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:
PAS 1231.1347.1798

March 15, 2004

Colonel Edward L. Flinn
Deputy, Commander and Chief of Staff
National Training Center and Fort Irwin
Fort Irwin, California 92310-5000

Attn: Director, Strategic Programs

Subject: Biological Opinion for the Proposed Addition of Maneuver Training Lands at Fort Irwin, California (1-8-03-F-48)

Dear Colonel Flinn:

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion regarding the proposed addition of maneuver training lands at Fort Irwin and its effects on the federally endangered Lane Mountain milk-vetch (*Astragalus jeagerianus*) and the threatened desert tortoise (*Gopherus agassizii*) and its critical habitat. This document was prepared in accordance with section 7(a)(2) of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) (Act). Your request for formal consultation was received on July 2, 2003.

This biological opinion is based primarily on the biological assessment (Charis Professional Services Corporation 2003) and reports and publications in our files. A complete administrative record of this consultation is on file in the Service's Ventura Fish and Wildlife Office.

CONSULTATION HISTORY

The following history of the consultation process for the proposed expansion of Fort Irwin was summarized, in part, from the biological assessment (Charis Professional Services Corporation 2003).

Modified Coyote Basin Alternative

The Army initiated planning for the expansion of Fort Irwin in the late 1980s. Pursuant to an interagency agreement between the Army and Bureau of Land Management (Bureau), the Bureau assumed the lead for compliance with the National Environmental Policy Act and Endangered Species Act. After a lengthy period of informal consultation regarding the effects of potential expansion alternatives on the desert tortoise, the Army requested consultation on an expansion proposal called the Modified Coyote Basin Alternative (U.S. Army Corps of Engineers 1991). This proposed expansion covered approximately 328,660 acres and was

primarily to the south, southwest, and southeast of the former boundaries of Fort Irwin. (Note that, although the Army has not used the withdrawn expansion lands for training, the current boundaries of Fort Irwin include these lands. Therefore, we use the term "former boundaries" to indicate the size and configuration of the installation prior to the withdrawal.) The Service (1991b) provided a draft biological opinion to the Army in which it determined that the proposed expansion would likely jeopardize the continued existence of the desert tortoise. The biological opinion was not finalized. (Note that, pursuant to the interagency agreement, the Bureau was the lead agency for consultation. The Army Corps of Engineers prepared the environmental documents, including the biological assessment, under the direction of the Bureau [the lead agency for consultation] and Army [the project proponent]. In issuing the biological opinion, the Service mistakenly addressed it to the Army.)

Silurian Valley Alternatives

The Army subsequently proposed the Silurian Valley Alternative, which directed expansion to the north, east, and south of the former boundaries. This proposed expansion included approximately 329,710 acres. The Service issued a biological opinion to the Bureau on August 19, 1993, which included the determination that the proposed expansion was not likely to jeopardize the continued existence of the desert tortoise (Service 1993).

As a result of discussions with the Army and Bureau after the issuance of the biological opinion in 1993, the Bureau requested formal consultation regarding a proposed expansion of approximately 331,200 acres to the north, east, and southeast of the former boundaries. The Service issued a biological opinion to the Bureau on April 29, 1994, which included the determination that the proposed expansion was not likely to jeopardize the continued existence of the desert tortoise or result in adverse modification of its critical habitat (Service 1994a).

The draft environmental impact statement for a Silurian Valley Expansion was released for public review in 1996 (Bureau 1996). However, the Army determined that this alternative did not meet its needs for additional areas on which to conduct maneuvers because of terrain, recreational use of the area, State Highway 127, and a major utility corridor (Charis Professional Services Corporation 2003). Consequently, the Army did not pursue this alternative.

Modified Southern Alternative

Between 1997 and 2000, several alternatives were proposed and briefly considered. In December 1999, the Departments of the Interior and Army decided to convene a panel of experts on the desert tortoise and conservation biology to discuss the potential effects of the Modified Southern Alternative on the desert tortoise. This proposal included lands to the east, south, and southwest of the former boundaries. The panel included staff from the Army, Service, U.S. Geological Survey, California Department of Fish and Game, and four scientists who were not associated with these agencies. Four of the eleven panel members served on the team that prepared the recovery plan for the desert tortoise. The following summary is derived primarily from meeting notes provided by LaRue (2000).

The panel met in January and February 2000. The panel was directed to determine whether the expansion, as presented in the April 1999 Army proposal, was likely to jeopardize the continued existence of the desert tortoise in the Western Mojave Recovery Unit; the panel was given no latitude to identify alternatives or geographical modifications and was required to justify its decision. Additionally, if the panel determined that the alternative was likely to cause jeopardy for the desert tortoise, then it was required to identify measures for the expansion to reduce the level of impact to a point where a jeopardy determination was not likely, if possible.

The panel concluded that the proposed expansion was likely to jeopardize the continued existence of the desert tortoise in the Western Mojave Recovery Unit; it reached this conclusion because of the likely loss of individuals and habitat in a recovery unit that had already experienced a substantial decline in the abundance of desert tortoises. To offset the adverse effects of the expansion, the panel recommended an extensive set of measures that included designation of reserves for the desert tortoise in the western Mojave Desert, acquisition of all private lands within these reserves (approximately 460,000 acres), prohibition of all new development in the reserves, withdrawal of reserve lands from mineral entry, and acquisition and retirement of cattle allotments. The panel recommended numerous other measures and an aggressive program of research on the desert tortoise. Three members of the panel, including the Service's representative, did not endorse the report. These panelists did not endorse the conclusions of the majority because the report failed to provide any scientific rationale as to why their proposal to offset the effects of the expansion would remove the jeopardy; they also cited a lack of data (such as the effectiveness of a translocation program), the number of desert tortoises that would likely be killed, and the amount of habitat that would be disturbed. The Departments of the Interior and Army did not comment on the final report; however, the full set of recommendations in the final report (i.e., LaRue 2000) was likely considered too expensive and onerous to implement (Haigh 2000).

Current Proposal

After numerous discussions between representatives from the Departments of the Interior and Army, President William J. Clinton signed the Consolidated Appropriations Act of 2001 (Public Law 106-544) on December 21, 2000. The appropriations act described the boundaries of the proposed expansion of Fort Irwin and required the Secretaries of the Army and Interior to provide a joint report on the key elements of a proposed expansion plan within 45 days and a proposed expansion plan within 120 days (Army undated). The appropriations act also required the Service to provide a preliminary review of the proposed expansion plan within 90 days. The act called for completion of the consultation process, pursuant to section 7(a)(2) of the Act, within 24 months and completion of the National Environmental Policy Act process within 30 months.

On January 12, 2001, the key elements report was provided to Congress. The key elements report briefly outlined the Army's need to expand Fort Irwin and the proposed conservation program for the desert tortoise and Lane Mountain milk-vetch to be used to offset the effects of the expansion (Departments of the Interior and Army 2001). The Service provided the

preliminary review of the proposed expansion to the Secretaries of the Interior and Army on March 28, 2001. The preliminary review noted that the proposed expansion may substantially impair the survival and recovery of the desert tortoise in the western Mojave Desert and that the impacts to the Lane Mountain milk-vetch (based on its known distribution at the time) would likely jeopardize the continued existence of the Lane Mountain milk-vetch. The review included preliminary recommendations regarding measures to reduce and offset impacts to the desert tortoise and Lane Mountain milk-vetch and a request for additional information to more accurately assess the extent of impacts of the proposed expansion and accompanying conservation measures (Service 2001).

On January 11, 2002, President George W. Bush signed the Fort Irwin Military Lands Withdrawal Act of 2001 (Public Law 107-107) into law. This legislation withdrew approximately 110,000 acres of land, formerly managed by the Bureau, for military use. Subsequent surveys and GIS analysis indicated that the proposed expansion area covers 118,674 acres.

Clarification of the Biological Assessment

During our review of the biological assessment, we noted that it "found that the proposed project is likely to adversely modify desert tortoise critical habitat" (page 0-1 of Charis Professional Services Corporation 2003. Note that, from this point through the end of the biological opinion, the phrase 'biological assessment' refers to the document prepared by the Charis Professional Services Corporation in 2003 unless otherwise specifically noted.). In a meeting with you and your staff on January 23, 2004, we asked for clarification of that statement. By letter dated January 29, 2004, you noted that the Army had "not intended to draw a conclusion as to whether the proposed action would result in an adverse modification of designated critical habitat" of the desert tortoise (Army 2004b). Your letter also included errata pages to replace pages 0-1, 0-2, and 518 (sic; actually 5-18) of the biological assessment.

Changes in the Proposed Action

As a result of numerous meetings, the Army proposed several changes to the action proposed in the biological assessment. By letter dated February 17, 2004, the Army committed to the creation of a "no-dig" zone in an area of approximately 3,366 acres in and around the Brinkman Wash-Montana Mine occurrence of the Lane Mountain milk-vetch; to shifting the southwestern boundary of the UTM 90 area to increase by approximately 1,600 acres the conservation area for the desert tortoise; to implement measures to assist the Bureau in managing lands that will be acquired to benefit the desert tortoise and Lane Mountain milk-vetch; to increasing the number of sweeps to capture desert tortoises in the Superior Valley and UTM 90 parcels; to translocating these animals for research and conservation; to provide funding for a desert tortoise management team for research and implementation of management actions to promote recovery of the desert tortoise; to provide funding for additional research and collection of data (e.g., remote sensing, disease, tracking); to control factors that limit recovery of the desert tortoise (e.g., disease, poaching); and to provide funding for future adaptive management measures (Army 2004a).

These changes are contingent upon the limits of legislated funding. The details of the changes are described in the appropriate sections of the Description of the Proposed Action portion of this biological opinion.

On February 25, 2004, the Army provided us with an addendum to its biological assessment (Army 2004c). In this addendum, the Army provided additional detail on several of the measures mentioned in the previous paragraph and on activities needed to prepare the additional training lands for military exercises. It also clarified that the 'no-dig' zone mentioned in the previous paragraph covered approximately 3,700 acres of which 1,872 acres supported habitat for the Lane Mountain milk-vetch. The details of the information in the addendum are described in the appropriate sections of the Description of the Proposed Action portion of this biological opinion.

On February 27, 2004, we provided a draft biological opinion to the Army for its review (Service 2004a). By letter dated March 11, 2004, the Army provided comments to us (Army 2004d). This biological opinion incorporates the Army's comments, as appropriate.

DESCRIPTION OF THE PROPOSED ACTION

The proposed action, which has been summarized from the biological assessment (Charis Professional Services Corporation 2003), includes four major components. First, training would occur on and over the withdrawn land within the boundaries of the expansion area; any private lands within the new boundaries would be acquired by the Army. Second, maneuvers would occur on approximately 19,643 acres along the southern boundary of Fort Irwin that are currently off-limits to force-on-force training. (Force-on-force training is the movement of soldiers and equipment over the battlefield in realistic training exercises.) Third, the Army would create an improved transit route for vehicles through the Goldstone Deep Space Communications Complex, which is managed by the National Aeronautics and Space Administration. Last, the Army proposes to implement measures to conserve desert tortoises and the Lane Mountain milk-vetch, both within and outside of the boundaries of Fort Irwin.

The use of additional lands for training would occur in phases. The Army proposes to begin use of the Eastgate parcel in approximately September 2006. Use of the UTM 90 area would begin in approximately September 2007. The final addition of training lands, those in the Superior Valley parcel, would occur in approximately September 2009.

Description of Training Activities

The biological assessment provides a more detailed description of the training activities that are proposed for the withdrawn lands. The two major areas of withdrawn lands are the Superior Valley and Eastgate parcels, which lie to the west and east of the former boundaries of Fort Irwin. We will provide more detailed descriptions of these parcels in the Environmental Baseline section of this biological opinion. The UTM 90 area, which is the third major area that

would be used for maneuvers under the proposed action, is located along the south-central boundary of Fort Irwin.

Airborne, air assault, light, and special operations brigades may train at Fort Irwin, although armor and mechanized units comprise the majority of units. Training rotations occur ten times per year; each rotation lasts 31 to 38 days and includes 14 days of field operations. Force-on-force maneuvers last 7 to 10 days. The remaining field days are used to train with live fire at stationary, moving, and pop-up targets. This training occurs at an existing facility that will not be affected by the proposed action; consequently, we will not discuss live fire further in this biological opinion. The remaining time is used for deployment, maintenance, re-supply, and redeployment back to the unit's home station.

Brigades from around the country visit Fort Irwin to train; the visiting brigades are called the BLUFOR and typically consist of 3,000 to 5,000 soldiers with 1,400 vehicles. The OPFOR, based at Fort Irwin, represents the enemy. Up to 2,500 soldiers and 700 vehicles comprise the OPFOR. As many as 750 observer-controllers with 658 vehicles participate in the force-on-force maneuvers; the numbers of observer-controllers varies, depending on the size of the rotational forces. The observer-controllers observe the training exercises and teach members of the rotational units while in the field.

During a typical exercise, the BLUFOR establishes a staging area and moves from this area to try to accomplish a specific mission; the training scenarios vary, depending on the mission goal. In general, the Eastgate parcel would be used primarily for staging and logistical support; however, the Army may also use this area for heavy maneuvers. The UTM 90 area would allow the use of mechanized brigade-sized units in a southern corridor that connects to the Superior Valley parcel. The biological assessment notes that the Superior Valley parcel would be used primarily for staging and logistical sites, although heavy maneuvers may also occur in this area.

Every type of tracked and wheeled vehicle in the Army's inventory, including M1A1 Abrams main battle tanks, Bradley infantry fighting vehicles, armored personnel carriers, and wheeled combat and supply vehicles, may participate in force-on-force training. The characteristics of the terrain determine where vehicles travel during an exercise. Tracked vehicles are capable of operating over virtually all flat and gently sloping lands; some areas, such as dry lakebeds, cultural sites, natural resource areas, and rights-of-way, may be designated as off-limits. In some locations where topography or grade is a confining element, some engineering work may be performed to provide a one- or two-lane supply route through hilly terrain or a pass for tracked vehicles. Exercises also include helicopters and fixed wing aircraft. Eye-safe lasers are used during all force-on-force exercises.

The Army began using Stryker Brigade Combat Teams at Fort Irwin in 2003. The primary combat vehicle of these teams is called the Stryker, which weighs approximately 25 tons. These vehicles perform direct fire, indirect fire, reconnaissance, and command and control functions. Because they have lighter armor than tanks, Strykers typically use washes, rocks, and the reverse

slopes of hills for cover. The Stryker teams would operate over a much broader battle space than the 15.5- by 22-mile area used by heavily armored units; they would cover a 31- by 62-mile area.

Wheeled re-supply and administration vehicles normally use established roads and trails and do not operate for long distances over untracked surfaces. Engineer companies or crews from Fort Irwin maintain major roads, trails, and all drainage structures to eliminate or avoid erosion caused by training.

Airborne or air assault battalions and brigades also train at Fort Irwin. Because of their mobility and ability to operate in any terrain, these airborne or air assault units can maneuver and train in all parts of the project area (including the mountain areas) within the boundaries of Fort Irwin.

During each exercise, five tactical assembly areas and four brigade support areas are established to provide support for troops. These areas contain ammunition, supplies, fuel, and maintenance, medical, and engineering facilities. The tactical assembly areas and brigade support areas cover 1.5 by 1.5 miles and 2 by 2 miles, respectively; these areas are maintained from 2 to 7 days each.

To support combat scenarios, engineers dig antitank ditches, infantry bunkers, and slit trenches. The largest trenches can be 6.5 feet across, 6.5 feet deep, and several miles long. Individual fighting positions are also used; these pits are approximately 10 feet across, 10 feet deep, and 33 feet long. The excavations are filled and the surface contours restored after every rotation.

Human waste and trash generated during exercises are returned to the cantonment area (the area of Fort Irwin that contains housing, offices, and storage and maintenance facilities) for disposal. Petroleum-based fuels, antifreeze, motor oil, vehicle batteries, smoke pots, and smoke generators, and training pyrotechnics are used in the field during exercises. These items are either hazardous or contain hazardous materials. If a spill of hazardous materials occurs, the responsible unit and on-call environmental remediation teams will follow the Army's spill contingency plan.

Obscurants are used during training to mask the movements of troops and equipment. High-quality mineral oils are burned to obscure human vision. Graphite smoke oil can be used to prevent detection by infrared detection systems; however, the Army does not use graphite oils at Fort Irwin and, according to the biological assessment, does not plan to use them in the new maneuver areas.

A 3-mile long transit route would be constructed through the Goldstone Deep Space Communication Complex on an existing graded dirt road. This transit route would be used to transport troops and equipment between the cantonment area and the Superior Valley parcel. The 30-foot wide dirt road would be surfaced with low-dust compacted gravel, resin-impregnated pavement, or concrete; the road would probably require 12-foot wide graded shoulders on each side and numerous culverts to provide adequate drainage.

The improved access route would typically be used for a maximum of 5 days per rotation. The heaviest use of the route would be when soldiers and equipment move to the Superior Valley parcel. The biological assessment notes that three to five rotations per year would probably use the transit route. For 2 of the 5 days, approximately 500 vehicles would drive the access road per day. On the remaining 3 days, approximately 100 vehicles would use the route in a 24-hour period. The speed limit on the transit route will be 25 miles per hour.

Actions to Prepare Fort Irwin for Use of the Additional Training Lands

The Army would construct a barrier to vehicles along the boundaries of Fort Irwin in areas where the installation is accessible because of terrain. The purpose of the barrier would be to prevent trespass onto Fort Irwin and to stop military vehicles from accidentally leaving the installation. The barrier would consist of a berm alongside a ditch; both would be approximately the width of a bulldozer. In locations where the density of desert tortoises warrants the construction of a fence to exclude them from Fort Irwin, that fence would be installed adjacent to or within the vehicle barrier (Army 2004c).

The Army would construct two areas where water would be available to soldiers and vehicles; they would be located in the Eastgate and Superior Valley parcels. Each of these water stops would include a well, water purification unit, 10,000-gallon storage tank, and dispersal pump (Army 2004c).

Aircraft warning devices would be installed on the power lines in the Boulder Corridor that runs along the southeastern boundary of Fort Irwin in the Eastgate parcel. The work would be performed by the Department of Water and Power of the City of Los Angeles. Access to the power lines would be via the existing service roads for the utility corridor (Army 2004c).

The Army would build two or three tank crossings over Fort Irwin Road in the maneuver area. It would also construct a corridor along Fort Irwin Road, using K-rails, to keep military vehicles away from the road (Army 2004c).

The Army would reroute Copper City Road to skirt the Superior Valley parcel. From the point where Copper City Road currently enters Fort Irwin, the new route would follow the southern boundary of the Superior Valley parcel to the west, turn north at the western boundary, and connect to the existing road. The rerouted road would remain as an improved dirt road (Army 2004c).

The Army would remediate at least one unauthorized dump site. Trash would be removed from the dump site and disposed of at authorized landfills (Quillman pers. comm. 2004).

The Army would also close several mines, primarily in the Eastgate parcel. The method of closure would depend on the type of mine and whether the area supported cultural or natural resource values that the Army would want to maintain (Quillman pers. comm. 2004).

Proposed Measures to Avoid, Reduce, and Offset the Impacts of the Proposed Action

The Army has proposed measures to avoid or reduce the potential effects of training on the desert tortoise and Lane Mountain milk-vetch; these measures would be implemented within the boundaries of Fort Irwin. To offset effects that cannot be avoided, the Army has also proposed to implement numerous measures within the Western Mojave Recovery Unit of the desert tortoise but outside the boundaries of Fort Irwin. We anticipate that the Army will continue to consult informally with us as conservation actions within the Western Mojave Recovery Unit are planed and implemented. This biological opinion will focus primarily on the effects of those actions and activities that are defined and planned within the boundaries of Fort Irwin, while considering the general effects of proposed conservation actions outside those boundaries.

Conservation Measures within the Project Area

Conservation Areas for the Desert Tortoise within Fort Irwin. The Army has proposed to establish several conservation areas for the desert tortoise along the boundary of the installation. The westernmost conservation area, comprising 963 acres, lies on the east slope of the Paradise Range; the Army refers to this area as the UTM 90 Conservation Area Spur. To the east, a 908-acre conservation area lies between Fort Irwin Road and the Manix Trail; the Army refers to this area as the UTM 90 Conservation Area West. The third area lies approximately 10 miles to the east; this parcel includes 2,460 acres; the Army refers to this area as the UTM 90 Conservation Area East. (See Figure 2-5 of the biological assessment for a map of these areas.) Last, approximately 4,560 acres will be included in a 500-meter wide buffer to the north of the Boulder Utility Corridor; this buffer extends from the eastern edge of the third conservation area to the eastern border of the Eastgate parcel.

