

**PRELIMINARY REVIEW OF THE EFFECTS OF THE EXPANSION OF THE  
NATIONAL TRAINING CENTER/FORT IRWIN  
ON THE DESERT TORTOISE AND LANE MOUNTAIN MILKVETCH**

March 28, 2001

**DIRECTION FOR THIS REVIEW**

Congress directed the Department of the Army and Department of the Interior to draft a proposed plan for the expansion of the maneuver training lands at the National Training Center, San Bernardino County, California, while protecting endangered and threatened species and their critical habitats. Public Law 106-554, Consolidated Appropriations Act, 2001, incorporates by reference H.R. 5666, Miscellaneous Appropriations, Section 323 of which requires that the Secretaries of the Army and Interior to provide Congress a joint report of the key elements of the proposed expansion plan no later than 45 days after enactment. The Key Elements Report was provided to Congress on January 12, 2001. Within 90 days after enactment, the Director of the Fish and Wildlife Service is to provide the Secretaries with a preliminary review of the plan that identifies an approach for implementing the plan consistent with the Endangered Species Act. Within 120 days of enactment, the Secretaries are required to submit a proposed expansion plan and to propose legislation for the withdrawal and reservation of public lands for the National Training Center expansion. The Army desires to expedite approval of the expansion to satisfy the training needs of the new interim brigade combat teams that are scheduled to train at the National Training Center in 2003.

**PURPOSE OF THE REVIEW**

As noted in the previous paragraph, Public Law 106-554 requires the FWS to submit to the Secretaries a preliminary review of the proposed expansion plan (as developed as of that date) not later than 90 days after the date of its enactment. The public law further states that, in the preliminary review, the FWS “shall identify, with as much specificity as possible, an approach for implementing the proposed expansion plan consistent with the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.)” (ESA).

Section 7(a)(2) of the ESA requires that Federal agencies insure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of the critical habitat of any such species. To this end, the Army must consult with the FWS regarding the effects of the proposed expansion of the National Training Center on the threatened desert tortoise (*Gopherus agassizii*) and the endangered Lane Mountain milkvetch (*Astragalus jaegerianus*).

To meet the intent of Congress, we have reviewed the proposed expansion plan, including the proposed conservation measures, developed as of the date of this report. This document contains our preliminary analysis of the effects of the proposed expansion plan on the desert tortoise and

the Lane Mountain milkvetch. We have also provided information on the aspects of an expansion plan for which additional information must be developed prior to the initiation of formal consultation, pursuant to section 7(a)(2) of the ESA, as is required by Public Law 106-554. Although we have attempted to provide the most complete analysis possible, the receipt of new information between the date of this review and the conclusion of formal consultation may alter the conclusions we have reached herein. The purpose of this Preliminary Review is to provide early information so the Department of the Army can prepare an expansion proposal that includes appropriate measures for ameliorating the effects to the desert tortoise and Lane Mountain milkvetch. As stated in Public Law 106-554, this preliminary review does not constitute the FWS' biological opinion for the National Training Center's proposed expansion pursuant to section 7(a)(2) of the ESA.

#### DESCRIPTION OF THE PROPOSED EXPANSION AREA

The proposed expansion includes two parcels of land contiguous with the existing National Training Center boundaries. Parcel 1 (Superior Valley) is located to the west of the National Training Center and contains approximately 63,673 acres. The eastern-most boundary of this parcel is its contiguous with the National Training Center's southwest edge; the parcel is bounded on the north by Mojave B Range of the Naval Air Weapons Station, China Lake, and on the south by the Paradise Range and Lane Mountain. The western edge of the parcel is located in the area of the Superior Dry Lakes.

Parcel 2 (East Gate) includes approximately 46,438 acres directly east of and contiguous with the National Training Center. It is bounded on the north by the Avawatz Mountains and on the east by State Highway 127; its southern boundary runs adjacent to the Boulder Power Corridor.

Approximately 22,139 acres along the southern boundary of the National Training Center that are currently off-limits to training would also be opened to training. With limited exceptions, this area south of the UTM 90 line would be opened for maneuvers.

#### DESCRIPTION OF ACTIVITIES THAT WOULD OCCUR WITHIN THE PROPOSED EXPANSION AREA

The National Training Center is the only instrumented training area suitable for force-on-force and live fire training of heavy brigade-sized military forces. Currently, the National Training Center has only one maneuver corridor suitable for brigade-sized maneuvers. Expansion of the National Training Center would provide the Army with a second, brigade-sized maneuver corridor. A more complete description of the Army's needs with regard to training can be found in the Key Elements Report.

The Superior Valley parcel and the area south of the UTM 90 line would be used for these brigade-sized force-on-force maneuvers. This training involves the rapid movement of large numbers of tracked and wheeled vehicles over extensive areas. The East Gate parcel would be

used as a staging area. This parcel would allow training units to prepare for maneuvers but would not be used for force-on-force training.

