Valley OHV Management Area, RPAA, and their associated areas of unauthorized use, we anticipate a greater amount of injury and mortality, but this would not create a substantial increase in the existing mortality rate in these areas. In the Stoddard Valley OHV Off-highway Vehicle Management Area and its associated areas of unauthorized use, we anticipate that mortality rates will increase substantially due to the proposed action. We cannot equate this increase to a quantifiable number of individuals. We anticipate that some of the injury and mortality caused by displacement of OHV recreation will occur in the Ord-Rodman DWMA, but barriers and increased law enforcement proposed by the Marine Corps would substantially reduce this from what would occur inside the designated OHV area.

Because of a lack of sufficient information, we cannot quantify the mortality associated with OHV displacement. However, all locations that would receive displaced OHV recreation already experience injury and mortality associated with OHV use. With the exception of the Stoddard Valley OHV Management Area and the areas of unauthorized OHV use associated with it, we do not anticipate that the existing mortality rate would substantially increase because the amount of visitor use would not substantially increase. Consequently, OHV displacement in these areas is unlikely to have an appreciable additive effect on desert tortoise abundance, distribution, or reproduction beyond what these areas currently experience. The increased mortality rate in the Stoddard Valley Off-highway Vehicle Management Area and its associated areas of unauthorized use would be unlikely to reduce appreciably the distribution of desert tortoises on a range-wide basis because we expect that they would persist in this area, albeit at lower densities. We expect that the range-wide number of desert tortoises and their reproduction would decrease by a minor amount because of the increase in mortality rates; these reductions are unlikely to diminish appreciably the ability of the species to survive and recover because this area is not crucial to the long-term conservation of the species.

Preservation of connectivity between areas of protected habitat (i.e., DWMAs) is needed for recovery to address the potential effects of climate change and to preserve long-term gene flow and genetic variability (Service 2012b). Our analysis shows that the proposed expansion would affect an identified linkage area that connects the Ord-Rodman DWMA to Joshua Tree National Park. However, we have also concluded that desert tortoises would continue to occupy this linkage under the proposed training scenario.

In summary, the proposed action would undeniably affect desert tortoises on MCAGCC and the proposed expansion areas through the injury and mortality of a large number of individuals; most of the deaths would result from smaller desert tortoises being missed during translocation from areas of moderate and heavy disturbance and being killed during training. We also expect that a relatively small number of desert tortoises are likely to be killed or injured outside of these areas by OHV use that would be displaced from the Johnson Valley Off-highway Vehicle Management Area. Training would likely extirpate desert tortoises from localized areas within the expanded boundaries of MCAGCC; their densities would decrease in some areas of the expanded base and within the Johnson Valley and Stoddard Off-highway Vehicle Management Areas. The Marine Corps' proposes to translocate desert tortoises from the areas to be used for moderate- and high-intensity training, to implement general protective measures during construction, training and translocation, and relocate the MEB in the southern expansion area to an area of lower density to reduce the number of desert tortoises that are likely to be killed by training. For these reasons, we anticipate under the proposed action would not substantially affect the distribution, abundance, or reproduction of the desert tortoise.

Effects on the Recovery of the Desert Tortoise

Above, we have considered how injury and mortality would affect current recovery unit and range-wide distribution, abundance, and reproduction of the species. We must also consider how the proposed action would affect the recovery potential of the desert tortoise. To achieve recovery, each recovery unit must contain well distributed, self-sustaining populations across a sufficient amount of protected habitat to maintain long-term population viability and persistence (Service 2011e). Based on the information we have discussed in this biological opinion, the current amount of protected habitat (i.e., DWMAs and other Tortoise Conservation Areas) in the Western Mojave Recovery Unit is sufficient to achieve these requirements if declines do not reduce each DWMA's densities and population size below that needed to maintain population viability and long-term population persistence.