In meetings with the Army on January 9, 2004, you noted that the Army would also commit to enlarging the areas that were off-limits to off-road travel in the first two conservation areas noted in the previous paragraph. Specifically, the westernmost area will now comprise 1,890 acres and the conservation area between Fort Irwin Road and the Manix Trail has been expanded to the east of the Manix Trail and covers 2,762 acres.

Conservation Measures for the Lane Mountain Milk-vetch within Fort Irwin. The Army has proposed to conserve two areas for the Lane Mountain milk-vetch within the boundary of Fort Irwin. The first area is adjacent to the southern boundary of Goldstone Deep Space Communications Complex and includes approximately 2,471 acres. The second conservation area lies to the north of Lane Mountain in the south-central portion of the Superior Valley Parcel; the Army refers to this area as the East Paradise Conservation Area. This area encompasses approximately 4,300 acres. Both of these areas also support desert tortoises, generally at the lower end of the range densities found in the project area.

In meetings with the Army on January 9, 2004, you noted that the Army would also commit to creating a 'no-dig' zone on 3,366 acres of the Brinkman Wash-Montana Mine occurrence of the Lane Mountain milk-vetch. In the addendum to the biological assessment provided on February

25, 2004, you clarified that approximately 1,872 acres of Lane Mountain milk-vetch habitat would be located within a larger 'no-dig' zone of approximately 3,700 acres (Army 2004c).

Management of Conservation Areas. All conservation areas will be managed in the following manner. Some slight variations in management may occur as a result of the specific needs of a conservation area (e.g., different signs may be used depending on the boundary situation).

1. No mechanized training will be allowed.

2. No ground-disturbing activities will be allowed; however, communications sites and other necessary tracking or monitoring equipment, including environmental monitoring equipment, may be sited in such areas.

3. No off-road travel will be permitted at any time.

4. Road use will be limited to existing roads in the area only. No new routes will be established unless the Army requires them to enhance its ability to manage the areas.

5. Certain roads may stay open to vehicle travel to allow access for observer controllers, biologists from the Department of Public Works, other biological researchers, range control, spectrum managers, communications and related specialists, and military police.

6. Aircraft and helicopters will be permitted to fly over the conservation areas, subject to airspace restrictions; however, no landing will be allowed.

7. The boundaries of the conservation areas will be fenced and marked at appropriate intervals with sibert stakes. Sibert stakes are made of light and heat reflective material and are visible day and night. Tetrahedrons will be used to block all roads leading into the conservation areas to prevent straying of unauthorized Army vehicles from the training area. On certain roads, the placement of tetrahedrons will allow access by authorized vehicles but clearly indicate that a conservation area is being entered.

8. Conservation area boundaries will be marked with signs indicating the boundary of the military reservation or conservation area; the signs will indicate that entry by vehicles is not allowed.

In the 'no-dig' zone in the Brinkman Wash-Montana Mine occurrence, the Army would prohibit any digging and the establishment of tactical assembly areas and brigade support areas and would use only dismounted troops. The Army may also construct one or two roads through the area to provide access to observer-controllers and to a communication site, if such a site is deemed necessary. If the Army determines that roads and a communication site are necessary, it would work with the Service to avoid impacts to the Lane Mountain milk-vetch to the greatest degree practicable.

Translocation Plan for Desert Tortoises. In the original biological assessment, the Army proposed to translocate approximately 300 desert tortoises from the region south of the UTM 90 line to areas south of the installation or other areas identified by the Service as acceptable locations. The biological assessment notes that the Army will present a detailed translocation proposal to the Service within 180 days of issuance of this biological opinion, if we approve the general translocation plan. The biological assessment notes that any plan would likely involve several pre-training sweeps in spring and fall to collect desert tortoises and studies of the specific areas proposed to receive desert tortoises, of the receiving populations, and of the animals to be translocated.

In the original biological assessment, the Army did not propose any active sweeps of the proposed maneuver areas in the Superior Valley and Eastgate parcels because of the lower number of desert tortoises. As described in the original biological assessment, desert tortoises would have been removed from these areas only if Army personnel detected them before and after training begins. Desert tortoises in these areas may be removed to adjacent proposed conservation areas or to other approved areas on adjacent land managed by the Bureau.

In a meeting on February 6, 2004 and by letter dated February 17, 2004, the Army committed to conducting sweeps of both the UTM 90 and Superior Valley areas to collect as many desert tortoises as possible; the Army would not limit its translocation effort to 300 animals. The Service and Army also discussed implementing an extensive research, monitoring, and management program for the translocated animals. The general concept to which the Army and Service agreed was that desert tortoises would be moved to two or more parcels of substantial size in areas that are considered important for the recovery of the species but where the density of animals was currently extremely low because of recent declines. This program could include fencing the translocation parcels to allow the desert tortoises to become acclimated to the sites and to reduce the number and degree of threats. Management of these enclosures will focus on eliminating or reducing the sources of mortality. Monitoring and research will attempt to identify sources of mortality that may be affecting translocated desert tortoises. As noted in the biological assessment, a final translocation plan will be developed within 180 days of the issuance of this biological opinion.

Desert Tortoise-proof Fencing. The Army has proposed to install fencing to exclude desert tortoises from training areas along the southern boundary of Fort Irwin between its intersection with Fort Irwin Road and the beginning of the 500-meter buffer zone in the southeastern corner of Fort Irwin. Certain areas may not be fenced due to terrain or lack of accessibility to both desert tortoises and to military vehicles. Fencing will also be installed to protect the conservation areas located to the east of Fort Irwin Road. The fence will be composed of desert tortoise-proof material on the lower portion and barbed wire on the upper portion. A sufficient number of fence posts will be equipped with sibert stakes so the fence can be readily seen at any time of the day. The Army will provide a fencing plan for this boundary to the Service within 180 days of the issuance of this biological opinion. The Army has not proposed to fence any areas in the Eastgate or Superior Valley Parcels because fewer desert tortoises would benefit from this action in these areas.

Goldstone Transit Route. To avoid or lessen the impacts to the desert tortoise of the upgrade and use of the proposed route through the Goldstone Deep Space Communications Complex, the Army will implement the following measures.

1. Road shoulders will be graded so desert tortoises would not be trapped in the road or be impeded in their movements.

2. The road will be improved with low-dust compacted gravel, resin-impregnated pavement, or concrete to reduce potential dust impacts to sensitive wildlife or plants.

3. If culverts are constructed, they will be designed to accommodate potential use by desert tortoises.

4. All vehicle movement on the road will be restricted to the road itself; no cross country travel will be permitted. Stopping for short periods of time will be allowed on the road's shoulders; the shoulders will not be used for driving.

5. If any vehicle stops on the road or the shoulders, the area beneath the vehicle must be thoroughly inspected for the presence of desert tortoises before it can be moved.

6. Military personnel driving on the road and stopping on the shoulders will take precautions not to disturb or injure desert tortoises. If a desert tortoise is in harm's way, biologists from the Department of Public Works will be immediately notified; these biologists will relocate the desert tortoise to a safe location.

7. Before any use, all military personnel using the road will be fully briefed on rules regarding safety, the presence of desert tortoises, and the required precautions in desert tortoise habitat. This briefing will be included in the standard briefing regarding environmental considerations in which each soldier must participate.

General Protective Measures for Both Species

Dry Lakes. To reduce the amount of dust, all dry lakes in the project area will be posted and designated off-limits to mechanized training. The Army will establish an approximately 82-foot buffer zone around the dry lakes. Off-road travel will not be permitted but vehicles would be allowed on existing dirt roads.

Use of Existing Roads. To the greatest extent possible, Army units will use existing improved dirt roads as major transit routes. The purpose of this measure is to reduce disturbance of native vegetation and limit soil compaction in the area.

Avoidance of Springs. To avoid impacts to sensitive species that rely on the springs, all springs in and near training areas will be posted and designated off-limits to mechanized training.

Education of Soldiers, Contractors, and Civilians. Any person who enters the maneuver areas on Fort Irwin will be required to undergo a briefing on safety and environmental considerations. The briefing will include rules and regulations regarding the off-limits areas, conservation areas, use of the Goldstone Transit Route, identification of the desert tortoise and Lane Mountain milk-vetch, and the importance of minimizing disturbances in their habitats. This briefing, which will be an expanded version of the instruction that is currently provided for the desert tortoise, will be provided to military personnel, civilian employees, and contractors.

Compensation Plan and Conservation Actions outside the Project Area

The compensation plan and conservation actions proposed as part of the proposed project are intended to offset and reduce the impact to the desert tortoise, its critical habitat, and the Lane Mountain milk-vetch.

Land Acquisition. Land that is acquired to offset the effects of the proposed action will likely be placed under management of the Bureau. The biological assessment notes that the Army's goal in developing a compensation plan for the proposed action involved developing criteria to ensure that lands acquired from private property owners and other non-federal entities were of conservation value to the desert tortoise and Lane Mountain milk-vetch. The Army proposes to use the following general guidelines, goals, and procedures during land acquisition.

1. The purchase of all land identified as potential compensation habitat will be made with the concurrence of the Service.

2. All land purchased will be within or adjacent to the proposed Superior-Cronese Lakes, Fremont-Kramer, and Ord-Rodman desert wildlife management areas.

3. Other land may be purchased outside the proposed desert wildlife management areas if the land provides an important direct or indirect conservation benefit to the west Mojave ecosystem that will ultimately benefit the desert tortoise or Lane Mountain milk-vetch.

4. All land purchased will directly or indirectly promote the survival, recovery, and conservation of the desert tortoise or Lane Mountain milk-vetch.

5. Priority will be given to land purchases that will provide the maximum conservation benefit for the least amount of money. This priority will involve weighing the benefits of purchase among various parcels of land under consideration for purchase.

6. Priority will be given to the purchase of full sections of land to reduce the administrative costs of acquisition and allow more land to be purchased.

7. The Army will make every attempt to restrict mineral entry and exploration on all acquired parcels through the use of deed restrictions, agreements, or cooperative land use designations as the parcels are purchased. However, if the mineral interests are acquired,

without restriction, when the surface estate is purchased, these lands would be open to mineral entry because the acquisition occurred with Federal funds. The Bureau notes that it will not withdraw the proposed desert wildlife management areas from mineral entry except within the proposed area of critical environmental concern for the Lane Mountain milk-vetch on Coolgardie Mesa and in the area adjacent to the East Paradise Conservation Area on Fort Irwin.

8. The highest priority will be given to parcels of land that contain the highest biological value for the conservation and recovery of the desert tortoise and Lane Mountain milk-vetch. To determine the relative value of parcels, the Army evaluated the amounts of total corrected sign (e.g., burrows and scat of desert tortoises) and vehicle-based disturbances, historical and current core populations, properties that are contiguous to land owned or held by the Federal government or the Catellus Corporation, the presence of land within a proposed desert wildlife management area or critical habitat of the desert tortoise, and the presence of the Lane Mountain milk-vetch. The biological assessment provides a detailed description of how the Army assigned values to parcels of land. Based on its analysis, the Army determined that approximately 129,013 acres of compensation land may be purchased. We recognize that, as a result of the addition of the use of adaptive management as a strategy to conserve the desert tortoise and Lane Mountain milk-vetch, more funds may be spent on other actions to recover these species than were described in the biological assessment; consequently, the Army may not be able to acquire as much land as it estimated in the biological assessment.

At our meeting on February 6, 2004, the Service and Army agreed that acquisition of the lands from the Catellus Corporation was the highest priority and that further purchases would be made with the Service's concurrence. We asked the Army if it could determine whether any other large areas of land were in the possession of single owners to assist in establishing acquisition priorities.

Route Closure and Rehabilitation in Lane Mountain Milk-vetch and Desert Tortoise Habitat. The Army will contribute funds or labor to pay for closure and rehabilitation of roads within the area of critical environmental concern for the Lane Mountain milk-vetch proposed by the Bureau in the West Mojave Plan and selected areas of important habitat of the desert tortoise. Roads will be blocked off and rehabilitated and signed, as necessary. Kiosks will be constructed in certain areas to provide information to the public regarding open and closed routes. The original biological assessment notes that the Army's funding for this activity will be limited to $500,000; by modifying the biological assessment to include the use of adaptive management, this limitation can be modified, if needed. Based on information provided by the Bureau, the Army estimates that $500,000 would enable the closure, rehabilitation, and signing of approximately1,625 miles of roads.

Installation of Desert Tortoise-Proof Fencing on Irwin Road. The Army will fund the installation of desert tortoise-proof fencing along Irwin Road from the junction of Fort Irwin Road to the boundary of the Barstow Cemetery. This portion of the road covers 8.8 miles. The

original biological assessment notes that the Army's funding for this activity will be limited to $700,000; by modifying the biological assessment to include the use of adaptive management, this limitation can be modified, if needed. This action will not include under crossings.

Retirement of Grazing Allotments. The Army will attempt to purchase fee land and associated assets and improvements associated with the Harper Dry Lake, Cronese Lakes, Cady Mountain, and Ord Mountain allotments. These allotments are located in the western Mojave Desert and are authorized by the Bureau for cattle grazing. The proposed West Mojave Plan contains a procedure by which specific allotments can be voluntarily retired. If allotments cannot be purchased, the funding that would have been used will be directed toward the acquisition of additional land. The acreages and other information on the four allotments are described in the following table.

Allotment	Acreage of Allotment	Animal Unit Months	Acreage of Allotment within Critical Habitat of the Desert Tortoise	Acreage of Allotment within Desert Wildlife Management Areas
Harper Dry Lake	26,315	52	16,483	26,297
Cronese Dry Lake	65,306	42	40,475	37,186
Cady Mountain	231,905	171	0	0
Ord Mountain	154,853	179	125,158	114,889
Total	478,379	444	182,116	178,372

At our meeting on February 6, 2004, the Army noted that the same rancher held the permits for the Cronese Dry Lake and Cady Mountain allotments and that the owner would not sell either base property individually.

Research and Collection of Data. The Army proposed, by letter dated February 17, 2004, to provide funding for additional research and collection of data to promote the recovery of the desert tortoise.

Assisting the Bureau of Land Management with Management of Acquired Lands. The Army will assist the Bureau and other agencies to form a working group, as described in the key elements report (Army 2004c). Representatives of the Army, Service, Bureau, and California Department of Fish and Game and possibly other agencies would be invited to participate in the working group. The key elements report notes that the working group would evaluate proposals to conserve the desert tortoise and Lane Mountain milk-vetch; this group may also undertake other tasks designed to recover these species.

Adaptive Management. By letter dated February 17, 2004, the Army proposed to provide funding for a program of adaptive management to implement actions for the recovery of the desert tortoise. We understand this to mean that management of the translocation sites may be

altered to address issues that arise over time; we also understand that funding could also be shifted among the various general protective proposals in the biological assessment, such as land acquisition and road closures and rehabilitation, or used for other recovery programs, such as management of predators.

Desert Tortoise Management Team. By letter dated February 17, 2004, the Army also proposed to fund, from operational funds directed to Fort Irwin, the staffing of a desert tortoise management team. This team would work to implement recovery actions for the desert tortoise. The size and composition of this team have not been determined. We envision that it could include full-time staff from the Service and Bureau; we also envision that staff from the Army would participate in at least a part-time capacity.

STATUS OF THE SPECIES

Desert Tortoise

The desert tortoise is a large, herbivorous reptile found in portions of the California, Arizona, Nevada, and Utah deserts. It also occurs in Sonora and Sinaloa, Mexico. In California, the desert tortoise occurs primarily within the creosote, shadscale, and Joshua tree series of Mojave desert scrub, and the lower Colorado River Valley subdivision of Sonoran desert scrub. Optimal habitat has been characterized as creosote bush scrub in which precipitation ranges from 2 to 8 inches, diversity of perennial plants is relatively high, and production of ephemerals is high (Luckenbach 1982, Turner and Brown 1982, Schamberger and Turner 1986). Soils must be friable enough for digging of burrows, but firm enough so that burrows do not collapse. In California, desert tortoises are typically associated with gravelly flats or sandy soils with some clay, but are occasionally found in windblown sand or in rocky terrain (Luckenbach 1982). Desert tortoises occur in the California desert from below sea level to an elevation of 7,300 feet, but the most favorable habitat occurs at elevations of approximately 1,000 to 3,000 feet (Luckenbach 1982, Schamberger and Turner 1986).

Desert tortoises are most active in California during the spring and early summer when annual plants are most common. Although they spend most of their lives in burrows or caves to escape the extreme conditions of the desert, they will become active in suitable weather at any time of the year; rainfall, particularly during the summer, often initiates activity. Young desert tortoises are more likely to be active in less optimal weather than adults (Wilson 1999). Further information on the range, biology, and ecology of the desert tortoise can be found in Burge (1978), Burge and Bradley (1976), Hovik and Hardenbrook (1989), Luckenbach (1982), Weinstein et al. (1987), and Service (1994b).

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

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

Desert tortoises, particularly males, are territorial and will fight intruders; females also occasionally fight. Although fights are unlikely to result in high levels of mortality or serious injury, they require energy and may render animals more susceptible to predation because desert tortoises are generally less wary when in combat.

Desert tortoises can produce from one to three clutches of eggs per year. On rare occasions, clutches can contain up to 15 eggs; most clutches contain 3 to 7 eggs. Multi-decade studies of the Blanding's turtle (*Emydoidea blandingii*), which, like the desert tortoise, is long lived and matures late, indicate that approximately 70 percent of the young animals must survive each year until they reach adult size; after this time, annual survivorship exceeds 90 percent (Congdon et al. 1993). Research has indicated that 50 to 60 percent of young desert tortoises typically survive from year to year, even in the first and most vulnerable year of life. We do not have sufficient information on the demography of the desert tortoise to determine whether this rate is sufficient to maintain viable populations; however, it does indicate that maintaining favorable habitat conditions for small desert tortoises is crucial for the continued viability of the species.

Desert tortoises typically hatch from late August through early October. At the time of hatching, the desert tortoise has a substantial yolk sac; the yolk can sustain them through the fall and winter months until forage is available in the late winter or early spring. However, neonates will eat if food is available to them at the time of hatching; when food is available, they can reduce their reliance on the yolk sac to conserve this source of nutrition. Neonate desert tortoises use abandoned rodent burrows for daily and winter shelter. Rodent burrows are often shallowly excavated and run parallel to the surface of the ground; this feature may make them more vulnerable to damage from foot and vehicle traffic.

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

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

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

The Mojave population of the desert tortoise includes those animals living north and west of the Colorado River in the Mojave Desert of California, Nevada, Arizona, southwestern Utah, and in the Colorado Desert in California. On August 4, 1989, the Service published an emergency rule listing the Mojave population of the desert tortoise as endangered (54 *Federal Register* 32326). In its final rule, dated April 2, 1990, the Service determined the Mojave population of the desert tortoise to be threatened (55 *Federal Register* 12178). The Service 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).

Critical habitat is designated by the Service to identify the key biological and physical needs of the species and key areas for recovery, and focuses conservation actions on those areas. Critical habitat is composed of specific geographic areas that contain the biological and physical attributes that are essential to the species' conservation within those areas, such as space, food, water, nutrition, cover, shelter, reproductive sites, and special habitats. These features are called the constituent elements of critical habitat. The specific 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(59 *Federal Register* 5820).

The recovery plan for the desert tortoise is the basis and key strategy for recovery and delisting of the desert tortoise. The plan divides the range of the desert tortoise into six distinct recovery units and recommends the establishment of 14 desert wildlife management areas throughout the recovery units. Within each desert wildlife management area, the recovery plan recommends implementation of reserve level protection of desert tortoise populations and habitat, while

maintaining and protecting other sensitive species and ecosystem functions. The design of desert wildlife management areas should follow accepted concepts of reserve design. As part of the actions needed to accomplish recovery, land management within all desert wildlife management areas should restrict human activities that negatively affect desert tortoises (Service 1994b).

Four recovery units identified in the recovery plan are located in California. Eight critical habitat units are also located in California. The recovery units in which the critical habitat units are found and their acreages are listed in the following table.

Recovery Unit	**Critical Habitat Unit**	**Acreage**
Western Mojave		
	Fremont-Kramer	518,000
	Superior-Cronese	766,900
	Ord-Rodman	253,200
	Pinto Mountain	171,700
Northern Colorado		
	Chemehuevi	937,400
Eastern Colorado		
	Chuckwalla	1,020,600
Eastern Mojave		
	Ivanpah Valley	632,400
	Piute-Eldorado	453,800

The Western Mojave Recovery Unit extends from approximately Olancha and the northern Panamint Valley in the north to the middle of Joshua Tree National Park in the south. (Note that the Desert Tortoise Recovery Plan Assessment Team considers the Pinto Mountain area, on the northern edge of Joshua Tree National Park, to be part of the Northern Colorado recovery Unit (Heaton et al. 2004). The Desert Tortoise Recovery Plan Assessment Committee was formed by the Service to evaluate the existing recovery plan to determine how to best update it.) The recovery unit also extends from the Sierra Nevada and Tehachapi Mountains in the west to Death Valley and the eastern side of Joshua Tree National Park in the east.