The Army currently uses heated mineral oil to obscure units from visual observation by the opposition; this practice would continue in the expansion areas. The FWS and the Army are currently consulting on the potential effects on the desert tortoise of the use of graphite in its obscurant smokes. The addition of graphite to the obscurant smokes blocks infrared observation of units; it is generally used less frequently in training exercises than the mineral oils. Depending upon the outcome of that consultation, the Army may also use graphite in its obscurants.

The National Training Center contains instruments that record how training exercises are conducted. Combatants view the records of the training to further the learning they receive from the field exercises. Because the existing instrumentation only covers current training areas, additional instruments to monitor training activities would need to be installed throughout the expansion area, much on higher ground that overlooks training areas. Maintenance of the equipment would be required and new roads may be needed to provide access to the equipment.

#### RELATIONSHIP OF THE PROPOSED EXPANSION OF THE NATIONAL TRAINING CENTER TO THE WEST MOJAVE COORDINATED MANAGEMENT PLAN

Currently, the FWS, Bureau of Land Management, California Department of Fish and Game, four counties, 11 cities, other agencies, and numerous stakeholders are participating in the West Mojave Coordinated Management Plan for a 9.5-million acre area in the western Mojave Desert. The goal of this planning effort is to develop a programmatic consultation for public lands and a habitat conservation plan for non-federal lands, pursuant to sections 7(a)(2) and 10(a)(1)(B) of the ESA, respectively, that would function to conserve listed and sensitive species and expedite the process of complying with the ESA. This planning effort was initiated in 1992; a draft environmental impact statement and habitat conservation plan should be released for public review in November 2001.

Section 232(g) of Public Law 106-554 notes that any analysis required under the National Environmental Policy Act of 1969 (NEPA) with respect to the proposed expansion of the National Training Center must be coordinated, to the extent practicable and appropriate, with the review of the West Mojave Coordinated Management Plan. As details of the proposed expansion and the West Mojave Coordinated Management Plan are developed, such analysis will be possible; indeed, this analysis is required for the decision-makers and the public to fully understand the effects and relationship of the two projects. However, pursuant to Public Law 106-554, we are conducting our review of the effects of the proposed expansion and the conservation measures without consideration of the West Mojave Coordinated Management Plan.

#### CONSERVATION MEASURES

Public Law 106-554 authorizes the appropriation of \$75,000,000 to the Secretary of the Army for conservation measures necessary to comply with the ESA for the listed species which would be affected by the proposed expansion. The Key Elements Report states that the conservation measures are intended to offset the direct and indirect impacts of the proposed expansion. The Key Elements Report also notes that the Army may provide additional conservation benefits through supplemental on-the-ground management actions not identified below. The supplemental management actions have not yet been identified. However, if identified at the time of formal consultation, pursuant to section 7 of the ESA, any conservation benefits that may result will be considered. The proposed conservation measures, as identified in the Key Elements Report, are:

1. An additional 484 acres will be withdrawn to expand the existing Fort Irwin Study Site to approximately 2,470 acres. Research on the ecology of hatchling desert tortoises is currently conducted at this site. The Army and BLM will jointly manage this area.
2. To the extent practicable and consistent with its military needs and the Act, the Army will seek to manage appropriate areas south of the UTM 90 line in such a way as to protect the desert tortoise and its habitat.
3. The BLM will designate an approximately 123,550-acre area south of Fort Irwin as an Area of Critical Environmental Concern (ACEC). Approximately 3,100 acres of existing Fort Irwin lands will become part of this ACEC. The BLM will manage this ACEC for the protection and conservation of the desert tortoise and its habitat and for research on the desert tortoise. The Fort Irwin Study Site is located within this area.
4. A Working Group, composed of staff from the Army, FWS, California Department of Fish and Game, and BLM, will evaluate proposals for land acquisition and other conservation measures (e.g., research needs and priorities, management practices) to ensure they meet the appropriate criteria and provide for adequate conservation of the species to offset the impacts of the proposed expansion. The FWS will make the final determination as to whether any specific parcel of land should be acquired or whether any other conservation measure, including research, is appropriate and should be funded with the authorized appropriations. Conservation measures necessary to comply with the ESA may include, but are not limited to, the following:
  1. Establishment of ACECs which encompass wildlife management areas in the western Mojave Desert. The ACECs will provide special management attention to protect and prevent irreparable damage to important wildlife resources within areas (see 43 C.F.R. §1601.0-5);
  2. Establishment of Research Natural Areas (RNA) in the vicinity of the Alvord Mountains and Paradise Valley. Mechanisms will be included in the West

Mojave Coordinated Management Plan for designating additional RNAs to support future research as the need arises;