Although the Ord-Rodman DWMA is small, its current density is almost twice that needed for population viability. The Superior-Cronese and Fremont-Kramer DWMAs are larger than that recommended for long-term population persistence. Although the density within these two units is below that identified for population viability (i.e., 10 adults per square mile), their combined population size (i.e., 14,307 adults, Service 2010c) is higher than that identified for maintenance of long-term population persistence (Service 1994). In addition, all of these DWMAs are not isolated from populations in contiguous areas, which functionally increases the area across which desert tortoises are distributed and currently helps to maintain viability associated with the DWMAs.

Clearly, the Marine Corps' proposed action is likely to alter existing conditions and affect desert tortoises in the action area, including portions of the DWMAs identified above. Displaced OHV use is likely to increase the amount of OHV disturbance in all of these DWMAs, but we anticipate that this effect will be minor because either the predicted displacement to these areas is small and/or the Marine Corps will implement measures to control illegal OHV use. We conclude that these minor effects would not reduce population size and density across a sufficient area to compromise population viability or persistence within the identified DWMAs.

The remaining non-DWMA portions of the action area are not essential to the recovery of the desert tortoise; loss of individuals and removal of habitat within these areas is unlikely to compromise our recovery strategy. In addition, the SUAs and additional protected areas identified by the Marine Corps would functionally increase the protected areas associated with the Ord-Rodman DWMA and bring it closer the geographic size needed for long-term viability in the event that populations in the contiguous areas are lost. The measures proposed to control human access would also reduce threats within the Ord-Rodman DWMA, which may improve its resiliency.

Preservation of connectivity between areas of protected habitat (i.e., DWMAs) is needed for recovery to address the potential effects of climate change and to preserve long-term gene flow and genetic variability (Service 2012b). Our analysis shows that the proposed expansion would affect an identified linkage area that connects the Ord-Rodman DWMA to Joshua Tree National Park. However, we have also concluded that desert tortoises would continue to occupy this linkage under the proposed training scenario.

In summary, the proposed action would have undeniable effects to desert tortoises on MCAGCC and the proposed expansion areas through the injury and mortality of a large number of individuals. However, some portion of this injury and mortality would occur regardless of the proposed action under the authorization of other biological opinions. Even ignoring this fact, the injury and mortality we anticipate under the proposed action would not substantially affect the distribution, abundance, or reproduction of the species. In addition, we have concluded that the proposed action would not compromise population viability within areas that are important to the recovery strategy for the species (i.e., DWMAs and linkage areas).

Summary of Effects to Critical Habitat of the Desert Tortoise

The proposed action would result in effects to critical habitat associated with OHV displacement and translocation of desert tortoises. We have concluded that OHV displacement would occur in the Ord-Rodman, Fremont-Kramer, and Superior-Cronese Critical Habitat Units and would affect each of the primary constituent elements. However, these effects would be minimal because the increase above current OHV use would be low in most areas; in the Ord-Rodman Critical Habitat Unit the Marine Corps has proposed measures that would control human use in this area. We have also concluded that effects to critical habitat associated with construction of repatriation pens for translocation research would be minimal due to the small amount of disturbance and that the translocation of and translocated desert tortoises themselves would have little, if any, effect on the primary constituent elements of critical habitat. Consequently, the proposed action will not reduce the conservation role and function of critical habitat. To some extent, the placement of barriers to control OHV use and the increase in law enforcement in the Ord-Rodman Critical Habitat Unit will enhance the management of this critical habitat unit and improve its function.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future

Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

We consider actions that are reasonably certain to occur as actions that have received approval from municipal, State, or tribal governments, and have no pending discretionary approvals left. We contacted local agencies whose jurisdictions overlapped the areas that the Marine Corps identified as likely to experience OHV use displaced from the Johnson Valley Off-highway Vehicle Management Area. These local agencies included the counties of Kern, San Bernardino, Los Angeles, and Inyo, the City of California City, and the California State Lands Commission. After receiving information on projects from these agencies, we compared the location of the proposed action to determine whether it overlapped our action area or lands managed by the Bureau. We have not included any discussion of the effects of actions that are likely to occur on public lands because the Bureau is required to consult on those action pursuant to section 7(a)(2) of the Act. This process resulted in our determination that only two non-federal projects in the action area met the criteria to be included in this analysis.