All or portions of the Eastern Mojave, Northeastern Mojave, Northern Colorado, and Eastern Colorado recovery units lie to the east and southeast of the Western Mojave Recovery Unit. We will not discuss these units further in this biological opinion.

The following description of the Western Mojave Recovery Unit is summarized from the recovery plan for the desert tortoise (Service 1994b) and the Bureau's biological evaluation for

an amendment to the California Desert Conservation Area Plan (Bureau 2001). The Western Mojave Recovery Unit is exceptionally heterogeneous and large with distinct climatic and vegetation characteristics in its western, central, and southern regions. The most pronounced difference between this and other recovery units is in timing of rainfall and the resulting vegetation. Most rainfall in the Western Mojave Recovery Unit occurs in fall and winter and produces winter annuals. Desert tortoises are active above ground primarily in the spring so they can consume plants that germinated in response to winter rains; however, recent studies have demonstrated that a limited number of individuals are likely to be active at any time of the year. In the western Mojave Desert, desert tortoises occur primarily in valleys and on bajadas and rolling hills in saltbush, creosote bush, and scrub steppe communities.

During the summers of 1998 and 1999, biologists associated with the West Mojave Plan surveyed over 1,200 transects over a large area of the western Mojave Desert. These transects failed to detect sign of desert tortoises in areas where desert tortoises were previously considered to be common. These data strongly suggest that the number of desert tortoises has declined substantially over large areas of the western Mojave Desert.

Between 1971 and 1980, 27 plots were established in California to study the desert tortoise; 15 of these plots were used by the Bureau to monitor desert tortoises on a long-term basis (Berry 1999). Generally, the plots were visited at roughly 4-year intervals to determine the numbers of desert tortoises they supported. Desert tortoises found on these plots during the spring surveys were registered; that is, they were marked so they could be identified individually during subsequent surveys. The Desert Tortoise Recovery Plan Assessment Committee (2004) evaluated data from these plots and used a "multivariate analysis (to assess) the statistical significance of downward trends in population densities in the West Mojave (Desert)." Based on this analysis, the Desert Tortoise Recovery Plan Assessment Committee concluded that the population densities of adult desert tortoises exhibited a significant downward trend ($P < 0.0001$) from approximately 1975 through 2000.

Based on density values derived from line-distance sampling conducted within the Western Mojave Recovery Unit (i.e., the Fremont-Kramer, Superior-Cronese, and Ord-Rodman critical habitat units), Heaton et al. (2004) calculated the number of adult desert tortoises to range from 20,420 to 41,224. They arrived at this estimate by multiplying the average density for each critical habitat unit by the acreage of suitable habitat that was sampled within the unit and totaling the results. Note that the sampling excludes areas over 4,200 feet in elevation and playas, where desert tortoises are not expected to live, and private lands, which are not sampled because of lack of access. Desert tortoises that reside within suitable habitat on private lands are not included in the estimate; consequently, the predicted range of the number of desert tortoises may be greater than estimated. Conversely, as we noted previously in this section, the most favorable habitat for desert tortoises occurs between 1,000 and 3,000 feet, therefore, including elevations of up to 4,200 feet in the abundance calculation may result in an overestimate of the number of desert tortoises. Finally, statistical issues with the methodology of line-distance sampling may introduce even greater variances in the estimated total than those shown in the

depicted range. Regardless of the variance that may exist in these estimates, they represent the best available scientific and commercial information.

The desert tortoise was listed in response to loss and degradation of habitat caused by numerous human activities including urbanization, agricultural development, military training, recreational use, mining, and livestock grazing. The loss of individual desert tortoises to increased predation by common ravens, collection by humans for pets or consumption, collisions with vehicles on paved and unpaved roads, and mortality resulting from diseases also contributed to the Service's listing of this species. The recovery plan for the desert tortoise considered the Western Mojave Recovery Unit to be one of the most threatened units (Service 1994b). Desert tortoises in this recovery unit continue to face numerous threats today. Predation by common ravens and feral dogs, mortality on paved and unpaved roads, vandalism and poaching continue to cause loss of individuals; unauthorized off-road vehicle use, cattle grazing, urbanization, mining, and the development of utilities are activities that continue to cause loss and degradation of habitat.

Lane Mountain Milk-vetch

The Lane Mountain milk-vetch was listed as endangered on October 6, 1998 (63 *Federal Register* 53596). We are scheduled to publish a proposal to designate critical habitat for the Lane Mountain milk-vetch on April 1, 2004. A recovery plan is currently being prepared.

The Lane Mountain milk-vetch is a perennial plant species in the pea family. It is a slender, diffuse plant, 12 to 27.5 inches tall, with straggling, freely branched stems that arise from a buried root-crown (Barneby 1964). Herbage is light-gray or greenish, strigulose with short, fine, straight hairs. The flowers, 5 to 15 per stalk, are cream to purple, or lighter with veins of a deeper color. Fruits are pencil-shaped, linear, smooth, and pendant, 0.6 to 1 inch long.

Plants of this species typically grow under and entangled within the canopy of low shrubs. Few plants have been observed in the open. Most of the host species are intricately branched low shrubs, but a few of the observed hosts were bunch grasses (*Stipa* sp.) and subshrubs such as Mojave aster (*Machaeranthera tortifolia*) and wishbone bush *(Mirabilis bigelovii*); the most common host plants were turpentine bush *(Thamnosma montana*), white bursage (*Ambrosia dumosa*), California buckwheat (*Eriogonum fasciculatum* var. *polifoium*), Cooper goldenbush (*Ericameria cooperi*), and Mormon tea (*Ephedra nevadensis*) (Charis Professional Services Corporation 2002). Host plants were usually living, although a few hosts are dead shrubs.

The scrub community at Lane Mountain milk-vetch sites is typically a diverse mix of shrub species. Brandt et al. (1997) characterized milk-vetch sites as areas where Nevada Mormon tea (*Ephedra nevadensis*) and Cooper goldenbush (*Ericameria cooperi*) are dominant shrubs and where the shrub density is greater than in surrounding areas. The Lane Mountain milk-vetch occurs at elevations of approximately 3,100 to 4,100 feet (Charis Professional Services Corporation 2002).

The Lane Mountain milk-vetch occurs on rocky, low ridges, only a foot or two higher than the main bajada slope, and rocky low hills, 10 to 20 feet high, where bedrock is exposed or probably near the surface (Lee and Ro Consulting Engineers 1986). It appears to be largely confined to granitic substrates.

The Lane Mountain milk-vetch appears to have a very short growing period in very dry years (Bagley 1989). The perennial rootstock may allow the Lane Mountain milk-vetch to survive occasional dry years, while longer periods of drought might be endured by remaining dormant (Beatley in Bagley 1989). It typically blooms in April and May.

Limited observations on its pollinators were carried out in 2003 (Kearns 2003 in Service 2004b). Although 30 species of insects were observed visiting flowers in the area, only 4 visited Lane Mountain milk-vetch flowers. The most frequent pollinator was *Anthidium dammersi*, a solitary bee in the megachilid family (Megachilidae) that occurs in the Mojave and Colorado deserts of California, Nevada, and Arizona (Kearns 2003 in Service 2004b).

Prigge and Sharifi (pers. comm. 2004) determined that seedlings could be distinguished from resprouts of established plants by the presence of small cotyledons and a reduced number of leaflets on the youngest branches. They also observed that, at least in one year, most seedlings died before becoming large enough to bear flowers. In a greenhouse, Sharifi et al. (2003 in Service 2004b) and Sharifi in litt. (2003 in Service 2004b) determined that 11 percent of seeds germinated readily without additional treatment (e.g., scarification or cold stratification). After germination, it took 4 to 6 weeks for seedlings to reach 1 to 2 inches in length, indicating that the seedlings may be allocating most of their initial growth into root production. Nothing further is known of the reproductive biology of this species.

The Lane Mountain milk-vetch is known only from four occurrences within an area of land that is approximately 18 miles in diameter. The southwestern end of the range lies on the northeastern slopes of the Mud Hills; from the Mud Hills, occurrences extend generally to the northeast, across the lower slopes of Lane Mountain and the northern portion of the Paradise Range, ending in unnamed hills in the southern portion of the Goldstone Deep Space Communications Complex. The NASA Goldstone occurrence is located on lands managed by the National Aeronautics and Space Administration and the Department of the Army within the boundaries of Fort Irwin; it is located to the east of the Superior Valley parcel. The Brinkman Wash-Montana Mine occurrence is located within the boundaries of Fort Irwin to the southwest of the NASA Goldstone occurrence. Most of the Paradise Valley occurrence is located within the boundaries of Fort Irwin to the west and southwest of the Brinkman Wash-Montana Mine occurrence; the remaining portions of the occurrence are located on lands managed by the Bureau. The Coolgardie Mesa occurrence is located primarily on lands managed by the Bureau to the southwest of the Paradise Valley occurrence. Based on the available historical and recent information, the Lane Mountain milk-vetch does not appear to have been more widespread than is currently known; no extirpations of population have been documented.

The Coolgardie Mesa occurrence is crossed by numerous roads. In many areas, vehicles seem to remain primarily on the established routes. In the southernmost portion of the occurrence, off-road vehicles use a few large denuded areas as staging areas and spread out from this area. Mark Hessing (pers. comm. 2004) notes that he has observed off-road vehicles traveling through habitat of the Lane Mountain milk-vetch a 0.25 mile to the west of Copper City Road, the main dirt road through this occurrence. More detailed descriptions of the other three occurrences are contained in the Environmental Baseline section of this biological opinion.

From mid-April through early August, 2001, the Army conducted extensive surveys for the Lane Mountain milk-vetch. A full description of the methodologies is provided in Charis Professional Services Corporation (2002). The surveys were focused on areas that had not been surveyed in 1999 because data from the 1999 survey was to be included in the final results. The primary objectives of the survey were to identify new occurrences of the Lane Mountain milk-vetch, determine the boundaries of the occurrences, and collect enough information to estimate population numbers. The surveyors used three types of transects; each transect type involved 4 to 7 surveyors walking approximately 30 feet apart and making one or more passes over an area. The surveyors collected GPS and other data on each plant that was detected; after the first 2 weeks, the surveyors reduced the amount of data that were being collected on each plant because of the large number of individuals being detected.

The boundaries of occurrences were mapped to include every plant that was found. The extent of each occurrence was then mapped using a minimum convex polygon (i.e., the smallest polygon in which no internal angle exceeds 180 degrees). The average density of plants was calculated by dividing the total number of plants observed in the occurrence for the area within the transects. The number of plants in the occurrence was then calculated by multiplying the size of the occurrence by the average density of plants. Because individuals of the Lane Mountain milk-vetch are difficult to observe for a variety of reasons and different surveyors vary in their ability to detect plants, the Army developed an "observability" formula to assist in estimating the total number of plants in each occurrence. The following table provides an estimate of the number of Lane Mountain milk-vetch plants adjusted by the observability factor and the actual number of plants observed during surveys within each of the four occurrences.

Percentage of Observability	NASA Goldstone	Brinkman Wash-Montana Mine	Paradise Valley	Coolgardie Mesa	All Locations Combined
100 percent	1,399	3,109	4,324	5,288	14,121
50 percent	2,799	6,219	8,648	10,576	28,241
10 percent	13,993	31,094	43,239	52,881	141,207
Total Recorded Plants[1]	555	1,487	1,667	2,014	5,723

[1] The total number of plants includes those detected in both the 1999 and 2001 surveys. It does not include plants discovered in 2003; we did not include those plants because they

were detected after the observability numbers had been calculated. The total number of plants includes mature plants only; seedlings are excluded from the total.

The Army conducted additional surveys in 2003. Nine new plants were found clustered in a relatively small area outside the boundary of the Paradise Valley occurrence (Science Applications International Corporation 2003). Mike Dungan of Science Applications International Corporation, who conducted the 2003 surveys, did not believe that this small group of plants warranted increasing the minimum convex polygon for the occurrence. Three new plants were also found outside the boundary of the Coolgardie Mesa occurrence in 2003; Dr. Dungan believed that these individuals did not justify expanding the map of the distribution of the Lane Mountain milk-vetch at Coolgardie Mesa.

The Army speculates that the sizes of the occurrences and numbers of individuals likely represent minimum levels "because the survey year represented a normal rainfall year preceded by (2) years of drought and population boundaries were conservatively drawn" and that the boundaries of the occurrences and numbers of individuals may fluctuate after several successive years of normal or above normal rainfall (Charis Professional Services Corporation 2003). We cannot address the degree of conservatism used to draw the boundaries of the occurrences; however, we expect that the information presented in the biological assessment likely represents a reasonable distribution of the plants. Given the normal patterns of rainfall in the Mojave Desert, we would not expect that short-term differences in rainfall would substantially alter the distribution of the Lane Mountain milk-vetch.

The following table describes the acreage of the occurrences, based on the Army's use of minimum convex polygons to define the boundaries, and ownership information.

	NASA Goldstone	**Brinkman Wash–Montana Mine**	**Paradise Valley**	**Coolgardie Mesa**	**All Locations Combined**
Acreage[1]	1,283	5,497	4,794	9,775	21,349
Land Management Agencies or Owners	Army, NASA	Army[2]	Army, Bureau[3]	Bureau, private[4]	

[1]Total acreage in polygons.

[2]This occurrence includes a small amount of private and State Lands Commission lands; however, the Army proposes to acquire these areas.

[3]This occurrence includes a small amount of private lands; these areas are proposed for acquisition by the Army or, if they occur outside the boundaries of Fort Irwin, by the either the Army or Bureau.

[4]Approximately ¼ of the occurrence is privately owned.

Most of the habitat of this species that remains on public lands is managed by the Bureau as Class M; a small portion of known occupied habitat near the northeastern-most corner of the Mud Hills may be within an area managed as Class L. Lands within Class L include areas that are managed to provide for lower density, carefully controlled multiple uses of resources while ensuring that sensitive values are not significantly diminished. Lands within Class M include areas that are managed to provide for a wide variety of present or future uses that include mining, livestock grazing, recreation, energy, and utility development. The Bureau and Service are currently consulting, under the authorities of section 7(a)(2) of the Endangered Species Act, on the West Mojave Plan; the West Mojave Plan is a proposed amendment of the Bureau's California Desert Conservation Area Plan for the western Mojave Desert. As part of this plan, the Bureau has proposed to manage the areas where the Lane Mountain milk-vetch occurs as Class L. It has also proposed to withdraw the area from mineral entry (subject to valid existing rights), minimize routes of travel for vehicles, and install fencing, if necessary, to protect the Lane Mountain milk-vetch (Bureau 2003).

The species was listed because of threats related to habitat destruction from dry wash gold mining, other mining activities (materials lease mining), rock and mineral collecting, off-highway vehicle activity, and potentially from increasing fire frequency and any associated fire suppression activities. The expansion of Fort Irwin was also identified as a potential threat. Sheep grazing has not occurred within the habitat of this species since 1989 as a result, first, of drought and, secondly, of a consultation between the Service and Bureau on the desert tortoise.

ENVIRONMENTAL BASELINE

We are considering the area within the boundaries of Fort Irwin as the action area for this consultation because, with a minor exception, the proposed preparation and use of the additional training lands would occur within the boundaries of Fort Irwin. One task to prepare training lands would occur outside of the boundary of Fort Irwin; the power lines in the Boulder Corridor would be fitted with aircraft warning devices. However, because this work would be conducted by the Department of Water and Power of the City of Los Angeles, the Army would not be directly involved.

We acknowledge that several actions the Army proposed to offset the adverse effects of the use of the new training lands will occur outside the boundaries of Fort Irwin, anywhere in the Western Mojave Recovery Unit. Because these actions are related to the primary action proposed by the Army (i.e., the use of additional training lands at Fort Irwin), we will generally consider their effects on the desert tortoise and Lane Mountain milk-vetch. However, several of these actions (e.g., the fencing of Irwin Road, rehabilitation of roads on Bureau lands, and research and collection of data) will require additional planning, analysis, and authorization by other agencies, including the Bureau and Service. Additionally, we do not know the specific locations where several of these actions would occur; consequently, we cannot provide specific baseline information for such areas.

We note that the Army, in the biological assessment, defines the action area to include Fort Irwin and much of the western Mojave Desert. (See Figure 1-1 in Charis Professional Services Corporation 2003.) Despite the fact that we do not consider the action area to include the entire Western Mojave Recovery Unit, we have provided general information on the status of the desert tortoise and Lane Mountain milk-vetch in the western Mojave Desert in this biological opinion because the proposed addition of training lands and the conservation measures have the potential to affect the survival and recovery of these species throughout the region.

Description of Affected Habitats

The action area contains a diverse assemblage of habitat types and terrain. The following description provides only a brief summary of the biological and physical characteristics of the area; it is summarized from the biological assessment and our experience with the region.

The western portion of the Superior Valley parcel comprises saltbush scrub communities surrounding two playas at an elevation of approximately 3,000 feet; the terrain is generally flat. The land trends generally upward to the east and transitions into Joshua tree woodland and creosote bush scrub communities. The terrain also becomes more varied with small, steep hills, the northern flank of the Lane Mountain range, and rolling hills adding diversity. In the northern portion of the parcel, creosote bush scrub and saltbush scrub communities intermingle. To the south, a large wash flows from the center of parcel through Paradise Valley to outside the boundaries of Fort Irwin. Steep, rugged ranges line the eastern border of the parcel, ending with the northern portion of the Paradise Range in the south; these ranges support Mojave mixed woody scrub communities, which are probably the most botanically diverse plant assemblages within this parcel.

The western portion of the UTM 90 parcel includes the eastern edge of the Paradise Range and supports a Mojave mixed woody scrub community. In the vicinity of Fort Irwin Road and the Manix Trail, the terrain consists of a series of rolling hills and undulating terrain; although characterized as a creosote bush scrub community, this area supports a slightly greater diversity of plants. The northern slope of the Alvord Mountains lies to the east. This broad alluvial fan primarily supports a creosote bush scrub community; portions of this area contain high quality perennial grasslands with robust stands of galleta grass (*Hilaria rigida*). The eastern end of the parcel supports sandy areas and a few large canyons that drain to the south.

The Eastgate parcel contains the South Avawatz Mountains in its southernmost portion. The eastern portion of the parcel is a large alluvial fan that slopes to the east. The fan is rocky and crossed by numerous small braided washes. The lowest point of this parcel is at its eastern end, at 854 feet.

Desert Tortoise

To assess the number of desert tortoises in the Superior Valley and UTM 90 areas, the Army used plot studies, which involved marking and recapturing desert tortoises, transects, and line-

distance sampling. The methods are fully described in the biological assessment and its appendices (Charis Professional Services Corporation 2003). In summary, the Army's most recent surveys included 568 1.5-mile-long belt transects in approximately 56 square miles in the Superior Valley and UTM 90 areas in 2001; in combination with plots, the transects covered the western portion of the UTM 90 area and approximately 71 percent of the main use area in the Superior Valley. In 2002, the Army surveyed 116 1.5-mile-long belt transects in an additional 11 square miles of the Superior Valley and UTM 90 areas. The following table depicts the results of these surveys.

Estimated Number of Adult Tortoises in the Project Area			
Location	**Total Area**[1]	**Estimated Number of Desert Tortoises** [2]	**Approximate Confidence Interval for Abundance Estimate**
Superior Valley Parcel	70,045 acres	626-658	516-1,143[4]
UTM 90 Area North and West of the Alvord Mountains	16,401 acres	430-441	337-640[4]
UTM 90 Area East of the Alvord Mountains	6,813 acres	96-124[3]	----[5]
Eastgate Parcel	48,629 acres	288[3]	----[5]
Goldstone	1,472 acres	5[3]	----[5]
TOTAL	143,360 acres[1, 6]	1,445-1,516	1,245-2,206[4]

[1]Includes all conservation areas except those on Fort Irwin (NASA Goldstone) and the 2-square mile conservation area outside of the boundaries of Fort Irwin.

[2]From Karl (2002b [Appendix D] in Charis Professional Services Corporation 2003), plus additions based on current withdrawal area boundary.