In San Bernardino County, the planning commission has conditionally approved a 26-acre solar project near El Mirage. In general, we do not consider the El Mirage area to be important for the long-term conservation of the desert tortoise; it is outside the boundaries of critical habitat and DWMAs and, in many areas (outside of the El Mirage Off-highway Vehicle Management Area), disturbed by unauthorized vehicular recreation.

We expect that few, if any, desert tortoises would be affected by that project because that area has historically been subjected to large amounts of human disturbance. If desert tortoises are present on the site, we would recommend that the project proponent apply for an incidental take permit, pursuant to section 10(a)(1)(B) of the Act; in general, the County of San Bernardino contacts us if its reviews under the California Environmental Quality Act indicate that desert tortoises are present on a project site.

Based on our screening of projects in the action area and the analysis in the previous two paragraphs, we do not expect that the cumulative effects associated with the proposed expansion of the Marine Corps' base are likely to have a measurable effect on the desert tortoise. The project at El Mirage will not affect critical habitat because it is located approximately 7 miles to the south of the southern boundary of the Fremont-Kramer Critical Habitat Unit.

CONCLUSION

Desert Tortoise

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. The Marine Corps would implement numerous measures to reduce the level of injury and mortality associated with the proposed action.

2. Relative to the number of desert tortoises that occur in the Western Mojave Recovery Unit and range wide, the proposed action would injure or kill a small portion of the population.

3. Relative to the amount of occupied desert tortoise habitat in the Western Mojave Recovery Unit and range wide, the proposed action would result in complete loss of desert tortoises from only small, localized areas but would not appreciably affect distribution of the species.

4. Population and habitat fragmentation associated with the proposed action would not result in loss of desert tortoises from large areas.

5. Adverse effects in areas that are important to desert tortoise recovery (i.e., DWMAs and linkage areas) would be minor and would not result in loss of population viability.

6. The majority of injury and mortality associated with the proposed action would occur in areas that are not important to recovery of the species.

7. The injury and mortality of desert tortoises within MCAGCC, the western expansion area, and most Bureau-designated OHV areas would not result in an appreciable change in what these areas currently experience under existing land uses that we have previously analyzed in other biological opinions.

8. The Marine Corps' funding of vehicle barriers, law enforcement, and signs in the Ord-Rodman DWMA will improve protection of this area and reduce threats to its important populations, which, along with its funding of monitoring, will improve our ability to recover the desert tortoise.

9. The Marine Corps' proposed SUAs and the proposed changes in the Bureau's land use classification for areas adjacent to the Ord-Rodman DWMA will functionally increase the size of the protected areas associated with this DWMA and improve the long-term potential for maintaining population viability there. These changes in land use will improve our ability to recover the desert tortoise.

After reviewing the status of critical habitat of the desert tortoise, 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 destroy or adversely modify critical habitat of the desert tortoise. We have reached this conclusion because:

1. The small amount of anticipated OHV displacement that would occur in critical habitat would result in a minimal increase in effects to the primary constituent elements.

2. The disturbance of habitat containing the primary constituent elements associated with the proposed translocation strategy would be minimal.

3. The Marine Corps' funding of vehicle barriers and law enforcement in the Ord-Rodman Critical Habitat Unit will improve protection of the primary constituent elements.

INCIDENTAL TAKE STATEMENT

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

The measures described in this document are non-discretionary. The Marine Corps has a continuing duty to regulate the activities covered by the incidental take statement in the biological opinion. If the Marine Corps fails to implement the terms and conditions of this incidental take statement, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, the Marine Corps must report the progress of its action and its impact on the desert tortoise to the Service as specified in the incidental take statement [50 *Code of Federal Regulations* 402.14(i)(3)].

Overview

The proposed action will likely result in the take of desert tortoises associated with authorized and unauthorized OHV use by recreationists displaced from the Johnson Valley Off-highway Vehicle Management Area; increased use in the remaining portions of the Johnson Valley Off-highway Vehicle Management Area is likely to increase the amount or extent of take above its current levels. The translocation of desert tortoises from the western expansion areas and training and preparation work will result in take. In the following sections, we will address each of these specific circumstances.

Displaced Use within the Areas Authorized for OHV Recreation

We anticipate that OHV use displaced from the Johnson Valley Off-highway Vehicle Management Area is likely to increase the level of vehicular recreation within the areas of the western Mojave Desert that have been authorized for such use. Specifically, we expect that the Bureau’s remaining OHV management areas (i.e., Stoddard Valley, Rasor, El Mirage, Dove Springs, Jawbone Canyon, and the remaining portion of Johnson Valley) and its route network in the western Mojave Desert are likely to experience an increase in use. Because of their proximity to the western expansion area, the Stoddard Valley Off-highway Vehicle Management Area and the remaining portion of Johnson Valley are likely to receive higher levels of use than the other OHV areas and the route network. Because of the increased levels of use, we expect that the amount of take of desert tortoises (in the form of injury or mortality) is likely to increase in these areas to a degree commensurate with the increase in use.

We are not providing an exemption, in this biological opinion, from the prohibitions against take that are contained in section 9 of the Endangered Species Act for this take. The Service and Bureau have completed consultation on several of the off-highway vehicle management areas and the route network; these biological opinions have adequately evaluated the effects of the expected use of these areas and exempted the take associated with such activities.

Displaced Use within the Areas Not Authorized for OHV Recreation

The exemption for incidental take statement applies only to lawful activities. Because unauthorized OHV recreation is not a legal activity, we cannot provide an exemption to the prohibition against take for this activity.

Translocation of Desert Tortoises from the Expansion Areas

We anticipate that the translocation of desert tortoises from the heavy and moderate disturbance areas of the western expansion area will result in the take of approximately 949 larger and 696 smaller individuals. Most of these animals are likely to be taken in the form of capture when they are collected and moved to pens or release sites. We anticipate that a few desert tortoises may be killed or injured during translocation activities.

Because of all of the variables involved, which we have discussed in depth in the biological opinion, the numbers we have provided in the previous paragraph are estimates. Translocation of desert tortoises from the heavy and moderate disturbance areas of the western expansion area will reduce the number of desert tortoises that are directly killed or injured by training; consequently, we are not basing re-initiation of formal consultation on the number of individuals that may be removed from these areas. Additionally, we have no means of predicting how many desert tortoises are likely to be killed or injured during translocation activities; based on previous translocations, we anticipate that few individuals are likely to be killed or injured during this process. For these reasons, we will use the terms and conditions of this biological opinion to establish appropriate thresholds for re-initiation of consultation.

The Service will evaluate the issuance of a recovery permit, under the auspices of section 10(a)(1)(A) of the Endangered Species Act, for the take of desert tortoises that would be used for controls and residents for monitoring the translocated animals. After translocation, all testing and other work on translocated desert tortoises would be transferred to that recovery permit. The Ventura Fish and Wildlife Office and Desert Tortoise Recovery Office will work closely with the Marine Corps and permittee to resolve any confusion over which legal authority (section 7(a)(2) or 10(a)(1)(A) of the Endangered Species Act) is involved.

Training and Preparation Work within the Expanded MCAGCC

We anticipate that desert tortoises will be taken in the form of capture, injury, and mortality during training and the preparation of training sites within the entire base (i.e., existing boundaries and the expansion areas). We previously exempted take associated with training, the preparation of training sites, and construction and maintenance of infrastructure (up to 150 acres per year) within the existing boundaries of MCAGCC (Service 2002; 1-8-99-F-41). This incidental take statement supersedes the 2002 biological opinion for training and the preparation of training sites. For all other aspects of base operations that are not associated with the proposed action in this biological opinion (e.g., the construction and maintenance of infrastructure), the take exemptions from the 2002 biological opinion (1-8-99-F41) remain in effect.

We anticipate that desert tortoises will be taken in the form of capture when they are moved from harm’s way during training and the preparation of training sites within the entire base. As we discussed in this biological opinion, moving desert tortoises from harm’s way during training and the preparation of training sites is unlikely to kill or injure these individuals; it is a protective measure that removes the animal from danger. For this reason, we are not establishing any threshold for re-initiation of formal consultation for this form of take.