[3]Previous studies indicated that densities in this area were low. To arrive at a density estimate, Karl eliminated 840 acres of unsuitable habitat (slopes greater then 30 percent, areas greater than 4,500 feet in elevation, playas) from further consideration. She then estimated an average of one desert tortoise per square mile for the eastern half of the parcel, which includes approximately 23,000 acres. For the western portion, Karl applied the midpoint of the range of densities estimated by the Bureau from transects conducted on adjacent lands; based on this method, she estimated a density of 6.5 desert tortoises per square mile for the approximately 24,789 acres of remaining potential habitat in the Eastgate area. (See the biological assessment for a more detailed description of this method.)

[4]Confidence intervals are based on calculated limits for the sampled distance, plus the total number of desert tortoises estimated for the unsampled distance.

[5]Could not be determined based on approximation method used to estimate abundance.

[6]Includes acreage for the Goldstone Transit Route.

In conclusion, the Army estimates that approximately 1,445 to 1,516 desert tortoises occupy the Superior Valley, UTM 90, and Eastgate parcels; the confidence interval for this estimate ranges from 1,245 to 2,206 desert tortoises. We concur with the Army's statement that the estimates likely are high for the Eastgate area; in our experience, desert tortoises are scarce in this region. A limited area of the Eastgate parcel, on the southern flanks of the South Avawatz Mountains, provides suitable habitat for an aggregation of desert tortoises (Woodman pers. comm. 2004).

Heaton et al. (2004) attempted to evaluate the estimates of the number of desert tortoises in the Superior Valley and UTM 90 parcels. They concluded that transects from the line-distance sampling effort in the Superior-Cronese Critical Habitat Unit were not placed appropriately to calculate densities in the Superior Valley parcel and that the estimates developed by Karl were valid. They combined the east and west parcels in evaluating the UTM 90 area and concluded that the line-distance sampling results were consistent with the numbers in the biological assessment. They agreed that a range of from 352 to 764 desert tortoises was appropriate to use for this area; this range combines the lower end value from the line-distance sampling effort with the higher end value provided by Karl's transects and estimations.

The distribution and abundance of the desert tortoise within the former boundaries of Fort Irwin have been greatly affected by military exercises. They have been essentially eliminated from most of the valleys and bajadas where vehicles frequently travel off road. They persist in small numbers at the slopes of mountain ranges where they are protected from vehicles by the terrain.

Prior to the withdrawal of the lands, the Bureau and Service conducted one substantial consultation on the desert tortoise that affected management of the Superior Valley parcel. On April 11, 1991, we issued a biological opinion to the Bureau in which we concluded that the Bureau's ephemeral sheep grazing program in the western Mojave Desert was likely to jeopardize the continued existence of the desert tortoise (Service 1991). Sheep have not grazed legally within the Superior Valley parcel since 1989 because of drought and, since that time, because of the Service's biological opinion.

Without including consultations regarding expansion proposals, the Army and Service have conducted six formal consultations on the desert tortoise since its listing. Two of the consultations involved projects that did not overlap the action area (the installation of an antenna system within the Goldstone Deep Space Communications Complex [Service 1992]; the creation of a recreational area for use of off-road vehicles [Service 2002b]; we will not discuss these projects further in this biological opinion.

In 1991 and 1995, the Army and Service formally consulted on the effects of the ongoing training at Fort Irwin on the desert tortoise and its critical habitat, respectively (Service 1991a, 1995). We are including a discussion of these consultations because the areas covered by the previous biological opinions overlap the new boundaries for training, particularly along the northern edge of the UTM 90 parcel to a small degree; we cannot discern precisely where this overlap occurs. The area south of the UTM 90 line was established as off-limits to vehicles traveling off-road during these consultations; at the time these consultations were completed, the distribution and abundance of desert tortoises had already been altered by decades of training

(Service 1991a, 1995). The Service concluded that the continued training at Fort Irwin was not likely to jeopardize the continued existence of the desert tortoise (specifically in the 1991 biological opinion) or adversely modify its critical habitat (specifically in the 1995 biological opinion) because most activities occurred in areas that had been affected by training prior to the listing of the desert tortoise or designation of its critical habitat. The biological assessment (Charis Professional Services Corporation 2003) notes that 36 desert tortoises were killed at Fort Irwin during military maneuvers between 1994 and 2002; an additional 85 desert tortoises were moved from harm's way during this period. By letter dated June 16, 2003, the Army notified us that four desert tortoises had been killed in fiscal year 2003 as of the date of the letter.

Two of the projects on which we consulted with the Army are located within the action area of this biological opinion. On April 19, 2002, we issued a biological opinion to the Army regarding a survey of the revised boundary of Fort Irwin. The proposed action involved placement of markers along the new boundaries; access would be by pick-up truck and all-terrain vehicles, and on foot. The Army committed to attempting to avoid desert tortoises when traveling through the project area. We found that the proposed action was not likely to jeopardize the continued existence of the desert tortoise or adversely modify its critical habitat because the Army included measures in its project description to avoid desert tortoises, few individuals were likely to be killed or injured by the surveys, and disturbance of habitat would be temporary (Service 2002a). The survey had not been completed as of the date of this biological opinion (Quillman pers. comm. 2004).

On June 9, 2003, we issued a biological opinion to the Army regarding the installation of a fiber optic cable between Fort Irwin and the Naval Air Weapons Station, China Lake. The proposed route of the cable crosses the action area under consideration in this biological opinion. The cable would be installed in a 12-inch wide trench along a 32-mile long route; most of the installation would be either within roads or their shoulders. The Army committed to have biologists accompany the installation equipment and move any desert tortoises from harm's way. The Army also proposed to avoid burrows if possible and to inspect and excavate by hand any burrows that could not be avoided. We found that the proposed action was not likely to jeopardize the continued existence of the desert tortoise or adversely modify its critical habitat because the Army included measures in its project description to avoid killing or injuring animals and only a small area of habitat would be temporarily disturbed (Service 2003). The cable had not been installed as of the date of this biological opinion (Quillman pers. comm. 2004).

In summary, the areas affected by activities evaluated in four previous biological opinions overlap the action area under consideration in this document. The effects of ongoing training may have degraded the quality of habitat of the desert tortoise within the action area for this consultation to some degree; however, with few exceptions (e.g., tank crossings of Fort Irwin Road), ongoing training has affected only portions of the edges of the current action area have been disturbed by previous training. The Army has not yet installed the fiber optic connection to the Naval Air Weapons Station, China Lake, or conducted the boundary survey; however, we

expect that the effects of these projects on the desert tortoise and its critical habitat would be minor.

Lane Mountain Milk-vetch

Most of the Paradise Valley occurrence, the Brinkman Wash–Montana Mine occurrence, and part of the NASA Goldstone occurrence are located in the action area. The sizes of the occurrences and potential numbers of Lane Mountain milk-vetch plants in them are described in the Status of the Species section of this biological opinion.

In general, the three occurrences that are located entirely or primarily within the boundaries of Fort Irwin are relatively undisturbed by human activities. At the time the proposed rule to list the Lane Mountain milk-vetch was being prepared, a small portion of the Brinkman Wash-Montana Mine occurrence within the former boundaries of Fort Irwin experienced some vehicle traffic. Shortly after this use was discovered, the Army installed protective fencing around the site; use is currently restricted to soldiers traveling on foot during light training. Few roads cross the remainder of the Brinkman Wash-Montana Mine occurrence; most of the roads cross the northern portion of the occurrence because of the steep and rugged nature of the southern portion. Prior to its withdrawal for use by the Army, this area experienced generally light recreational use and a low level of casual mining. (Descriptions of the baseline conditions of the habitat within the occurrences located within Fort Irwin are based on examination of maps and personal observations by Ray Bransfield (biologist, Service, Ventura Fish and Wildlife Office).

The Army has fenced the portion of the NASA Goldstone occurrence on its lands to prevent entry by vehicles. Few roads traverse the area and it is relatively undisturbed.

Relatively few roads cross the Paradise Valley occurrence; the western portion of the occurrence contains all the roads noted on topographic maps. Although we are not familiar with the area where this occurrence is located, we are aware that portions of the Paradise Valley experienced some level of unauthorized off-road vehicle use when the land was managed by the Bureau; this use was evident by the number of trails leaving the main unpaved road through the valley and areas where recreational users camped. We do not know if the level of use of the area has changed since the lands were withdrawn.

The Army and Service have conducted two formal consultations on the Lane Mountain milk-vetch for projects located within the action area of this biological opinion. On April 19, 2002, we issued a biological opinion to the Army regarding a survey of the revised boundary of Fort Irwin. This proposed action is briefly described in the previous section of this biological opinion. The Army committed to attempting to avoid individuals of the Lane Mountain milk-vetch when setting markers and traveling off-road. We found that the proposed action was not likely to jeopardize the continued existence of the Lane Mountain milk-vetch because the Army included measures in its project description to avoid individuals of the Lane Mountain milk-vetch, few individuals were likely to be disturbed by the surveys, and disturbance of habitat would be temporary (Service 2002a). The survey had not been completed as of the date of this biological opinion (Quillman pers. comm. 2004).

On June 9, 2003, we issued a biological opinion to the Army regarding the installation of a fiber optic cable between Fort Irwin and the Naval Air Weapons Station, China Lake. This proposed action is briefly described in the previous section of this biological opinion. The Army committed to search the right-of-way for the Lane Mountain milk-vetch prior to the onset of ground disturbance, flag any individuals of the plant that were found, and reroute the cable to avoid these individuals; we noted that this measure was likely to avoid most impacts to the species but that the potential existed for surveyors to miss young or well-hidden plants. We found that the proposed action was not likely to jeopardize the continued existence of the Lane Mountain milk-vetch because the Army included measures in its project description to avoid individuals of the Lane Mountain milk-vetch and the route was located north of any known occurrences of the species (Service 2003). The cable had not been installed as of the date of this biological opinion (Quillman pers. comm. 2004).

In summary, the areas affected by activities evaluated in two previous biological opinions overlap the action area under consideration in this document. The Army has not yet installed the fiber optic connection to the Naval Air Weapons Station, China Lake, or conducted the boundary survey; however, we expect that the effects of these projects on the Lane Mountain milk-vetch would be minor.

EFFECTS OF THE ACTION

In the following section, we have analyzed the potential effects of training on the desert tortoise and Lane Mountain milk-vetch on the additional training lands. We have also evaluated actions that the Army must undertake to prepare the additional training lands for use. We note that, generally, the effects of the actions needed to prepare the land for training would be minor in comparison to those associated with the use of the additional training areas because of their nature and the limited areas in which they would occur.

We have also analyzed the beneficial and adverse effects, if any, of conservation measures the Army has proposed to implement for these species. Several of the conservation actions would be implemented by other agencies or individuals (e.g., rehabilitation of routes on public lands by the Bureau, studies on desert tortoises by researchers with the U.S. Geological Survey) and would require future evaluation and authorization by the Service (e.g., consultations pursuant to section 7(a)(2) and recovery permits pursuant to section 10(a)(1)(A) of the Act). 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.

Finally, we attempted to quantify, to the best of our ability, both the adverse and beneficial effects of the proposed action on the desert tortoise and Lane Mountain milk-vetch. Given the difficulty in detecting individuals of both species, the large areas over which the training and conservation measures would occur, and uncertainties regarding when and where training and conservation measures would intersect with individuals and habitat of the listed species, we cannot precisely quantify these effects in all cases. However, despite these difficulties, we have used the best available scientific and commercial information in our evaluations.

Desert Tortoise

Effects of the Preparation of the Additional Training Lands

The Army would prepare the Superior Valley, UTM 90, and Eastgate parcels for training through several construction and remediation actions. In general, these activities would disturb a limited amount of habitat in comparison with training activities and affect far fewer desert tortoises. In most cases, desert tortoises could be killed by heavy equipment being used at work sites or as they travel to the sites. Additionally, desert tortoises are likely to be affected in much the same manner as they are by most construction activities; for example, discarded trash may attract predators and workers may maliciously or unknowingly injure or collect desert tortoises. The Army has proposed to provide environmental education programs to all civilians and soldiers that enter areas where desert tortoises could occur; such programs can effectively reduce the level of mortality of desert tortoises caused by carelessness.

The Army would construct a barrier to vehicles along the boundaries of Fort Irwin in areas where the installation is accessible because of terrain. Desert tortoises could be killed or injured during construction of the barrier, both above ground and in their burrows. The ditch portion of the barrier may entrap desert tortoises if its sides are too steep. The potential exists for the barrier to disrupt movement of desert tortoises along large washes. The barrier may also cause increased erosion in adjacent areas.

The Army would construct two water stops, one each in the Eastgate and Superior Valley parcels. The well, water purification unit, 10,000-gallon storage tank, and dispersal pump that would be placed at each stop would result in the loss of an unquantified amount of habitat. Desert tortoises could be killed or injured during construction of the water stops. However, both stops would be located in areas where training would likely severely degrade the habitat at some point in the future. If water is readily available to common ravens and other predators of the desert tortoise at the water stops, the local abundance of these animals may increase; an increase in the number of predators would place an additional population stressor on desert tortoises in adjacent, undisturbed areas. Given that common ravens will fly great distances for water, they could affect a substantial area of adjacent lands.

Aircraft warning devices would be installed on the power lines in the Boulder Utility Corridor. Workers from or contractors for the Department of Water and Power may kill desert tortoises as they drive along the existing service roads to access the utility corridor. However, this route is currently well-used by the public and workers for the various utility companies that maintain facilities in the Boulder Utility Corridor. The presence of work crews to install the warning devices is unlikely to add substantially to the level of traffic along the corridor.

The Army would build two or three tank crossings over Fort Irwin Road and install a corridor along Fort Irwin Road, using K-rails, in the maneuver area. The use of heavy equipment in this area may kill or injure desert tortoises; however, this area is highly disturbed by current training activities. Consequently, we expect that construction of the crossing and installation of the K-

rails would kill few, if any, desert tortoises; additionally, most of the habitat in this area adjacent to the road is already degraded.

The Army would reroute Copper City Road to skirt the Superior Valley parcel; the rerouted road would parallel the boundary barrier. Construction of the road could kill or injure desert tortoises, both above ground and in their burrows. Copper City Road is currently a maintained and well-traveled route; therefore, the rerouting should not alter use patterns in a manner that would affect desert tortoises. Some potential exists that the public may use the road to try to observe training activities; because force-on-force maneuvers will not occur in this area, the military activities may be of limited interest to most members of the public. Additionally, the rerouting of the road would occur in an area where desert tortoises are generally not abundant.

The Army would remediate at least one unauthorized dump site. Vehicles traveling to and from the site may kill or injure desert tortoises. On rare occasions, desert tortoises have taken shelter in trash dumps; these individuals and others living nearby could be killed or injured during the removal of debris.

The Army would close several mines, primarily in the Eastgate parcel. Many mines are likely located in rugged and steep areas; we expect that the existing disturbance around these sites would likely result in the presence of few desert tortoises. Desert tortoises have been known, on occasion, to use abandoned mine shafts for shelter. Because the mines will be evaluated for their resource value before closure, the Army would likely detect any desert tortoises that may be using them. In the event that desert tortoises are using the mines, the mine will be closed in a manner that allows continued access by desert tortoises (Quillman pers. comm. 2004)

The Army would allow communications sites and other necessary tracking or monitoring equipment, including environmental monitoring equipment, and the roads to these facilities to be sited in the conservation and 'no-dig' areas that have been established for the Lane Mountain milk-vetch. Desert tortoises occur in these areas in varying densities. Therefore, some unquantified amount of habitat would be lost and desert tortoises would likely be killed in these areas as a result of construction activities.

The signing of dry lakes, conservation areas, the 'no-dig' area, and springs as off-limits areas has the potential to kill or injure desert tortoises, if vehicles drive off-road to place the signs. Few desert tortoises are likely to be killed or injured by these activities because the work does not involve disturbance of the ground and would occur in fairly limited areas. Additionally, desert tortoises do not occur in abundance in the vicinity of the dry lakes and springs.

As noted at the beginning of this section, the overall effects on the desert tortoise and its habitat due to preparation activities should be minor in comparison to the effects of training. Additionally, although the details of the translocation plan have not been developed to date, desert tortoises found during preparation activities may be made available for translocation.

Effects of the Use of the Additional Training Lands

Desert tortoises can be struck by vehicles that are driving on paved and unpaved roads and across roadless areas (Boarman and Sazaki 1996). The Army would use roads throughout Fort Irwin to deploy soldiers and vehicles to the areas where training exercises would begin. Roads would also be used to support training exercises; supplies, wastes, and construction materials would be hauled along roads. The number of desert tortoises that would be killed or injured on roads depends on numerous factors, such as the density of animals in adjacent habitat, the type and level of training activity in adjacent habitat, the nature and frequency of the use, and the presence of animals on the roads when they are being used. The Army's proposals to educate soldiers and other personnel about conservation of the desert tortoise may reduce the level of mortality on roads to some degree.

Cross-country travel would occur primarily during training exercises. Desert tortoises would be killed or injured during cross-country travel. The number of animals that would be killed or injured will vary, as discussed in the previous paragraph, in response to many factors. In some areas of Fort Irwin, rugged and steep terrain would restrict the amount of cross-country travel during training exercises; in these areas, desert tortoises may persist for years. However, desert tortoises would be extirpated from areas where vehicles regularly travel cross country, such as during training exercises.

Because of their small size, hatchlings and slightly larger desert tortoises could be trampled by foot traffic. Nests are also vulnerable, but their typical location, near the mouth of a burrow, likely protects them to some degree from foot traffic. Foot traffic would likely pose a greater degree of threat where habitat is not as disturbed by vehicles, such as in areas used for orienteering and other dismounted activities.

Cross-country travel, particularly when large numbers of vehicles are being used, also results in the destruction of burrows; desert tortoises could either be trapped inside the burrows or find them unavailable when they are needed to escape predation or extreme weather conditions. Nests, which are generally placed near the mouths of burrows, would also be crushed by vehicles. During a study conducted by Berry et al. (2002) in the Tiefort Mountains at Fort Irwin, none of the natural caves and rock shelters collapsed, although 30 percent of burrows constructed in open ground collapsed or were damaged as a result of natural or anthropogenic causes; natural caves and rock shelters may be relatively more common in rugged and steep terrain and may therefore assist desert tortoises to persist in these areas.

Desert tortoises may be killed in their burrows when soldiers excavate trenches during training exercises. At the Marine Corps Air Ground Combat Center at Twentynine Palms, a desert tortoise died after becoming entangled in camouflage netting; another died after being entangled in communications wire. In both cases, the materials had been left behind as debris after the conclusion of an exercise (Evans pers. comm. 2004). Desert tortoises may seek shelter in the shade of vehicles and be crushed when those vehicles are subsequently moved. Improper

disposal of food wastes and trash often attract predators of the desert tortoise, especially common ravens (*Corvus corax*).

The Army currently uses mineral oil as a visual obscurant on the existing training lands on Fort Irwin. To the best of our knowledge, the Army has not specifically analyzed the effects of mineral oil on the desert tortoise. Similarly, we have no information on the effects of mineral oil on the desert tortoise. Because desert tortoises are afflicted with diseases of the upper respiratory tract, this issue warrants specific investigation.

The Army estimated that approximately from 999 to 1,049 adult desert tortoises will be killed by training activities (Charis Professional Services Corporation 2003). Note that this total does not include hatchling and juvenile desert tortoises or the approximately 300 individuals the Army originally proposed to translocate. Since the biological assessment was prepared, the Army has proposed to increase the size of the conservation areas for the desert tortoise along the southern boundary of the installation in the vicinity of Fort Irwin Road and the Manix Trail and to designate approximately 3,700 acres in the vicinity of the Brinkman Wash-Montana Mine occurrence of the Lane Mountain milk-vetch as a low-use, "no-dig" area. The Army calculated that the increase in the size of these conservation areas would decrease the number of adult desert tortoises that could be killed by 152 (Army 2004c) because these animals would be located outside of areas used for training. We acknowledge that the expansion of the conservation areas is likely to conserve additional desert tortoises and have no basis for contending the estimate of the numbers provided by the Army. We will discuss the effects of translocation later in this biological opinion.

As noted in the Status of the Species section of this biological opinion, the constituent elements of critical habitat of the desert tortoise include sufficient space to support viable populations within each recovery unit 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. The proposed use of the additional training lands would decrease the quality and quantity of forage species, remove proper soil conditions for required plant species, and decrease the amount of vegetation available for shelter from temperature extremes and predators in areas where training with vehicles occurs on a regular basis. Cross-country travel, particularly during training exercises that involve large numbers of vehicles, will, over time, destroy or damage most of the shrubs in an area. Shrubs that are not killed are often substantially reduced in height and width; consequently, they would provide little or no shelter for any desert tortoises that may remain.