We anticipate that desert tortoises will be taken in the form of injury or mortality during training and the preparation of training sites within the entire base. Based on our analysis in this biological opinion, we estimate that between 572 and 662 larger and 2,919 and 4,098 smaller desert tortoises are likely to be killed or injured in areas identified for heavy and moderate disturbance. We derived this number from the total of the larger and smaller desert tortoises that we anticipate will remain within the heavily and moderately disturbed areas within the entire base after translocation (which would occur only in the expansion areas). In addition, we anticipate that a small amount of injury and mortality will occur when desert tortoises in the surrounding areas periodically move into the heavy and moderate disturbance areas after clearance surveys. We also anticipate that military activities will injure or kill a small number of desert tortoises of all sizes in areas away from those identified for heavy and moderate disturbance. We cannot quantify the take discussed in this paragraph because of all the variables involved, including but not limited to predicting the number of desert tortoises of various sizes and the effectiveness of clearance surveys.

An additional factor compounds the difficulty in monitoring the amount of take. Most of the individuals missed during clearance surveys (both for translocation and for moving animals from harm’s way) are likely to be smaller desert tortoises; many of the desert tortoises that are missed are likely to be killed or injured during training. The Marine Corps is unlikely to locate most of their carcasses; the Marine Corps will not detect even the carcasses of larger desert tortoises, particularly if they are in their burrows or moved by a coyote. The inability to locate these carcasses will make it difficult for the Marine Corps to monitor the amount of take that occurs during training and the preparation of training sites; we expect that more desert tortoises die than are found. For these reasons, we will use the terms and conditions of this biological opinion to establish appropriate thresholds for re-initiation of consultation.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of desert tortoises during the implementation of the proposed action:

1. The Marine Corps must ensure that the rate of mortality or injury of translocated and resident desert tortoises is not elevated above the rate of mortality or injury for other populations within the action area that are not affected by translocation.

2. The Marine Corps must ensure that the level of incidental take anticipated in this biological opinion is commensurate with the analysis contained herein.

Our evaluation of the proposed action includes consideration of the protective measures described in the Description of the Proposed Action section of this biological opinion. Consequently, any changes in these protective measures may constitute a modification of the proposed action that causes an effect to the desert tortoise that was not considered in the biological opinion and require re-initiation of consultation, pursuant to the implementing regulations of the section 7(a)(2) of the Act (50 Code of Federal Regulations 402.16).

TERMS AND CONDITIONS

To be exempt from the prohibitions of section 9 of the Act, the Marine Corps must comply with the following terms and conditions, which implement the reasonable and prudent measures described in the previous section and must comply with the reporting and monitoring requirements. These conditions are non-discretionary.

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

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

2. The following term and condition implements reasonable and prudent measure 2:

   The Marine Corps must re-initiate formal consultation, pursuant to the implementing regulations for section 7(a)(2) of the Act at 50 Code of Federal Regulations 402.16, with the Service if

   a. ten individuals of any size are injured or killed during the translocation of desert tortoises from the expansion areas. This number is only for desert tortoises that would be injured or killed during the process of moving them between the expansion and translocation areas; the recovery permit for post-translocation monitoring and research will address injury and mortality associated with that work.

b. 20 desert tortoises of any size are killed or injured in any calendar year as a result of training and preparation work for training within the expanded boundaries of MCAGCC (i.e., the expansion areas and the former boundaries).

REPORTING REQUIREMENTS

By January 31 of each year this biological opinion is in effect, the Marine Corps must provide a report to the Service that provides details on each desert tortoise that is found dead or injured within expanded installation and translocation recipient sites. The information must include the location of each mortality, the circumstances of the incident, and any actions undertaken to prevent similar instances from occurring in the future. We request that the annual report also describe activities that the Marine Corps implemented or funded as part of its conservation program for the desert tortoise within habitat of the desert tortoise. The Marine Corps must also describe actions that it took during the previous year to prepare the new training lands for military exercise, if the activities occurred in habitat of the desert tortoise. We request that you provide us with an evaluation of the effectiveness of the protective measures that the Marine Corps implemented; this information allows us to be more effective in protecting desert tortoises and in developing protective measures that are efficient for project proponents to implement.