Training with vehicles will lead to ground-disturbing activities within habitat of the desert tortoise. These impacts include the direct removal of annual plants that the desert tortoise uses for food. Disturbance of soils can accelerate the spread of invasive non-native plant species by destruction of soil crusts and cryptogams; these non-native species, in turn, can compete with the native plant species (Lovich and Bainbridge 1999) that the desert tortoise requires for nutrients

and shelter. Non-native plants can also increase the ability of the desert to carry wild fires (Lovich and Bainbridge 1999). Neither desert tortoises nor the plant species upon which they depend are adapted to fire; consequently, fires could result in a substantial loss of desert tortoises and severely alter the plant community structure within their habitat. If non-native species and fire spread into rugged and steep terrain that is not directly damaged by training activities, any desert tortoises that persist in these fragmented habitats would be placed at risk.

As we noted previously in this section, vehicles can destroy burrows that desert tortoises use for shelter and nesting. Vehicle use can also compact certain sediments to a degree that desert tortoises could no longer construct burrows or nests; sediments, such as sandy loams, provide good burrowing substrates for desert tortoises and are susceptible to compaction by vehicles. Rain cannot infiltrate compacted sediments; this lack of penetration by rainfall increases runoff and erosion from nearby areas. Additionally, native plants are slow to colonize areas where compaction has occurred because their roots cannot penetrate the denser sediments (Perkins 2004).

The actual extent of critical habitat containing constituent elements that would be degraded by training is difficult to calculate for several reasons. First, commanders have some degree of flexibility to use the available landscape when training. Second, despite this flexibility, some areas would not be used because they have no practical utility for training or cannot be accessed by soldiers and vehicles. Finally, we do not have accurate measurements of the areas within the critical habitat units that contain the constituent elements.

We will attempt to quantify the amount of critical habitat that would be degraded by analyzing the Superior Valley and UTM parcels separately. The Superior Valley parcel covers approximately 70,045 acres; the entire parcel is included in the Superior-Cronese Critical Habitat Unit. Approximately 4,300 acres of this parcel will be managed as a conservation area for the Lane Mountain milk-vetch (the East Paradise Conservation Area). Approximately 3,700 acres will be managed as a no-dig area, also to protect the Lane Mountain milk-vetch. (Note that a small portion of this area is located within the former boundaries of Fort Irwin and is not within the Superior Valley parcel; we did not subtract this acreage from that of the total area.) Consequently, desert tortoises in these areas will not be affected by training in which off-road travel by vehicles is involved; however, we note that these areas generally support low densities of desert tortoises. Superior Dry Lake occupies approximately 1,793 acres and does not support the constituent elements of critical habitat; although desert tortoises may occasionally cross playas, playas do not provide important habitat values for the species. The biological assessment (Figure 2-2 and table 5-3) notes that two areas of the Superior Valley parcel, totaling 1,165 acres, would experience a low rate of use because of steep slopes; based on its estimate that 30 percent of habitat in low use areas would be lost, the Army concluded that 815 and 350 acres would remain undisturbed and be lost, respectively. By subtracting the acreages of the conservation, no-dig, playa, and low-use areas from that of the Superior Valley parcel as a whole, we have determined that approximately 59,437 acres of critical habitat of the desert tortoise in the Superior Valley parcel may be affected by training activities. Although we recognize that the

precise acreage cannot be determined with complete accuracy at this time, we believe this calculation provides a reasonable estimate of the amount of habitat that would be lost.

The UTM 90 area covers approximately 23,214 acres; with some possible minor exceptions, the entire parcel is included in the Superior-Cronese Critical Habitat Unit. It does not contain any playas or areas that the Army describes as low use because of terrain. However, the Army has proposed to designate three areas in the UTM 90 parcel as conservation areas for the desert tortoise. These areas include 7,112 acres. Consequently, approximately 16,102 acres of critical habitat of the desert tortoise in the UTM 90 parcel may be affected by training activities. As we noted for the Superior Valley parcel, we believe this calculation provides a reasonable estimate, if not a precise calculation, of the amount of habitat that would be disturbed.

In addition to the portions of the Superior Valley and UTM 90 parcels that are not habitat for desert tortoises or would not be disturbed by training, other areas support lower densities of animals. In general, these areas are at the upper end of elevations which are used by desert tortoises or do not have suitable sediments, such as around the margins of playas. We did not attempt to quantify these areas because desert tortoises inhabit at least some of these regions and defining their boundaries would be somewhat arbitrary.

Determining whether an action is likely to adversely modify critical habitat requires an analysis of scale of the effects. That is, if the area of critical habitat under consideration does not have features that are unique to it, we must consider whether the value of the critical habitat unit, recovery unit, or the entire range of the species would be appreciably diminished for the conservation of a listed species (50 CFR 402.02). The following table depicts the acreages of critical habitat that would be affected by the Army's proposal, as adjusted by our calculations, and of the amount of critical habitat in the Western Mojave Recovery Unit.

	Total Acreage	**Net Acreage**
Superior Valley and UTM 90 Parcels	93,259	75,439[1]
Superior-Cronese Critical Habitat Unit	772,152	757,626[2]
All Critical Habitat Units in the Western Mojave Recovery Unit[3]	1,540,713	1,473,266[2]

[1]Total acreage of the parcels minus areas of playas and where vehicles would not be used.
[2]Total acreage of the critical habitat unit or units minus areas above 4,200 feet in elevation (above which line-distance sampling is not conducted) and of playas. Source: GIS product of the Ventura Fish and Wildlife Office.
[3]Omits the Pinto Mountain critical habitat unit (after Heaton et al. 2004).

In summary, approximately 75,439 acres of the Superior-Cronese Critical Habitat Unit could be adversely affected by training activities. This acreage comprises approximately 9.96 percent of the unit that could support the constituent elements of critical habitat. The proposed action could

affect approximately 5.12 percent of the critical habitat that has been designated in the Western Mojave Recovery Unit; in this calculation, we again subtracted the areas above 4,200 feet in elevation and of playas to try to focus more on lands that are of higher value for desert tortoises.

The Eastgate parcel covers approximately 48,629 acres; no areas within this parcel have been designated as critical habitat. Desert tortoises seem to be absent from large portions of this parcel and exist in low densities over much of the rest of the area because of low elevations, mountainous terrain, and possibly low levels of rainfall. For these reasons, the loss of habitat in this parcel will not affect a large number of desert tortoises.

Effects of the Conservation Measures

Conservation Areas for the Desert Tortoise within Fort Irwin. The first conservation area we will consider is the UTM 90 Conservation Area Spur, as described in the biological assessment, which was expanded to 1,890 acres by the Army at our meeting on January 6, 2004. The biological assessment depicts the northern portion of this area as supporting a density of approximately 5 to 13 desert tortoises per square mile. Because of the steep, rugged terrain in the west and the presence of Fort Irwin Road, we expect the density of desert tortoises in these portions of the conservation area to be somewhat lower than in the northern part.

The second conservation area lies to the east of the previously discussed area. As a result of a meeting with the Army on January 6, 2004, this area, which includes the originally proposed UTM 90 Conservation Area West, has been expanded to approximately 2,762 acres. Its supports densities of up to approximately 65 to 86 desert tortoises per square mile. This area contains generally high quality habitat.

The Army did not estimate densities within the 2,460-acre parcel east of the Alvord Mountains, known as the UTM 90 East Conservation Area. A rough comparison between the amount of sign (i.e., burrows, scat) found in this and the westernmost conservation area (see Figure 4-7 in the biological assessment) provides an indication that densities of desert tortoises in this area may be similar; that is, densities appear to be within the range of 5 to 13 desert tortoises per square mile. This area contains generally high quality habitat.

These conservation areas should protect desert tortoises from the direct impacts of training activities at Fort Irwin. However, an examination of the distribution of desert tortoises in and adjacent to Fort Irwin (see Figure 4-7 in the biological assessment), based on the detection of sign, indicates that fragmentation of aggregations of desert tortoises may pose long-term problems. For example, desert tortoises east of the Alvord Mountains are connected to those to the west primarily by way of the northern slope of this range; use of the UTM 90 area would substantially reduce the width of this corridor. The area to the south of the Alvord Mountains seemingly supports very low densities of desert tortoises; we are aware that portions of this region are unsuitable habitat for desert tortoises because of sandy sediments, lack of vegetation, and possibly other factors.

In the west, Fort Irwin Road currently poses a substantial barrier between desert tortoises in the southern portion of Paradise Valley and the western portion of the Coyote Basin. The loss of desert tortoises in the northern portion of Paradise Valley will substantially reduce connectivity to the Superior Valley and to farther reaches of the western Mojave Desert, such as Coolgardie Mesa. Some avenues for connectivity may remain through canyons and washes that are aligned from west to east in this region.

The fragmentation of populations is generally viewed negatively because it reduces genetic diversity; a lack of genetic diversity may reduce the ability of a species to adapt to changing environmental conditions. Isolated populations of desert tortoises may be less vulnerable to the natural transmission of infectious disease. At this time, we know that diseases such mycoplasmosis, cutaneous dyskeratosis, and herpesvirus infect wild desert tortoises; however, we are uncertain whether or how these diseases are related to the decline of desert tortoise numbers in the Western Mojave Recovery Unit. Consequently, we can reach no firm conclusion regarding whether fragmenting habitat in this region of the Western Mojave Recovery Unit benefits desert tortoises.

The 4,560-acre area to be included in the 500-meter wide buffer to the north of the Boulder Utility Corridor generally supports very few desert tortoises. Much of this area contains marginal habitat.

The East Paradise Conservation Area and the 'no-dig' area in the northern part of the Paradise Range, which were proposed to protect the Lane Mountain milk-vetch, will protect areas that support densities of approximately 5 to 13 desert tortoises per square mile. Portions of these areas seem to be too rugged to support high densities of desert tortoises.

Translocation of Desert Tortoises. The Army originally proposed to translocate approximately 300 desert tortoises from the UTM 90 area to the south or to another area identified by the Service. At a meeting on February 6, 2004, the Army stated that it would translocate as many desert tortoises as it could find from the Superior Valley and UTM 90 parcels to unspecified locations in the Western Mojave Recovery Unit.

Two fundamental types of translocation have been proposed. Desert tortoises immediately adjacent to the boundaries of Fort Irwin that are to be fenced would be moved to the side of the fence where training would not occur. We expect that desert tortoises moved such short distances would adapt to the new boundaries of their territories. Animals moved in this manner may attempt to return to the portions of their territory on the far side of the fence; in past studies, at least a small percentage of translocated desert tortoises that had been radio-tagged tried to return to their capture sites (Nussear pers. comm. 2004, Corn pers. comm. 2004). We expect that these animals would eventually become acclimated to the new boundaries of their territories and cease attempts to return. Transmission of disease should not be an issue because the animals are being moved short distances and would likely have had previous contact with any individuals in the area. We also expect that relatively few desert tortoises would be moved in this manner; for

this reason, these short-distance translocations are unlikely to introduce more animals into an area than it can support.

Far more desert tortoises are likely to be translocated to other locations in the Western Mojave Recovery Unit. Our analysis of the potential effects of such a large-scale program is based on the results of a study on translocation that was undertaken in Nevada and Utah (Nussear pers. comm. 2004). The following analysis is based on that study.

Nussear evaluated survivorship, the amount of area used, reproduction, and selection of shrubs for shade to attempt to determine whether translocated desert tortoises behaved differently than resident animals; the study was conducted over 3 years. They used five sites for translocation; we will focus our analysis on the results from the site that contained what seemed to be the most favorable habitat for the desert tortoise (i.e., Bird Springs Valley in Nevada). The translocated animals spent varying lengths of time in captivity before being released; the average amount of time in captivity for one group of released animals was 1.5 years. Sixty desert tortoises were moved to Bird Springs Valley the first year of the study.

In the first year of the translocation study at Bird Springs Valley, all but one death of both resident and translocated desert tortoises resulted from predation by canids. No animals died during the second year. In the third year, two resident and no translocated desert tortoises died. The greatest level of mortality of any site in any year was 15 percent in Bird Springs Valley in 1997.

Nussear found that translocated desert tortoises wandered extensively for 2 or 3 years, when compared to resident animals, before they eventually established new territories. These movements were more linear and did not appear to be within any sort of home range. Desert tortoises placed in habitats that were dissimilar to those from which they were removed (such as at two of the sites in Utah used in this study) traveled until they reached habitat similar to that from which they were removed.

Translocated desert tortoises produced the same number of eggs as resident animals in every year of the study. This result occurred at all the study sites.

Resident and translocated desert tortoises did not differ in their selection of shrubs for shade in 2 of the 3 years of the study in Bird Springs Valley. In 1999, translocated desert tortoises were using habitat at slightly higher elevations, which exposed them to a different assemblage of shrub species from which to choose.

Nussear did not detect any "intensified aggressive interactions or disturbance of the social structure of wild" desert tortoises. However, they warn against releasing "clumped groups" of animals to avoid such issues. We expect that the translocating of large numbers of desert tortoises into a small area that is already occupied could have substantial effects on the residents. These individuals may be at increased risk of competition for resources, such as shelter sites, food, and mates. The incidence of aggressive interactions resulting from territorial disputes may

increase; desert tortoises that spend more time fighting may be more vulnerable to predators and may spend less time in pursuit of more constructive activities, such as foraging and mating. The Army proposes to avoid most of these effects by translocating desert tortoises only to areas that have experienced declines; if the resident population has been entirely or nearly extirpated, the potential for adverse effects to resident animals will be greatly reduced.

The transmission of disease from resident to translocated desert tortoises or vice versa is of major concern. If disease is a causative factor of declines in numbers, the increase in numbers of desert tortoises in an area could accelerate its spread and lead to rapid decimation of all animals in the area. The translocation plan that the Army proposed to develop within 180 days of the issuance of this biological opinion should address issues related to the detection and transmission of diseases.

If the translocation is successful and we carefully analyze its progress, the process may allow us to repatriate desert tortoises to areas where they were completely or nearly extirpated from large areas in the recent past. The translocation could also provide us with information that would allow us to repeat the technique in other areas to try to reverse the decline of the desert tortoise in the Western Mojave Recovery Unit.

If the translocation is not successful, careful analysis of its progress may allow us to gain an understanding of why desert tortoises have been completely or nearly extirpated from large portions of the Western Mojave Recovery Unit. To date, many theories have been advanced to try to explain the declines; however, no one has provided a conclusive set of reasons for the declines. Once we understand the reason or reasons for the declines, we may be better able to address the issues. Therefore, the translocated desert tortoises will allow us to better understand the processes of decline and recovery in the Western Mojave Recovery Unit.

To ensure that the translocated desert tortoises have the greatest opportunity to survive, the threats to their survival will need to be effectively managed. At this point in time, we cannot address threats specifically because of the lack of detail of the translocation plan and locations. The Army, in cooperation with Dr. David Morafka, successfully managed small enclosures in which studies of hatchling desert tortoises were conducted. However, the costs and difficulties associated with managing two or more areas that are likely to be several square miles in size will be exponentially greater.

In summary, predation comprised the most dramatic source of mortality for both translocated and resident desert tortoises over the 3 years of the study; the rate of predation was approximately equal for both groups of animals. Mortality rates throughout the remainder of the study were low. No translocated desert tortoises died at Bird Springs Valley; only two resident animals died. These results indicate that translocation, conducted correctly, can be an effective conservation tool. By following guidelines outlined by Nussear and others, the translocation plan that the Service and Army will develop within 180 days of issuance of this biological opinion should be able to address factors that could compromise the success of the effort. Furthermore, if mortality rates for translocated desert tortoises are maintained at levels found in

the Bird Springs Valley study, a substantial number of desert tortoises would be conserved. We expect that, because we will use only sites where resident desert tortoises occur at unnaturally low densities, few resident animals are likely to die as a result of the translocation.

Desert Tortoise-proof Fencing. The exclusion of desert tortoises from training areas along the southern boundary of Fort Irwin will prevent most desert tortoises from entering the installation where they would be at risk of being killed by training activities.

Goldstone Transit Route. Given the relatively few desert tortoises in this area, we do not anticipate that many will be killed by use of the route. The Army's proposed measures, if consistently implemented, may further reduce the level of mortality.

Avoidance of Dry Lakes. Desert tortoises are generally uncommon in the immediate vicinity of and on dry lakes. Therefore, the Army's proposed measures will have little or no direct effect. However, if dust generated by training alters the quality of habitat, reducing the area from which dust is generated would be beneficial.

Use of Existing Roads. The Army will use existing improved dirt roads as major transit routes in the project area to the greatest extent possible. The use of roads would reduce the loss of vegetation and desert tortoises initially. However, desert tortoises and vegetation would be destroyed eventually in any area that is used for training, regardless of whether roads are used for transit.

Desert tortoises are likely to persist within the conservation areas for the desert tortoise and Lane Mountain milk-vetch and the 'no-dig' area for the Lane Mountain milk-vetch because the vast majority of the habitat in these areas would remain undisturbed. Consequently, vehicle use of these roads has the potential to kill or injure desert tortoises on a long-term basis. Because the use of the roads would be restricted to authorized personnel accessing communications sites and possibly observer-controllers who would be briefed on the conservation objectives within these areas, we expect that the level of mortality resulting from use of the roads would be low.

Avoidance of Springs. This measure would have virtually no effect on desert tortoises; the vast majority of springs occur outside of habitat for the desert tortoise. Additionally, if the area surrounding a spring is used for training, desert tortoises in that area would be eliminated.

Education of Soldiers, Contractors, and Civilians. Over the long term, this measure would protect desert tortoises that remain in rugged terrain and conservation areas. At the outset of training in areas where maneuvers have not occurred previously, soldiers, contractors, and civilians are more likely to encounter desert tortoises; if the soldiers, contractors, and civilians abide by the stipulations provided by the Army, the potential exists that individual desert tortoises may be protected. Additionally, proper disposal of trash and training materials that are no longer in use is also likely to prevent the mortality of a number of desert tortoises.

Land Acquisition. The recovery plan for the desert tortoise notes that acquisition of lands is important for its conservation. Once brought into Federal or State ownership, these lands are protected from some threats. For example, the Bureau is required to provide access to owners of private parcels. Therefore, the Bureau can designate an access network with fewer redundant routes if land ownership is not fragmented by numerous private holdings; the ability to designate routes as legally closed and subsequently to close them physically is one of the primary benefits of Federal or State ownership of consolidated blocks of land.

To a great degree, lands that are in Federal ownership are protected from private development, although some uses, such as casual mining, can occur with little or no review. Many of the areas that would be targeted for acquisition to offset the loss of desert tortoise habitat as a result of the proposed action are remote and unlikely to be developed in the near future, because of the lack of services and an abundance of private land closer to urban centers. However, we are aware that at least some interest exists in acquisition of large areas of land in the Western Mojave Recovery Unit to promote economic development.

If the land is managed by a Federal agency, that agency is required by section 7(a)(2) of the Act to consider whether any of its actions may affect a listed species or its critical habitat. The "may affect" threshold placed upon Federal agencies provides more protection than listed species and critical habitat receive on non-federal lands; if non-federal entities do not possess a Federal nexus (e.g., authorization or funding), they are only required to abide by the prohibitions contained in section 9 of the Act. These prohibitions are described later in this biological opinion.

Route Closure and Rehabilitation. Many of the activities that threaten the desert tortoise are associated with routes of travel. For example, desert tortoises can be killed by vehicles traveling on unpaved routes and across roadless areas (Boarman and Sazaki 1996); the roads provide additional access to roadless areas. People intent upon poaching or vandalizing desert tortoises gain access via dirt roads. Roads also serve as routes by which invasive species can spread throughout desert wildlife management areas. The recovery plan for the desert tortoise (Service 1994b) and the desert tortoise recovery plan assessment committee (Bransfield pers. obs. 2004) identified mortality factors associated with unpaved roads and high levels of human access as being detrimental to the conservation of the desert tortoise. Consequently, the closure and rehabilitation of approximately 1,625 miles of roads in desert wildlife management areas, which the Army proposed to fund or provide labor to implement, is a key element in the conservation of the desert tortoise in the Western Mojave Recovery Unit. Reducing the density of unpaved roads will protect desert tortoises from poaching, vandalism, and crushing by vehicles; we cannot estimate how many desert tortoises would be protected because we do not know which specific roads would be closed and the number of desert tortoises in the area.

The physical closure of unpaved roads has the potential to adversely affect desert tortoises; the primary impact would likely be killing desert tortoises on roads while accessing work sites or through use of heavy equipment at the closure site. Given our past experience with this type of activity, we expect that few, if any, desert tortoises are likely to be killed or injured during rehabilitation of roads. Although the Army will fund or provide labor for this work, the land

managing agency, most likely the Bureau, will need to conduct a site-specific analysis when work sites are identified. Consequently, we will further analyze potential impacts, pursuant to section 7(a)(2) of the Act, when the responsible agency identifies specific closure and rehabilitation activities and sites.

Installation of Desert Tortoise-proof Fencing on Irwin Road. The Army's funding of the installation of desert tortoise-proof fencing along Irwin Road from the junction of Fort Irwin Road to the boundary of the Barstow Cemetery would likely keep numerous desert tortoises from dying on this road every year. However, the Army limited its funding to $700,000, which may not cover the entire 8.8-mile length that it proposed to fence, and will not fund the installation of under crossings. For the long-term conservation of the desert tortoise, connectivity of habitat and maintenance of the fence need to be addressed.

Retirement of Grazing Allotments. The Army will attempt to purchase fee land and associated assets and improvements associated with the Harper Dry Lake, Cronese Lakes, Cady Mountain, and Ord Mountain allotments. Portions of the Harper Dry Lake, Cronese Lakes, and Ord Mountain allotments are located in proposed desert wildlife management areas and critical habitat of the desert tortoise. If the Army is able to purchase the fee land of the grazing permittee, it will request that the Bureau accept relinquishment of grazing privileges on the allotment and not re-issue the permits, pursuant to the Bureau's grazing regulations.

Although we do not have information that conclusively links livestock grazing to the recent declines in the numbers of desert tortoises in California, the removal of cattle from these areas would benefit the desert tortoise. When numbers of a long-lived animal, such as the desert tortoise, decline so precipitously, continued loss of individuals in any age group and further degradation of habitat are deleterious to the population's viability. Consequently, any incremental improvement in habitat condition and reduction in the rate of mortality should be pursued.

The exact degree of benefit is the subject of great debate. Cattle can trample desert tortoises, both above ground and in their burrows. In years of average and below-average availability of annual plants, cattle can cause desert tortoises to spend more time foraging to obtain sufficient food; desert tortoises are at risk of predation whenever they are outside of their burrows. Cattle also trample unoccupied burrows, which causes desert tortoises to spend more time above ground. Finally, cattle have likely altered the composition of plant communities in the desert by facilitating the spread of non-native grasses and selectively browsing certain species of shrubs.

The alteration of the desert's plant communities may be the greatest impact cattle have had on desert tortoises; the substitution of non-native grasses that have less nutritive value than a diverse assemblage of native annual plants may contribute to an overall decline in the physiological condition of desert tortoises. The added stress of long-term poor nutrition may make desert tortoises more susceptible to drought and disease. Consequently, the removal of cattle from areas that are important to the recovery of the desert tortoise may be a key conservation action.

The primary benefit of retiring cattle grazing will occur if habitat conditions for desert tortoises improve on the allotments. The most dramatic improvement will likely occur in the condition of shrubs, particularly if rainfall is average or above average; the increase in the size of shrubs will provide additional cover to desert tortoises. However, we do not know if the composition of the annual plant community will change with the removal of cattle; that is, the non-native grasses may not decrease in abundance and native annuals may not increase in abundance and diversity for decades, if ever. That change would likely have the most visible positive impact on the desert tortoise.

Note that we cannot accurately quantify the actual acreage of desert tortoise habitat that would be released from grazing pressure as a result of the Army's proposal to acquire cattle allotments. Portions of at least some of the allotments under consideration do not support suitable habitat for desert tortoises. Additionally, some ranchers may not be willing to sell their allotments.

Finally, desert tortoises occur in the Cady Mountain Allotment at extremely low densities. We recognize that the Bureau has issued permits for the Cronese Lake, which has higher values for desert tortoises, and Cady Mountain allotments to a single rancher who will only sell her base interests for both at the same time. Any attempt to quantify the benefits to the desert tortoise of acquiring cattle allotments should omit the Cady Mountain Allotment.

In summary, we acknowledge that the removal of cattle from the Harper Dry Lake, Cronese Lakes, and Ord Mountain allotments, if it can be accomplished, would benefit the conservation of the desert tortoise and likely contribute to some increase in the value of critical habitat in these areas. We cannot accurately quantify the number of desert tortoises that would benefit or amount of habitat that would be released from grazing pressure.

Research and Collection of Data. The Army's funding of additional research and collection of data is likely to provide information of value to the recovery of the desert tortoise. Some potential exists that desert tortoises may be injured or killed during research activities, primarily as a result of striking them with vehicles while driving through the desert or as a result of an accident with research procedures; both scenarios are reasonably unlikely to occur and likely to result in the mortality or injury of few desert tortoises.

Assisting the Bureau with Management of Acquired Lands. The Army has proposed to assist with establishment of the working group that is described in the key elements report. The key elements report calls for the working group to evaluate proposals to conserve the desert tortoise; this group may also undertake other tasks designed to recover the species. Focusing attention on the conservation needs of the desert tortoise is likely to benefit the species in a substantial manner. For example, the working group could direct research and direct other recovery activities to areas where they are most needed. The formation of a working group would have no adverse effects on the desert tortoise.

Adaptive Management. Adopting the principle of adaptive management should ensure that the Army and Service can address issues successfully as they arise. This flexibility should benefit the desert tortoise.

Desert Tortoise Management Team. A fundamental difficulty in attempting to recover the desert tortoise is that agencies such as the Service and Bureau do not have staff or funding to implement or oversee, on a consistent basis, actions that would actively conserve the species. Numerous stakeholders in the western Mojave Desert have repeatedly criticized the inability of the agencies to implement the recovery plan in an active manner. The formation of a team that is dedicated to pursuing recovery actions for the desert tortoise should alleviate this problem. Although its ultimate value will depend upon numerous factors, such as the level of funding to implement actions, the existence of a group that is dedicated to making actions happen on the ground should benefit the desert tortoise.

Summary

We estimate that approximately 1,147 to 1,197 adult desert tortoises occupy the areas where new training activities would occur; we arrived at this number by using the Army's range of 1,299 to 1,349 that is contained in the biological assessment and subtracting the 152 animals that are estimated to reside in the expanded conservation areas proposed by the Army during the consultation process. We generally concur that this estimate is reasonable, although the number of desert tortoises in the Eastgate parcel may be somewhat lower than the Army estimated. We do not know how many immature desert tortoises may occupy areas where training will occur; although we will not specifically address immature animals in every aspect of the following discussion, we recognize that they would be subject to the same effects as adult desert tortoises.

Absent any measures to protect desert tortoises within training areas, most of these animals would likely be killed or injured by military exercises. A relatively small number of these animals may be killed or injured during construction of the barrier fence at the perimeter of Fort Irwin, the fence to exclude desert tortoises along portions of the perimeter, a fence to exclude desert tortoises from Irwin Road, the two water sites, and two or three overpasses over Fort Irwin Road; closure and restoration of roads outside of Fort Irwin; rerouting of Copper City Road; construction of roads and communication and other facilities in the conservation and 'no-dig' areas; closure of mines; and installation of aircraft warning systems on power lines outside of the installation.

We do not know precisely how many desert tortoises would be killed or injured as a result of training and the activities needed to prepare the land for training. For the sake of analysis, we will use the upper limits of the Army's estimate of the number of adult desert tortoises that may occur in training areas, which is 1,197, as a starting point. The Army has estimated that approximately 288 adult desert tortoises reside in the Eastgate parcel; with possibly a few minor exceptions, these animals are widely scattered. Consequently, the Army has not proposed to undertake any efforts to translocate desert tortoises from the Eastgate parcel. We will assume that these animals will be killed or injured. We acknowledge that some desert tortoises, in the

Eastgate parcel and elsewhere, would likely persist in steeper, rugged areas where military vehicles do not normally travel. Other animals are likely to persist in areas where training activities are light and infrequent. We have no way to quantify these individuals. In most cases, however, these animals can be considered lost to the population of desert tortoises in the Western Mojave Recovery Unit because they will be effectively isolated from animals in the remainder of the unit.

To reduce the level of mortality associated with training, the Army has proposed to translocate as many desert tortoises as it can from the Superior Valley and UTM 90 parcels. Translocation of desert tortoises to managed parcels of land may, at best, prevent the loss of a large number of animals, allow these individuals to contribute to the conservation of the species in the Western Mojave Recovery Unit, and provide valuable information on how to use translocation as a recovery tool. At the worst, both translocated and resident animals will be subjected to high levels of mortality; if such an event happens, the information we gather as we monitor the translocation would be the sole benefit of the action. Given the results of the Nussear study at Bird Springs Valley, we expect that the translocation effort will be successful in large part.

The Army's proposal to search the Superior Valley and UTM 90 parcels may make approximately 909 adult desert tortoises available for translocation. (We arrived at this number by subtracting the estimated number of animals in the Eastgate parcel [288] from the upper limit of the Army's estimate of the number of adult desert tortoises in the entire area of additional training lands [1,197]. Although we have no way of estimating the numbers, intensive sweeps to locate adults are likely to detect some number of immature desert tortoises.)

As noted previously in this section, desert tortoises that are translocated short distances (such as to the other side of boundary fences at Fort Irwin) may attempt to return to portions of their former home ranges on the far side of the fence. As shown by the Nussear study, desert tortoises that are moved to more distant locations exhibited a high rate of survival. Consequently, for the purposes of this analysis, we will consider both groups of desert tortoises to survive at the same rate. We will also use a conservative analysis to assess the likelihood of individuals surviving the translocation effort by assuming a mortality rate of 15 percent, which was the highest rate exhibited in any single year during the Nussear study. (Note also that both resident and translocated desert tortoises experienced approximately the same rate of mortality. Additionally, the first year of the translocation occurred during a period of low rainfall; all of the mortalities seemed to result from predation. Consequently, the mortalities cannot be attributed unequivocally to translocation.) Because the desert tortoises in the Nussear study exhibited essentially no mortality over the final 2 years of the study, we will apply the 15 percent decrease only for the first year animals are translocated.

Note that, during the development of this biological opinion, the Service expressed concern with the number of adult desert tortoises that were likely to be killed by the use of the additional training lands. Our concern was prompted by the fact that the Army estimated, in its biological assessment, that approximately 1,049 adult desert tortoises would likely be killed. By expanding the conservation areas in the western portion of the UTM 90 parcel and proposing to increase the

number of animals that would be translocated, the Army reduced the number of desert tortoises that would be killed by a substantial number. Additionally, the Army's commitment to provide funding for a team of biologists to implement recovery actions in the Western Mojave Recovery Unit was an important factor in our analysis. Such a team would allow the agencies to pursue recovery actions in an active manner and thereby begin to reverse the downward population trend in the Western Mojave Recovery Unit.

Based on these estimates, approximately 136 adult desert tortoises may die during translocation. (Note that translocations may be spread out over many years because all of the additional lands will not be used for training until the fall of 2009. Note also that we may not be able to determine the cause of every mortality; consequently, determining which occurred specifically as a result of translocation will not be possible. The only mortalities which we would be able to determine with some degree of certainty would be those where the desert tortoise died while in the possession of workers implementing the translocation.) When added to the number of desert tortoises assumed to occupy the Eastgate parcel [288], we expect that 424 adult desert tortoises may be killed as a result of the proposed action. (As we mentioned previously in this biological opinion, some desert tortoises may persist for years on the periphery of training areas and reproduce in these areas. We have no way of estimating the level of mortality of these animals as a result of training. However, our previous analysis indicates that these remaining animals do not have value for the conservation of the species because of their isolation from large aggregations of desert tortoises. Consequently, the continuing low level of loss of desert tortoises in these areas will not add to the effects of the use of the additional training lands at Fort Irwin.) This level of mortality translates to approximately 1.03 to 2.07 percent of the 20,420 to 41,224 adult desert tortoises that Heaton et al. (2004) estimated resided in the Western Mojave Recovery Unit. We cannot estimate the percentage of the range-wide population of desert tortoises that may be killed as a result of the proposed action; too many variables exist to make an estimate possible (Heaton et al. 2004).

The Army's proposals to fence Irwin Road, acquire lands to manage for the conservation of desert tortoises, acquire cattle allotments, and close and restore routes on Bureau lands will undoubtedly lower mortality rates of desert tortoises in areas where these conservation measures are implemented. The establishment of a management team and the working group and the implementation of adaptive management to target activities that will provide the greatest benefit to the species will also reduce the rate of mortality and promote the conservation of the desert tortoise. We cannot quantitatively assess how many desert tortoises these actions will protect; however, they would certainly reduce mortality factors over a large area of the Western Mojave Recovery Unit and may assist in slowing the decline in this region.

We expect that the loss of 424 adult desert tortoises will not appreciably reduce the ability of the species to survive and recover in the Western Mojave Recovery Unit. These animals represent a small portion of the total number of desert tortoises in the Western Mojave Recovery Unit; additionally, the loss of these individuals would occur over a period of several years. The potential exists that, through adaptive management, the Army and Service will be able to identify short comings in the translocation program based on early work and correct these problems for

later projects. Finally, the conservation program proposed by the Army, which will include activities such as fencing Irwin Road and rehabilitating unpaved roads through the desert wildlife management areas in the Western Mojave Recovery Unit, is likely to remove sources of mortality for desert tortoises over a large area. The potential exists that these actions could protect more desert tortoises than may be lost as a result of expansion.

Training activities will directly degrade approximately 75,873 acres of critical habitat of the desert tortoise. This acreage comprises approximately 9.97 percent of the Superior-Cronese Critical Habitat Unit that could support the constituent elements of critical habitat and approximately 5.15 percent of the critical habitat that has been designated in the Western Mojave Recovery Unit. (Note that, in these calculations, we eliminated areas of the critical habitat units where desert tortoises would be unlikely to occur, such as at elevations over 4,200 feet and on playas.)

To offset this loss of critical habitat, the Army estimated that it would be able to acquire approximately 129,000 acres to compensate for the loss of habitat to new training areas. It has also proposed to set aside approximately 16,900 acres of Army lands for management of desert tortoises. This acquisition of land would remove, in several areas, the checkerboard pattern of ownership that currently exists. Consolidating land ownership is likely to promote more effective management because fewer roads would be needed to provide access to private lands and land uses could be managed more effectively. We acknowledge that some acquired areas may not support desert tortoises; however, their acquisition would enable better management of the ecosystem on which the desert tortoises depends and potentially eliminate impacts occurring on private property that can indirectly affect desert tortoises on adjacent public lands.

Cattle may be removed from approximately 246,474 acres of grazing allotments in the Western Mojave Recovery Unit. (We acknowledge that not all areas of acquired lands or cattle allotments contain suitable desert tortoise habitat; we did not include the Cady Mountain Allotment in the last acreage figure because of its low value for desert tortoises. Finally, we acknowledge that the additional commitments the Army made to fund conservation actions are likely to reduce, to some degree, the amount of land or number of allotments that can be purchased.) The increased level of management that will be possible on acquired lands should increase the likelihood that threats to the desert tortoise can be addressed on a more holistic level; this increased management within a smaller recovery unit is likely to continue to allow for the recovery of the species.

Training in the Eastgate parcel will result in the loss of additional thousands of acres of lower quality habitat that has not been designated as critical habitat. We do not view this area as crucial to the long-term survival and recovery of the desert tortoise because most of it is not capable of supporting even low densities of desert tortoises.

Although the proposed action would substantially reduce the area within the Superior-Cronese Critical Habitat Unit that would support the constituent elements of critical habitat, the value of the critical habitat for the conservation of the desert tortoise will not be appreciably diminished. As noted in the recovery plan, smaller areas require more intensive management to ensure the conservation of species. The management of the Red Cliffs Desert Reserve in southern Utah, which, with approximately 40,000 acres of suitable habitat is the smallest reserve for the desert tortoise, seems to provide effective conservation of the species. However, the remaining portion of the Superior-Cronese Critical Habitat Unit would far exceed the size of the Red Cliffs Reserve; the acquisitions proposed by the Army would assist in making this critical habitat unit more manageable.

Lane Mountain Milk-vetch

Effects of the Preparation of the Additional Training Lands

The only preparation that is likely to affect the Lane Mountain milk-vetch is the development of monitoring and communication sites and roads to these sites in the conservation and 'no-dig' areas. An unquantified amount of habitat may be disturbed by the clearing of the sites and the construction of the roads. We expect that the occurrences of the Lane Mountain milk-vetch would not be substantially affected by these roads and facilities because they will occupy a very small portion of the protected areas. Additionally, the Coolgardie Mesa occurrence of the Lane

Mountain milk-vetch is crossed by several roads; however, it seems to be thriving, with some plants being located within a few feet of frequently used roads.

Effects of the Use of the Additional Training Lands

The biological assessment provides a reasonable summary of the likely effects of the proposed action on the Lane Mountain milk-vetch and its habitat. Vehicles associated with training and supporting activities would crush or uproot Lane Mountain milk-vetch plants and their host shrubs. Construction, digging and other earth-moving activities, temporary bivouacs, helicopter landings, and movement of soldiers on foot would also destroy plants and degrade habitat. Direct impacts such as these are most likely to occur in level to slightly sloping terrain where vehicles have easy access.

In areas where training does not directly remove Lane Mountain milk-vetch plants and their habitat, partial removal of vegetation, erosion and compaction of sediments, and loss of cryptogamic crusts are likely to degrade habitat over time to the point where individuals no longer persist. The Lane Mountain milk-vetch generally occurs on a thin layer of sediment overlaying granite; frequent foot and vehicle traffic would easily erode this thin layer of sediments and remove the substrates in which the plant roots. Additionally, areas that are stripped of vegetation and sediments by training will be unable to hold rainfall; the increased runoff from these areas is likely to remove sediment from downhill areas and further degrade adjacent habitat. Where sediments persist, the destruction of cryptogamic crusts would likely lead to an increase in weedy annual species, such as

Mediterranean grass; these plants can compete with native species for moisture and nutrients and carry fire in plant communities that are not adapted to burning.

The northernmost portion of the Brinkman Wash-Montana Mine occurrence and the eastern portion of the Paradise Valley occurrence would likely be eliminated. These losses are quantified later in this section.

Wind may transport sediments of various sizes that could affect individuals of the Lane Mountain milk-vetch. In our preliminary review of the proposed action (Service 2001), we noted that vehicular activity could expose large amounts of both fine and coarse sediments to erosion by wind. We postulated that the movement of large amounts of coarse materials could bury the host shrubs of the Lane Mountain milk-vetch and transform the decomposed granitic sediments upon which it grows to a sandy substrate that would not be suitable for germination of seeds. Based on site visits to sand dune areas within existing training areas and discussions with geologists and Army personnel, we concluded that Lane Mountain milk-vetch habitat is unlikely to be physically buried by coarse materials carried by the wind. First, the sand dune areas on Fort Irwin we suspected were formed by the deposition of wind-borne sediments created by training were geological features. For example, the dunes on the west side of the Whale, a large volcanic extrusion in the southern portion of Fort Irwin, support Mojave fringe-toed lizards (*Uma scoparia*), desert kangaroo rats (*Dipodomys deserti*), and desert lilies (*Hesperocallis undulata*), which are all dune-adapted species unlikely to have migrated to this area since the onset of training at the installation. Furthermore, Coyote Dry Lake seems to be the source of the dunes on the southwest face of the Alvord Mountains.

We also questioned whether fine dust generated from training areas could adversely affect the Lane Mountain milk-vetch. Later, we also questioned whether dust deposited on the sediments in which the Lane Mountain milk-vetch grows could alter the geochemistry and water-bearing capacity of the sediments. The biological assessment notes that "dust ... could cover or abrade plants and affect photosynthesis and transpiration ..., which might affect the rate of growth, the reproductive capacity of individual plants, and ... the ability of these individuals to persist in adjacent areas." The Army concludes that, "(a)s a quick growing perennial herb, the Lane Mountain milk-vetch is less likely to experience negative impacts from the effects of dust or other particulate matter as the growing season is short and fast, lasting only a few months per year and stems elongate rapidly and leaves are constantly forming." Alternatively, as a rapidly growing plant with a short above-ground life, optimal photosynthetic conditions may be critically important to the species. The Service is currently funding the U.S. Geological Survey to research the potential effects of dust on the photosynthesis or respiration of this species. Based on conversations with a geologist from the U.S. Geological Survey (Reheis pers. comm. 2004), we have concluded that dust generated by training is unlikely to affect the geochemistry or water-bearing capacity of sediments in Lane Mountain milk-vetch habitat in a substantial manner, unless the dust accumulates in topographically favorable locations. First, the Lane Mountain milk-vetch grows in a very thin layer of sediments overlaying bedrock; therefore, the sediments do not have the physical capacity to store more dust than they already contain and rain is likely to wash most dust downslope. Second, the generally sparse vegetation and uniform texture (i.e., no coarse gravel) of the decomposed granite where the Lane

Mountain milk-vetch grows will not slow wind to such an extent that substantial amounts of dust are deposited. Heavily used training areas immediately adjacent to Lane Mountain milk-vetch habitat are a potential exception; in this case, the large amounts of dust could cover plants. Finally, the greatest potential source of dust is Superior Dry Lake and the clay sediments surrounding this playa in the western portion of the Superior Valley parcel; these clay sediments will generate much more dust once the surface crusts are broken than the granitic sediments to the east. The Army's proposal to place the lakebed and a 25-meter area around it off-limits to vehicle use is likely to reduce the amount of dust that would be generated from this area. Additionally, the biological assessment identifies this region as primarily supporting a medium level of use; less intense use may also function to reduce the amount of dust that is generated.