We recognize that the procedures we are likely to develop in close cooperation with the Marine Corps in the future may indicate a more efficient way of collecting this information. We welcome recommendations to improve the reporting method, provided that any new method meets the requirements of the implementing regulations for section 7(a)(2) of the Act (50 CFR 402.14(i)(3)).

DISPOSITION OF DEAD OR INJURED DESERT TORTOISES

Within 3 days of locating any dead or injured desert tortoises, you must notify the Ventura Fish and Wildlife Office by telephone (805 644-1766) and by facsimile (805 644-3958) or electronic mail. The report must include the date, time, location of the carcass, a photograph, cause of death, if known, and any other pertinent information.

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

The Marine Corps must take injured desert tortoises to a qualified veterinarian for treatment. If any injured desert tortoises survive, the Marine Corps must contact us regarding their final disposition.

CONSERVATION RECOMMENDATIONS

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

1. We recommend the Marine Corps use the results of the spatial decision support system analysis to work with us to develop and implement an integrated set of recovery actions for the Ord-Rodman DWMA and the contiguous SUAs. Such a program would include, but not be limited to range-wide monitoring and effectiveness monitoring, monitoring of OHV use, restoration of disturbed areas, fencing of heavily used roads, and management of common ravens. As part of such an integrated program, we recommend that the Marine Corps work with us to develop and implement a program to collect baseline data as soon as possible so we would have a baseline against which to measure the effectiveness of recovery actions.

2. We recommend that the Marine Corps coordinate closely with the Service to investigate specific research questions associated with head-starting. Through such coordination among the Marine Corps, the Service, and the several other head-starting facilities already in existence, we could determine whether the existing facilities are adequate to meet the recovery needs of the desert tortoises of the desert tortoise at this time.

3. We recommend that the Marine Corps work with the Service and re-initiate formal consultation of the 2002 biological opinion regarding other activities that may affect desert tortoises within MCAGCC. Our primary goal with such a consultation would be to address a broader array of Marine Corps actions than the current biological opinion.

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

RE-INITIATION NOTICE

This concludes formal consultation on the Marine Corps' land acquisition and air space establishment project in San Bernardino County, California. Re-initiation of formal consultation is required where discretionary Federal involvement or control over the action has been retained or is authorized by law and: (a) if the amount or extent of taking specified in the incidental take statement is exceeded; (b) if new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (c) if the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion; or (d) if a new species is listed or critical habitat designated that may be affected by the identified action (50 Code of Federal Regulations 402.16).

In instances where the amount or extent of incidental take is exceeded, the exemption issued pursuant to section 7(o)(2) will have lapsed and any further take would be a violation of section 4(d) or 9. Consequently, we recommend that any operations causing such take cease pending re-initiation.

If you have any questions regarding this biological opinion, please contact Brian Croft of my staff at (909) 382-2677.

Sincerely,

/s:/ Diane K. Nada

Diane K. Noda
Field Supervisor

Appendices
1 - Mojave population of the desert tortoise (*Gopherus agassizii*). 5-year review: summary and evaluation. Available on disk or hard copy by request or at http://ecos.fws.gov/docs/five_year_review/doc3572.DT%205Year%20Review_FINAL.pdf or.
2 - Map illustrating the 12 critical habitat units of the desert tortoise and the aggregate stress that multiple threats place on critical habitat.
3 - Map depicting the risk of invasion by exotic plants.
4 – Information on status of desert tortoises in areas that displaced off-highway vehicle activity may affect.
5 – Graph of relative population density among permanent study plots in the western Mojave Desert and map of the same area depicting an analysis of the likelihood of finding a live desert tortoise (from Tracy et al. 2004).

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Appendix 4. Information on status of desert tortoises in areas that displaced off-highway vehicle activity may affect.