The Army will likely use mineral oil as an obscurant in areas upwind of Lane Mountain milk-vetch plants; some amount of mineral oil may contact plants. We have no information on the effect of mineral oil on the Lane Mountain milk-vetch.

Pollinators of the Lane Mountain milk-vetch may be affected by dust. Dust can abrade the integument of arthropods and cause them to lose water more quickly. Their large surface-to-volume ratio makes arthropods vulnerable to desiccation; the arid conditions in the desert may exacerbate this condition. However, the 'no-dig' zone of the Brinkman Wash-Montana Mine occurrence and the conservation areas at the Paradise Valley and NASA Goldstone occurrences are large enough that dust is unlikely to cause a decrease in the number of pollinators within large portions of these areas. Pollinators that live in adjacent training areas may be reduced in number and diversity; we do not know enough about the pollination ecology of the Lane Mountain milk-vetch to determine whether some abundance of pollinators is critical. Because the Paradise Valley and NASA Goldstone occurrences are, respectively, upwind of and distant from major sources of dust, dust is unlikely to affect the pollinators of the Lane Mountain milk-vetch in these areas.

The Army divided the intensity of impacts to the Lane Mountain milk-vetch within its training areas into three classes (Charis Professional Services Corporation 2003). High-intensity use areas include areas where training is frequent and intense, such as in battle corridors where force-on-force exercises would occur. These areas have few, if any, topographic constraints to the movement of vehicles. The Army estimates that up to 100 percent of the habitat and individuals of Lane Mountain milk-vetch would be lost in these areas. In areas that experience moderate use, the Army estimates that up to 60 percent of the habitat could, over time, be rendered unsuitable for Lane Mountain milk-vetch by training activities. In general, such areas would be located at the end of the battle corridors where the terrain is rocky and uneven. The Army also predicted that low-intensity use areas would sustain up to a 20 percent loss of habitat and Lane Mountain milk-vetch plants over time. Low-use areas would be located on non-maneuverable steep slopes and along the borders of Fort Irwin that are not expected to receive heavy use.

Since the development of the biological assessment, the Army proposed approximately 1,872 acres of the Montana Mine-Brinkman Wash occurrence of the Lane Mountain milk-vetch as a 'no-dig' area. With the exception of one or two roads and communication sites that the Army

may place in this area, no ground-disturbing activities will be allowed in this area; soldiers on foot will be allowed to operate in this area and establish cover sites. We anticipate that, with the possible exception of where roads and communication sites may be developed, most of this 1,872-acre area will remain undisturbed. Consequently, with few exceptions, we expect the Lane Mountain milk-vetch in the 'no-dig' zone to persist with little disturbance.

We concur with the conclusion stated in the biological assessment that the proposed East Paradise Valley and NASA Goldstone Conservation Areas are not likely to be directly affected by training activities. The Army predicts that, intermittently, vehicles or personnel may stray into these areas and damage plants and habitat. However, we expect that such impacts would be minor.

The following paragraphs describe the extent of effects expected to Lane Mountain milk-vetch plants and their habitat; it is based on information in the biological assessment, as modified by information presented during the consultation process and the Army's addendum to the biological assessment (Army 2004c).

The NASA Goldstone Occurrence covers approximately 1,283 acres. The entire occurrence on Army lands will be placed off-limits to off-road use; the portion of the occurrence on the Goldstone Deep Space Communication Complex is not included in this conservation area.

The Brinkman Wash-Montana Mine occurrence covers approximately 5,499 acres. Approximately 3,627 acres of this occurrence would be subject to high- and medium- intensity use; this comprises 65.96 percent of the occurrence. The Army considers that, in high-use areas, 100 percent of the plants and their habitat would be affected by training. In medium-use areas, 60 percent of the plants and their habitat would be affected by training. Note that we considered areas where 60 percent of habitat would be affected as being completely lost in terms of conservation value for the Lane Mountain milk-vetch. Approximately 1,872 acres would be located in a low-use area; Note that the Army defines a low-use area as one where 20 percent of the plants and habitat would be affected by training (Charis Professional Services Corporation 2003). In its addendum to the biological assessment, the Army also calls the 'no-dig' area a low-use zone; however, based on the level of use that the Army has projected for this area, we expect that far less than 20 percent of the area and plants would be affected by training in this 1,872-acre area.

The Paradise Valley occurrence covers approximately 4,796 acres; note that approximately 200 acres of this occurrence lie outside of Fort Irwin. Approximately 971 acres of this occurrence would be subject to high- and medium- intensity use; this comprises 20.25 percent of the occurrence. Approximately 3,634 acres of the occurrence on Army lands will be placed off-limits to off-road use. Note that a small portion of this occurrence is located on lands managed by the Bureau.

The three occurrences combined cover approximately 11,378 acres on Fort Irwin. Approximately 4,917 acres or 42.47 percent of the area in the occurrences will be placed off-limits to off-road travel. Approximately 4,598 acres or 39.71 percent of the area in the occurrences will be subject to high and medium intensities of use. Approximately 1,872 acres or 16.17 percent of the area in the occurrences will be off-limits to off-road travel but would experience some level of foot traffic; we expect that this 'no-dig,' low-use area will persist in a fairly undisturbed state.

Effects of the Conservation Measures

Conservation Areas for the Lane Mountain Milk-vetch within Fort Irwin. The East Paradise Valley and NASA Goldstone conservation areas would result in the long-term protection of 4,917 acres of Lane Mountain milk-vetch habitat. The 'no-dig' area within the Brinkman Wash-Montana Mine occurrence should also confer a large degree of protection on an additional 1,872 acres of habitat. The Army would allow communications sites and other necessary tracking or monitoring equipment, including environmental monitoring equipment, and the roads to these facilities to be sited in these areas. Therefore, some unquantified amount of habitat would be lost, but we expect the loss to be minor. In summary, we expect that these occurrences will be able to survive and contribute to the recovery of the species.

Avoidance of Dry Lakes. The Lane Mountain milk-vetch does not inhabit the area around Superior Dry Lake. However, prohibiting training on the lakebed and in the surrounding area should greatly reduce the overall amount of dust that it generates. Eliminating this source of dust is important in ensuring that individual plants and their pollinators are not affected.

Use of Existing Roads. The Army will use existing improved dirt roads as major transit routes in the project area to the greatest extent possible. The use of roads may reduce the loss of Lane Mountain milk-vetch plants and their host shrubs in areas where force-on-force training does not occur. We cannot predict the effectiveness of this measure; we are basing our analysis on the information presented by the Army on the various intensity levels of training over portions of the installation.

Education of Soldiers, Contractors, and Civilians. This measure may protect Lane Mountain milk-vetch plants in the conservation areas and 'no-dig' zone by alerting them to the presence of a sensitive species.

Land Acquisition. The benefits of Federal ownership that we described for the desert tortoise also apply to the Lane Mountain milk-vetch. However, because the section 9 prohibitions are generally less protective of plants than animals, Federal ownership is even more important for the Lane Mountain milk-vetch. Because approximately 24 percent of the Coolgardie Mesa occurrence is privately owned, the acquisition of these lands would greatly promote the recovery of the species.

Route Closure and Rehabilitation. The Army's funds or provision of labor for closure and rehabilitation of roads in desert wildlife management areas would be an important element in the conservation of the Lane Mountain milk-vetch in the Coolgardie Mesa and West Paradise Conservation Areas. Unauthorized vehicle use in this area seems to be increasing; as the amount of unauthorized use increases, the potential for damage to Lane Mountain milk-vetch plants and their habitat also increases. Designation and clear marking of open routes in this area, combined with acquisition of private parcels, would allow law enforcement personnel from the Bureau to protect Lane Mountain milk-vetch habitat more effectively. The physical closure of roads, which the Army has proposed to fund, would also increase the level of protection for the Lane Mountain milk-vetch by reducing access points to its habitat and better enabling the Bureau's rangers to police the route network.

Adaptive Management. Adopting the principle of adaptive management should ensure that the Army and Service could address issues successfully as they arise. Although this measure was developed to address the desert tortoise, this flexibility should also benefit the Lane Mountain milk-vetch.

Summary

The Army estimates that approximately 11,387 acres of Lane Mountain milk-vetch habitat occur within Fort Irwin. Approximately 6,789 acres would be placed in conservation areas or a 'no-dig' zone; this amount comprises approximately 58.6 percent of the area within the occurrences. The use of the new training lands would result in the loss of approximately 4,598 acres; this amount comprises approximately 21.5 percent of the known habitat for this species. (Note that, although the Army estimates that 40 percent of the plants would not be destroyed in an area where the intensity of use is considered to be at a medium level, we consider this degree of impact to be a substantial degradation of the occurrence and the habitat upon which the species depends; therefore, we have included areas identified as medium-use zones as lost to the long-term conservation of the plant.) Although the loss of Lane Mountain milk-vetch plants and habitat are substantial, the remaining portions of the occurrences support dense aggregations of plants and are sufficiently large enough for the ecosystems to persist.

The Army's proposal to acquire lands to manage for the conservation of the Lane Mountain milk-vetch on Coolgardie Mesa would greatly facilitate recovery of the species. Finally, closing and restoring routes on Bureau lands on Coolgardie Mesa will also contribute to the conservation of the species.

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. Any future action within the boundaries of Fort Irwin would be subject to the consultation requirements of section

7 of the Act; consequently, we are not aware of any cumulative effects that are reasonably expected to occur in the action area.

CONCLUSION

After reviewing its current 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 addition of training lands at Fort Irwin is not likely to jeopardize the continued existence of the desert tortoise and Lane Mountain milk-vetch or to destroy or adversely modify critical habitat of the desert tortoise.

We have reached these conclusions regarding the desert tortoise because:

1. the Army has proposed measures to:

    a. reduce the number of desert tortoises that may be killed during training by translocating as many individuals as it can find within the Superior Valley and UTM 90 parcels to secured habitat outside of Fort Irwin; recent studies in Nevada indicate that, when properly done, desert tortoises can be translocated with low rates of mortality. Additionally, the Army has proposed to fence the boundaries of the installation to prevent desert tortoises from entering training areas, mark the boundaries of conservation areas to prevent vehicles from entering these protected areas, and educate personnel regarding their responsibilities to protect listed species at the installation; and

    b. offset the loss of individuals and habitat within Fort Irwin by acquiring private land and cattle allotments throughout the Western Mojave Recovery Unit, fence Irwin Road, establish a desert tortoise management team to implement recovery actions, fund the closure and restoration of roads on Bureau lands in the western Mojave Desert, and work with the Service in a program of adaptive management to address issues regarding desert tortoises in the Western Mojave Recovery Unit;

2. the number of desert tortoises that would be killed or injured is not likely to impair appreciably the ability of the species to survive and recover, in part, because the potential loss of animals would occur over a period of approximately 3 years; and

3. the loss of areas supporting the constituent elements of critical habitat within the Superior-Cronese Critical Habitat Unit will not appreciably reduce the ability of this unit to provide for the conservation of the desert tortoise.

We have reached this conclusion regarding the Lane Mountain milk-vetch because:

1. the Army has proposed measures to:

   a. reduce the number of Lane Mountain milk-vetch plants that may be destroyed during training by establishing large conservation areas and a 'no-dig' zone within the three occurrences that are located within Fort Irwin and educating personnel regarding their responsibilities to protect listed species at the installation; and

   c. offset the loss of individuals and habitat within Fort Irwin by acquiring private land within the Coolgardie Mesa occurrence, funding the closure and restoration of roads on Bureau lands on Coolgardie Mesa, and working with the Service in a program of adaptive management to address issues regarding the Lane Mountain milk-vetch;

2. after implementation of the proposed action, approximately 58.6 percent of the Lane Mountain milk-vetch habitat within the boundaries of Fort Irwin would be managed with some level of protection; and,

3. to the best of our knowledge, the overall status of the Lane Mountain milk-vetch seems to be stable.

Note that our conclusions are based, in large measure, on the Army's commitment to fund important conservation measures for the desert tortoise and Lane Mountain milk-vetch. These measures are vital to the survival and recovery of these species. Consequently, if, for any reason, the Army is unable to meet the obligations it has established for itself during this consultation, re-initiation of formal consultation would be required.

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 and must be undertaken by the Army. The Army has a continuing duty to regulate the activities covered by the incidental take statement in the biological opinion. If the Army fails to assume and implement the terms and conditions of the incidental take statement, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, the Army 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 CFR 402.14(i)(3)].

To provide clarity regarding the scope of this incidental take statement, we have listed all of the activities that the Army has included as part of the proposed use of additional training lands at Fort Irwin. We have grouped these activities according to whether they may result in incidental take as a result of direct actions by the Army or of actions taken by other agencies, or not result in incidental take. Note that we have included actions that would not result in incidental take for the sake of clarity; we cannot impose terms and conditions on such actions. Finally, we mention the Lane Mountain milk-vetch only because some actions that relate to the Lane Mountain milk-vetch could kill or injure desert tortoises.

Direct Actions by the Army

Training. We anticipate that military exercises may kill or injure any desert tortoises that are not translocated from the training areas. We cannot quantify the precise number of desert tortoises that may be killed or injured because of the large areas involved, the difficulty in determining the precise number of animals present, and the fact that some individuals may persist in rugged and lightly used areas. Based on information provided by the Army, we estimate that 1,197 adult desert tortoises occur in training areas; however, the Army has committed to translocating as many animals as possible from the Superior Valley and UTM 90 parcels. Desert tortoises in the Eastgate parcel, which the Army estimated to number 288, would not be translocated; consequently, most of these animals are likely to be killed by training. We do not have an estimate of the number of immature desert tortoises in training areas.

Translocation Plan for Desert Tortoises. The translocation of approximately 1,197 adult desert tortoises and an unknown number of immature animals would involve the take, in the form of capture, of all of these individuals. We further anticipate that 15 percent of the translocated desert tortoises and 15 percent of the resident desert tortoises (i.e., those animals residing in areas where the Fort Irwin would be released) may die. Based on the information provided by the Army, we anticipate that approximately 136 adult desert tortoises may die as a result of translocation; we expect that the same percentage of immature animals may die. Although we do not expect the mortality of resident animals to exceed 15 percent, we cannot estimate how many would die because we have not yet determined the location of the translocation areas. Because the Army will only move desert tortoises to areas where the resident population is severely depleted, we expect that very few resident animals will die as a result of translocation.

Note that this incidental take statement provides an exemption from the prohibitions against take only for translocation activities such as collecting, storing, and transporting desert tortoises, attaching and removing radio-transmitters and PIT tags, testing for diseases, and routine monitoring of animals. If the Army or any other entity wishes to pursue additional research on translocated animals, additional analysis and authorization pursuant to the authorities of the Endangered Species Act may be required.

Other Activities. We anticipate that the following actions may kill or injure a small number of desert tortoises. We cannot quantify the number of desert tortoises that may be killed or injured as a result of these activities; however, the level of mortality would be minor in comparison to the number of animals that would be either translocated or killed by training. Note also that at least some animals in the areas where these activities would occur may be translocated prior to their implementation.

1. Boundary barrier.

2. Water stops.

3. Tank crossings over Fort Irwin Road.

4. Rerouting of Copper City Road.

5. Remediation of unauthorized dump sites.

6. Closure of mines.

7. Development of sites for communication and monitoring equipment.

8. Signing conservation areas for the desert tortoise and Lane Mountain milk-vetch, dry lakes, and springs.

9. Desert tortoise-proof fencing along the southern boundary.

10. Goldstone Transit Route.

11. Use of existing roads.

Summary. Note that the take of desert tortoises is exempted from the prohibitions contained in section 9 of the Act only for actions required to prepare the additional lands for training, routine training, and the conservation measures described in this section within the boundaries of Fort Irwin and for collecting, storing, and transporting desert tortoises, attaching and removing radio-transmitters and PIT tags, testing for diseases, and routine monitoring of animals associated with translocation of desert tortoises to the sites selected in the plan to be prepared within 180 days of issuance of this biological opinion. All desert tortoises within these areas may be taken in the

form of injury, mortality, or capture. We cannot predict a precise number of desert tortoises that may be taken for the reasons we have discussed previously in this biological opinion.

If the Army proposes to undertake additional activities or construction of facilities other than those described and analyzed in this biological opinion, it should request initiation of consultation, pursuant to section 7(a)(2) of the Act. Additional research on desert tortoises may require authorization under the authorities of section 10(a)(1)(A) of the Act.

Actions by Other Agencies

The following actions will require additional analysis and authorization by agencies other than the Army. Consequently, although desert tortoises may be killed or injured during their implementation, we are not providing an exemption to the prohibitions against take for the following actions:

1. Route closure and rehabilitation in Lane Mountain milk-vetch and desert tortoise habitat.

2. Installation of desert tortoise-proof fencing on Irwin Road.

3. Research and collection of data.

4. Installation of aircraft warning devices.

Actions that would not Result in Incidental Take

The following actions will not kill or injure desert tortoises. Consequently, we are not providing an exemption to the prohibitions against take for the following actions and they will not be discussed further in this incidental take statement. Note that the future actions proposed by the working group or desert tortoise management team or undertaken to implement adaptive management could cause take; however, we cannot evaluate those future actions at this time.

1. Retirement of grazing allotments.

2. Land acquisition.

3. Assisting the Bureau of Land Management with management of acquired lands.

4. Adopting the principle of adaptive management.

5. Formation of a desert tortoise management team.

6. Education of soldiers, contractors, and civilians.

Lane Mountain Milk-vetch

Section 9 of the Act does not address the incidental take of listed plant species. Consequently, we have not included an incidental take statement, reasonable and prudent measures, or terms and conditions for the Lane Mountain milk-vetch. We remind you that section 9(a)(2)(B) of the Act prohibits the removal and reduction to possession and the malicious damage of endangered species on any areas under Federal jurisdiction.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of the desert tortoise during activities related to training on the additional maneuver lands at Fort Irwin, preparation for training on the new lands, and translocation of desert tortoises from training areas:

1. The Army must ensure that only qualified personnel are allowed to handle desert tortoises.

2. The Army must develop procedures to reduce the take of desert tortoises during the preparation of the new training lands for military exercises.

3. The Army must ensure that all personnel using vehicles to mark boundaries within habitat of the desert tortoise receive instruction on their responsibilities with regard to protection of the species.

4. The Army must provide specific information on the procedures that will be implemented to translocate desert tortoises.

5. The Army must develop a set of procedures that would be followed if a desert tortoise is encountered during military exercises.

Note that these reasonable and prudent measures and terms and conditions pertain only to activities related to training on the additional maneuver lands at Fort Irwin, preparation for training on the new lands, and translocation of desert tortoises from training areas. If the Army wishes to pursue any other discretionary actions that may affect the desert tortoise or its critical habitat, it must consult with the Service, pursuant to section 7(a)(2) of the Act.

TERMS AND CONDITIONS

To be exempt from the prohibitions of section 9 of the Act, the Army must comply with or ensure that any contractor complies with the following terms and conditions, which implement the reasonable and prudent measures described in the previous section of this biological opinion and the reporting and monitoring requirements. These terms and conditions are non-discretionary.

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

   a. The capture, handling, translocation, and monitoring of desert tortoises must be conducted only by qualified personnel who have been approved by the Service. (We consider personnel to be qualified if they possess demonstrated experience conducting the types of activities which they desire to undertake; for example, moving a desert tortoise a short distance out of harm's way requires less experience than attaching and removing radio transmitters.) Mickey Quillman of the Department of Public Works is authorized to conduct these activities within the boundaries of Fort Irwin and outside the boundaries of Fort Irwin when working on translocation of desert tortoises from training areas.

   b. In unforeseen circumstances, such as when a desert tortoise is encountered during a training exercise, Mr. Quillman may authorize other individuals to handle desert tortoises when these animals are at risk. Mr. Quillman must instruct such individuals in proper handling techniques when he provides this authorization.

   c. If the Army wishes to use other biologists to handle desert tortoises, it must provide us with their credentials for our review and approval at least 30 days prior to onset of the activity for which you wish them authorized. Note that a specific description of their experience with desert tortoises and references are a key component of their credentials.

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

   Prior to the onset of ground-disturbing activities associated with construction of the boundary barrier, water stops, sites for communication and monitoring equipment, roads to these sites, and tank crossings over Fort Irwin Road; rerouting of Copper City Road; remediation of unauthorized dump sites; closure of mines; and the installation of desert tortoise-proof fencing along the southern boundary; and the development of the Goldstone Transit Route, the Army must develop, through full coordination with the Service, specific procedures that will be followed during the implementation of these actions. The specific procedures must include, but need not be limited to:

   a. A field evaluation of the work site to determine whether additional protective measures are to be implemented.

   b. An evaluation of the level of on-site protection needed for desert tortoises during implementation of the project. Such on-site protection may include full- or part-time monitors or fencing to separate desert tortoises from work areas.

   c. A procedure to determine the fate of desert tortoises that may be encountered at the work site. This procedure must include a contingency plan to determine whether the

desert tortoise is to be left on-site or entered into the translocation program, based on the expected intensity of use and the status of the translocation program.

d. A project-specific worker education program.

e. A determination of whether the area is to be restored after completion of the project. Such a decision must be based on the expected intensity of use and the status of the desert tortoise in the vicinity.

f. The Army must develop a design for the boundary barrier that allows desert tortoises to exit the ditch or prevents them from entering it.

g. During the closure of mines, a determination must be made regarding whether desert tortoises are currently using or are likely to use the mine in the foreseeable future; if use by desert tortoises is occurring or likely to occur, the Army must close the mine in a manner that allows access to desert tortoises but safeguards any human visitors to the site. These procedures must include guidance on when undertaking such conservation measures are appropriate; for example, securing an entrance to a mine for desert tortoises would not be practical in an area that would be completely disturbed by training.

h. During the implementation of all projects, the Army must ensure that its activities are not providing subsidies for predators of the desert tortoise. In particular, the Army must ensure that the water stops do not provide drinking opportunities for common ravens.

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

Prior to the onset of signing of conservation areas for the desert tortoise and Lane Mountain milk-vetch (because desert tortoises also occur in these areas), dry lakes, and springs and use of existing roads, the Army must ensure that all personnel involved in these activities receive an education program regarding the desert tortoise and its potential to occur in the areas where they will be driving and that they are fully aware of their responsibilities when in the field.

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

At a minimum, the translocation plan must include information on:

a. The methods to be used to collect, hold, transport, and release desert tortoises at translocation sites.

b. A procedure on how to determine appropriate translocation sites.

c. The personnel who would be involved in the mechanics and research monitoring related to translocation.

d. The procedures for determining the health of desert tortoises and for the disposition of unhealthy animals.

e. The methods that will be used to manage and protect the translocation sites.

f. A method of determining when desert tortoises would be moved across the southern boundary fence or moved to a more distant translocation site.

g. A description of any radio-transmitters, data recorders, and PIT tags that may be used.

5. The following terms and conditions implement reasonable and prudent measure 5:

The Army must develop a set of procedures that would be implemented if a desert tortoise is encountered during military exercises. The goal of these procedures should be to prevent any unnecessary mortality of desert tortoises without compromising the realism of the training exercise. The Army may consider whether these procedures should involve the handling of desert tortoises at risk by soldiers.

We understand that the Army is currently revising the integrated natural resources management plan for Fort Irwin and recognize that the details of at least a portion of these reasonable and prudent measures and terms and conditions may be more appropriately defined during our Sykes Act review and consultation on that document. If the Army and Service jointly determine that this is the case, we are willing to work with you to incorporate them into the integrated natural resources management plan.

REPORTING REQUIREMENTS

By January 31 of each year this biological opinion is in effect, the Army must provide a report to the Service that provides details on each desert tortoise that is found dead or injured within the new training areas at Fort Irwin or at translocation 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. The annual report must also describe activities that the Army implemented or funded as part of its conservation program for the desert tortoise (e.g., activities related to translocation, the amount of road rehabilitation funded, land acquired, roads fenced, etc.) within habitat of the desert tortoise. The Army 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 were 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 Army 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)). Finally, we request that you include similar information in the annual report on the Lane Mountain milk-vetch; this information would be extremely useful to us as we continue our efforts to monitor the status of the species.

DISPOSITION OF DEAD OR INJURED DESERT TORTOISES

Within 3 days of locating any dead or injured desert tortoise, you must notify the Service's Division of Law Enforcement in writing (370 Amapola Avenue, Suite 114, Torrance, California 90501 and the Ventura Fish and Wildlife Office by telephone (805) 644-1766) and in writing (2493 Portola Road, Suite B, Ventura, California 93003). The report must include the date, time, location of the carcass, a photograph, cause of death, if known, and any other pertinent information.

Injured desert tortoises must be transported to a qualified veterinarian for treatment. If injured desert tortoises survive, the Service must be contacted regarding their final disposition unless other arrangements have been established in the translocation or other plans.

Dead specimens must be handled carefully to preserve biological material in the best possible state for later analysis. The remains of desert tortoises must be placed with the appropriate office of the U.S. Geological Survey if they are in any condition that is useful for research. Arrangements regarding proper disposition of potential museum specimens must be made with the U.S. Geological Survey. If other research entities request the remains of desert tortoises, the Army must receive the Service's approval before providing the remains. If the remains are not useful for research, they must be placed in a plastic bag, with signed documentation of the origin of the remains, and deposited in an approved landfill. Disarticulated shells and other remains found in the field that are not useful for research may be left in the field.

CONSERVATION RECOMMENDATIONS

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

1. We recommend that the Army attempt to conserve desert tortoises that occur in any higher density areas of the Eastgate parcel by either translocating these animals to an appropriate offsite location or by establishing reasonable off-limits areas that do not compromise the integrity of training while allowing these desert tortoises to remain in

place. These desert tortoises may be important for research purposes and as possibly the most easternmost animals in this portion of the Western Mojave Recovery Unit.

2. We strongly recommend that the Army restrict vehicle use to established routes and bivouac areas in the Superior Valley parcel where saltbush scrub comprises the dominant plant community. We offer this recommendation for several reasons. First, the clay sediments in this area will generate a large amount of dust once the cryptogamic crusts are disturbed. The dust may be transported to the east by prevailing winds where it may compromise the health of plant and animal communities. Additionally, additional sediments would likely be deposited in the lakebed itself during heavy rains; these sediments may damage the ephemeral invertebrate community in the lake. Second, this portion of the Superior Valley parcel is extremely flat and open. If the area is not intended for use as a battle corridor, as the Army contends, it would seem to provide little in the way of tactical advantage to be able to travel cross-country everywhere in this region. Finally, the area supports a low density of desert tortoises; by limiting vehicle use to established roads and bivouac areas, the Army could reduce the level of mortality, albeit to a small degree, associated with the proposed addition of training lands.

3. We recommend that the Army conduct additional research on the ecology of the Lane Mountain milk-vetch. Research topics could include additional study of its pollination ecology, seed dispersal, seed bank characteristics, and the nature and behavior of its root system; the latter study should be conducted on plants that occur in areas that are likely to be heavily disturbed by training. We also recommend that the Army evaluate the effects of mineral oil, as it is used as an obscurant, on the Lane Mountain milk-vetch.

4. We recommend that the Army study the effects of mineral oil, as it is used as an obscurant, on the desert tortoise.

5. We recommend that the Army consider whether a limited number of desert tortoises should be translocated before the large-scale translocations associated with the UTM 90 parcel occur. These smaller translocations would allow us to evaluate techniques for use in the larger translocation project.

6. We recommend that the Army discuss with us whether certain members of training units should be instructed in the handling of desert tortoises in the event that they are encountered and are in harm's way during exercises when biologists from the Department of Public Works cannot be reached. If the Army and Service determine that such a procedure is appropriate, we further recommend that standards for training personnel and appropriate procedures be incorporated into the integrated natural resource management plan that the Army is currently revising.

We request that you notify us if you intend to pursue any of these recommendations.

REINITIATION NOTICE

This concludes formal consultation on the proposed addition of training lands at Fort Irwin. Reinitiation of formal consultation is required where discretionary federal involvement or control over the action has been retained or is authorized by law and: (a) if the amount or extent of taking specified in the incidental take statement is exceeded; (b) if new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (c) if the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion; or (d) if a new species is listed or critical habitat designated that may be affected by the identified action.

As we noted in the Conclusion section of this biological opinion, our determination that the proposed action is not likely to jeopardize the continued existence of the desert tortoise and Lane Mountain milk-vetch or adversely modify critical habitat of the desert tortoise is based, in large measure, on the Army's commitment to fund important conservation measures for these desert tortoise and Lane Mountain milk-vetch. These measures are vital to the survival and recovery of these species. Consequently, if, for any reason, the Army is unable to meet the obligations it has established for itself during this consultation, re-initiation of formal consultation would be required.

If you have any questions regarding this biological opinion, please contact me at (805) 644-1766.

Sincerely,

Diane K. Noda

Diane K. Noda
Field Supervisor

REFERENCES CITED

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

Bagley, M. 1989. Sensitive plant species survey on a portion of the proposed Fort Irwin National Training Center expansion area, San Bernardino County, California. Report to U.S. Army Corps of Engineers, Los Angeles, California. Michael Brandman Associates. Santa Ana, California.

Barneby, R.C. 1964. Atlas of North American *Astragalus*. Memoirs of the New York Botanical Garden 13:1-1188.

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

Berry, K.H., G. Goodlett, and T. Goodlett. 2002. Effects of geology and cover site choice on desert tortoise populations at the Tiefort Mountains, California. Abstract of paper presented at the Twenty-fifth Annual Meeting and Symposium of the Desert Tortoise Council. http://www.deserttortoise.org/abstract/abstracts2000/2000abs4.html.

Boarman, W.I., and M. Sazaki. 1996. Highway mortality in desert tortoises and small vertebrates: success of barrier fences and culverts. I*n* G. J. Evink, P. Garrett, D. Zeigler, and J. Berry (eds.), *Trends in addressing transportation related wildlife mortality. Proceedings of the transportation related wildlife mortality seminar*. Environmental Management Office, Department of Transportation, Tallahassee, Florida.

Brandt, C.A., W.H. Rickard and N.A. Cadoret. 1997. Vegetation studies: National Training Center, Fort Irwin, California. Report for U.S. Army National Training Center, Fort Irwin, California. PNNL-11697. Pacific Northwest National Laboratory. Richland, Washington.

Burge, B.L. 1978. Physical characteristics and patterns of utilization of cover sites by *Gopherus agassizii* in southern Nevada. Proceedings of the 1978 Symposium, Desert Tortoise Council.

Burge, B.L., and W.G. Bradley. 1976. Population density, structure and feeding habits of the desert tortoise, *Gopherus agassizii*, in a low desert study area in southern Nevada. Proceedings of the 1976 Symposium, Desert Tortoise Council.

Charis Professional Services Corporation. 2002. Distribution and Abundance of Lane Mountain Milk-vetch (*Astragalus jaegerianus*). Prepared for U.S. Army National Training Center, Fort Irwin, California. Temecula, California.

Charis Professional Services Corporation. 2003. Biological assessment for the proposed addition of maneuver training land at Fort Irwin, California. Prepared for the U.S. Army National Training Center, Fort Irwin, California. Temecula, California.

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

Corn, P.S. 2004. Personal communication. Biologist, U.S. Geological Survey. Missoula, Montana.

Departments of the Interior and Army. 2001. Key elements of the proposed expansion plan for Fort Irwin and the National Training Center. Dated January 12. Washington, D.C.

Desert Tortoise Recovery Plan Assessment Committee. 2004. Abstract of the Desert Tortoise Recovery Plan Assessment Committee: status of tortoises in the West Mojave. Unpublished report. University of Nevada. Reno, Nevada.

Evans, R. 2004. Personal communication. Biologist, Marine Corps Air Ground Combat Center, Twentynine Palms, California.

Haigh, W. 2000. Reasonableness of Fort Irwin tortoise panel report. Bureau of Land Management. Barstow, California.

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

Hessing, M. 2004. Personal communication. Botanist, Charis Professional Services Corporation. Temecula, California.

Hovik, D.C., and D.B. Hardenbrook. 1989. Summer and fall activity and movements of desert tortoises in Pahrump Valley, Nevada. Abstract of paper presented at Fourteenth Annual Meeting and Symposium of the Desert Tortoise Council.

LaRue, E. 2000. Results of the Fort Irwin tortoise panel meeting of 18-19 January and 18 February 2000. Dated March 15. Wildlife biologist, Barstow Field Office, Bureau of Land Management. Barstow, California.

Lee and Ro Consulting Engineers. 1986. Endangered and sensitive species survey and deficiency tabulation, Fort Irwin National Training Center and Goldstone Space Communications Complex. Contract No. DACA09-84-C-0097. Report for Director of Engineering and Housing, Fort Irwin, National Training Center. Fort Irwin, California.

Lovich, J.E., and D. Bainbridge. 1999. Anthropogenic degradation of the southern California desert ecosystem and prospects for natural recovery and restoration. Environmental Management 24:309-326.

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

Nussear, K.E. 2004. Personal communication. Biologist. University of Nevada. Reno, Nevada.

Oftedal, O.T. 2001. Low rainfall affects the nutritive quality as well as the total quantity of food available to the desert tortoise. Abstract of paper presented at the Twenty-sixth Annual Meeting and Symposium of the Desert Tortoise Council. Http://www.deserttortoise.org/abstracts2001/2001abs29.html

Perkins, S. 2004. Thin skin. Desert's fragile crust takes millennia to form but only moments to destroy. Science News 165(1):11-13.

Prigge, B., and R. Sharifi. 2004. Personal communication. Botanists, University of California, Los Angeles. Los Angeles, California.

Quillman, M. 2004. Personal communication. Biologist, Department of Public Works. Fort Irwin, California.

Reheis, M. 2004. Personal communication. Geologist, U.S. Geological Survey. Denver, Colorado.

Schamberger, M., and F.B. Turner. 1986. The application of habitat modeling to the desert tortoise (*Gopherus agassizii*). Herpetologica 42(1):134-138.

Science Applications International Corporation. 2003. Lane Mountain milk-vetch data. Memorandum to Marcia Wertenberger. Dated October 1. Santa Barbara, California.

Turner, F.B., and D.E. Brown. 1982. Sonoran desertscrub. In: D.E. Brown (editor). Biotic communities of the American Southwest - United States and Mexico. Desert Plants 4(1-4):181-222.

U.S. Army Corps of Engineers. 1991. Final desert tortoise biological assessment and conservation plan for the proposed expansion of the National Training Center, Fort Irwin, California. Los Angeles, California.

U.S. Bureau of Land Management. 1996. Draft environmental impact statement for the Army's land acquisition project for the National Training Center, Fort Irwin, California, and proposed amendment to the California Desert Conservation Area Plan. Riverside, California.

U.S. Bureau of Land Management. 2001. Biological evaluation on effects of CDCA Plan, as amended, and proposed to be amended by the NEMO and NECO preferred alternatives and with other interim measures on desert tortoise. California Desert District. Riverside, California.

U.S. Bureau of Land Management. 2003. Draft environmental impact report and statement for the West Mojave Plan; a habitat conservation plan and California Desert Conservation Area Plan amendment. California Desert District, Moreno Valley, California.

U.S. Department of the Army. Undated. Proposed expansion plan for Fort Irwin and the National Training Center.

U.S. Department of the Army. 2003. Letter to U.S. Fish and Wildlife Service, Ventura Fish and Wildlife Office regarding mortalities of desert tortoises. Dated June 16. From Lieutenant Colonel Jeffrey S. Ogden, Director of Public Works. Fort Irwin, California.

U.S. Department of the Army. 2004a. Letter to U.S. Fish and Wildlife Service, Ventura Fish and Wildlife Office regarding changes to the proposed action. Dated February 17. From Colonel Edward L. Flinn, Deputy Commander and Chief of Staff, National Training Center. Fort Irwin, California.

U.S. Department of the Army. 2004b. Letter to U.S. Fish and Wildlife Service, Ventura Fish and Wildlife Office regarding clarification of the biological assessment. Dated January 29. From Colonel Edward L. Flinn, Deputy Commander and Chief of Staff, National Training Center. Fort Irwin, California.

U.S. Department of the Army. 2004c. Letter to U.S. Fish and Wildlife Service, Ventura Fish and Wildlife Office providing an addendum to the biological assessment. Dated Febuary 25. From Colonel Edward L. Flinn, Deputy Commander and Chief of Staff, National Training Center. Fort Irwin, California.

U.S. Department of the Army. 2004d. Letter to U.S. Fish and Wildlife Service, Ventura Fish and Wildlife Office providing comments on the draft biological opinion. Dated March 11. From Colonel Edward L. Flinn, Deputy Commander and Chief of Staff, National Training Center. Fort Irwin, California.

U.S. Fish and Wildlife Service. 1991a. Biological opinion for the Army's current mission at the National Training Center, Fort Irwin, California (1-6-91-F-42). Dated September 24. Southern California Field Station. Laguna Niguel, California.

U.S. Fish and Wildlife Service. 1991b. Draft biological opinion on the U.S. Army's proposed expansion of Fort Irwin, San Bernardino County, California (1-6-91-F-41). Dated August 21. Portland, Oregon.

U.S. Fish and Wildlife Service. 1991c. Biological opinion for ephemeral sheep grazing in the western Mojave and northern Colorado deserts of California (6840 CA-932.5) (1-6-91-F-18). Dated April 11. Southern California Field Station. Laguna Niguel, California.

U.S. Fish and Wildlife Service. 1992. Biological opinion for the construction and operation of an antenna research system by the Jet Propulsion Laboratory, Fort Irwin, California (1-6-92-F-10). Dated February 11. Southern California Field Station. Laguna Niguel, California.

U.S. Fish and Wildlife Service. 1993. Biological opinion for the National Training Center's proposed land acquisition project, San Bernardino County, California (1-6-93-F-17). Dated August 19. Ventura, California.

U.S. Fish and Wildlife Service. 1994a. Biological opinion for the National Training Center's proposed land acquisition project, San Bernardino County, California (CACA 33285 2310 6840 CA-932.5) (1-8-94-F-12R). Dated April 29. Ventura, California.

U.S. Fish and Wildlife Service. 1994b. Desert tortoise (Mojave population) recovery plan. Portland, Oregon.

U.S. Fish and Wildlife Service. 1995. Reinitiation of formal consultation on the Army's current mission at the National Training Center, Fort Irwin, California (1-8-95-F-16R). Dated September 15. Ventura, California.

U.S. Fish and Wildlife Service. 2001. Preliminary review of the effects of the expansion of the National Training Center/Fort Irwin on the desert tortoise and Lane Mountain milk-vetch. Dated March 28. Washington, D.C.

U.S. Fish and Wildlife Service. 2002a. Biological opinion for the boundary survey of lands withdrawn pursuant to Fort Irwin Military Lands Withdrawal Act of 2001, San Bernardino County, California (1-8-02-F-27). Dated April 19. Ventura, California.

U.S. Fish and Wildlife Service. 2002b. Proposed off-road vehicle area, U.S. Army National Training Center, Fort Irwin, San Bernardino County, California (1-8-00-F-78). Dated May 31. Ventura, California.

U.S. Fish and Wildlife Service. 2003. Proposed Fort Irwin-China Lake fiber optics cable installation, U.S. Army National Training Center, Fort Irwin, San Bernardino County, California (1-8-02-F-59). Dated June 9. Ventura, California.

U.S. Fish and Wildlife Service. 2004a. Draft biological opinion for the proposed addition of maneuver training lands at Fort Irwin, California (1-8-03-F-48). Dated February 27. Ventura, California.

U.S. Fish and Wildlife Service. 2004b. Internal draft of a proposed rule. Endangered and threatened wildlife and plants; proposed designation of critical habitat for *Astragalus jaegerianus* (Lane Mountain milk-vetch). Ventura Fish and Wildlife Office. Ventura, California.

Weinstein, M., K.H. Berry, and F.B. Turner. 1987. An analysis of habitat relationships of the desert tortoise in California. A report to Southern California Edison Company. Rosemead, California.

Wilson, D.S., D.J. Morafka, C.R. Tracy, and K.A. Nagy. 1999. Winter activity of juvenile desert tortoises (*Gopherus agassizii*) in the Mojave Desert. Journal of Herpetology 33:496-501.

Woodman, P. 2004. Personal communication. Kiva Biological Consulting. Inyokern, California.