	Information Source	Time Frame and Status
Stoddard Valley OHVMA	Berry and Nicholson 1984 Bureau et al. 2005	late 1970s; 50 to > 250 adults in the northern portion of the area, 1 to 20 adults in the southern portion of this area. 1998 to 2002; above-average desert tortoise sign[17] in the northern portion of the area and in Brisbane Valley to the west of the OHV area; encounter rate was 0.095[18].
Brisbane Valley	Berry and Nicholson 1984 Bureau et al. 2005	late 1970s; 50 to > 250 adults in this area. 1998 to 2002; above-average desert tortoise sign.
Johnson Valley OHVMA	Berry and Nicholson 1984 Bureau et al. 2005	late 1970s; southern portion contained 20 to >250 adults. late 1990s; above-average desert tortoise sign in the same location and at another location to the northeast, a 15-square-mile die-off area. early 1980s to mid-1990s; the Lucerne Valley permanent study plot, located within the DWMA contiguous with a higher-density area of the Johnson Valley OHVMA declined by 30 percent.
El Mirage OHVMA Edwards Bowl Heavy Use OHV Area	Berry and Nicholson 1984 Bureau et al. 2005	late 1970s; 50 to 100 adults. late 1990s; 4-square-mile die-off area in the Edwards Bowl, Encounter rate was 0.125 within the OHV area.
Rasor OHVMA	Bureau et al. 2005	late 1990s; very low densities, probably absent from large portions of the OHVMA.

[17] Areas of above-average desert tortoise sign potentially have more desert tortoises than other portions of the western Mojave Desert, but they do not necessarily indicate a lack of population decline or a large number of desert tortoises.

[18] The encounter rate represents the number of desert tortoises observed per mile of transect.

	Information Source	Time Frame and Status
Spangler Hills OHVMA	Berry and Nicholson 1984 Bureau et al. 2005	late 1970s; most of the area is 1 to 20; 20 to 50 adults in southeastern corner. late 1990s; no areas of above-average sign, except for one small area northwest of the OHV area Encounter rate was 0.018.
Dove Springs and Jawbone Canyon OHVMAs East Sierra Area Heavy Use OHV Area	Keith et al. 2005 (citations from other sources) Bureau et al. 2005 Keith et al. 2005	late 1970s; few sign detected, anecdotal observations. late 1990s; no live desert tortoises within Dove Springs. 2002 to 2004; less than 3 adults, unauthorized use outside of the OHV management areas is "widespread and frequent."
California City Rand Mountains	Berry and Nicholson 1984 Bureau et al. 2005	late 1970s and early 1980s; 50 to more than 250. late 1970s to mid-1990s; declines of 74, 84, and 91 percent within 3 permanent study plots within or near this heavy use area, a permanent study plot east of this area declined by 93 percent over the same period, 2 die-off areas totaling 100 square miles overlapping or immediately adjacent to this heavy-use OHV are.
Silver Lakes Residential Vehicle Impact Area	Berry and Nicholson 1984 Bureau et al. 2005 Service 2006, 2009b, 2010c, 2010d	1970s and early 1980s, 50 to 250 adults. late 1970s to early 1990s; declines of 69 percent within a permanent study plot. late 1990s; a 19-square-mile die-off area overlapping the northern portion of this area, above-average levels of sign across most of this area. Mid to late 2000s; more desert tortoises consistently located south of Highway 58 than north of highway.

	Information Source	Time Frame and Status
Hinkley Residential Vehicle Impact Area	Berry and Nicholson 1984	late 1970s and early 1980s; 20 and 250.
	Bureau et al. 2005	late 1990s; 21-square-mile die off area, above-average sign across most of this area.
	Service 2006, 2009b, 2010c, 2010d	Mid to late 2000s; 7 adults, desert tortoises consistently located across most of this area.
Coyote Corner Residential Vehicle Impact Area	Berry and Nicholson 1984	late 1970s and early 1980s; most of the area 20 to 100 adults.
	Bureau et al. 2005	late 1990s; above-average sign; a 63-square-mile die-off area overlaps much of this area.
	Service 2010c	Mid to late 2000s; 7 adults, desert tortoises consistently located across most of this area.
	Service 2012c	2008 to present; 586 desert tortoises were translocated from Fort Irwin into this general area, 245 desert tortoises (resident, translocated, and control animals) died. The deaths and translocations occurred over a broader area than identified as Coyote Corner.