3. Acquisition of non-federal lands within the wildlife management areas in the western Mojave Desert. Priorities for acquisition would be in areas with the greatest potential for contributing to the conservation and recovery of desert tortoise populations within the Western Mojave Recovery Unit. The following criteria have been proposed to guide the land acquisition process: the occurrence of desert tortoises; suitable habitat; overlap of habitats of the desert tortoise, Lane Mountain milkvetch, and other sensitive species; potential for conflict with conservation of the desert tortoise, Lane Mountain milkvetch, and other sensitive species (i.e., lands that have the most imminent threat of being developed would have a high priority for acquisition); ability to facilitate implementation of a vehicle route network ; relative disturbance (i.e., lands with the least amount of disturbance would be acquired first); relative distance from nearby development (i.e., lands that have the most imminent threat of being developed); and cost of land;
4. Construction of barriers, fences, and other structures that are designed primarily to conserve the endangered or threatened species and their critical habitats;
5. Conducting research studies on protecting and promoting conservation of the desert tortoise, Lane Mountain milkvetch, and other endangered or threatened species and their critical habitats. The Working Group would make recommendations regarding research needs and priorities. The FWS will make the final determination regarding the research projects that will be funded with the authorized appropriations; and
6. Other conservation measures that the Working Group may recommend as being necessary and appropriate to protect and promote the conservation of the desert tortoise, Lane Mountain milkvetch, and other endangered or threatened species and their critical habitats. The FWS will make the final determination as to whether a conservation measure should be funded with the authorized appropriations. These might include, but would not be limited to, the following:
  1. Designation and implementation of a vehicle access network within the Western Mojave Recovery Unit, including restoration of closed routes and signage. Particular consideration will be given to those areas where route designation and closure would best benefit the conservation of the desert tortoise, Lane Mountain milkvetch, and other special status species;

2. Establishment of a line distance sampling program for desert tortoise populations, to be implemented over 30 years throughout the Western Mojave Recovery Unit, based on the best available scientific information;
  3. An education program that promotes the conservation and recovery of the desert tortoise and the protection of the Western Mojave Recovery Unit; and
  4. Initial research or analysis to determine impacts of the proposed expansion that may occur outside training areas, such as, but not limited to, the effects of dust and obscurants on the desert tortoise and Lane Mountain milkvetch.
7. Withdrawal of BLM lands identified as necessary for the long-term survival and recovery of the desert tortoise and Lane Mountain milkvetch from mining, location, leasing, sale, entry, and other conflicting land uses to prevent the loss of the conservation value of the lands by these competing and incompatible uses.

## STATUS OF THE LISTED SPECIES

### **Desert Tortoise**

On August 4, 1989, the FWS published an emergency rule listing the Mojave population of the desert tortoise as endangered. In its final rule, dated April 2, 1990, the FWS determined the Mojave population of the desert tortoise to be threatened. The desert tortoise was listed in response to habitat loss and degradation 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 (*Corvus corax*), collection by humans for pets or consumption, collisions with vehicles on paved and unpaved roads, and mortality resulting from diseases also contributed to the FWS's listing of this species. The FWS designated critical habitat for the desert tortoise in portions of California, Nevada, Arizona, and Utah in a final rule, published February 8, 1994. Most of the following information is from the recovery plan for the desert tortoise (FWS 1994).

#### *General Description and Ecology*

The desert tortoise is a large, herbivorous reptile and the only naturally occurring tortoise in the Mojave Desert. Large individuals can reach 15 inches in length. 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. 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.

Desert tortoises are most active in California during the spring and early summer when annual plants are most common. Additional activity occurs during warmer fall months and occasionally after summer rain storms. Desert tortoises spend the remainder of the year in burrows, escaping the extreme conditions of the desert.

Desert tortoises consume herbaceous annuals, perennial grasses, and portions of some shrubs and cactus. Desert tortoises usually begin to breed when they reach 15 to 20 years of age. Population size is influenced most significantly by adult mortality due to length of their age to maturity and life span. Eggs are generally laid at the mouths of their burrows between May and July; they usually hatch in fall. Mortality of eggs and young is high; 98 percent of individuals do not reach reproductive age.

### *Population Trends*

To determine trends in populations of the desert tortoise, current data sets from 1998 through 2000 must be evaluated with data sets and sources of information available between the 1970s and early 1990s. Data on desert tortoises in the Western Mojave Recovery Unit were first generated in some detail during the 1970s. The distribution and relative densities of desert tortoises between the mid-1970s and the early 1980s were summarized in a comprehensive report and series of maps for California (Berry and Nicholson 1984, Berry 1984). The report and maps subsequently have been used by the Department of the Interior and Department of Defense, as well as the California Department of Fish and Game and California Energy Commission for wildlife management and land-use planning. The distribution and density maps were based on three general sources of data: more than 800 strip transects (1.5 miles long by 10 yards wide, generally walked in an equilateral triangle 0.5 mile on a side); 8 long-term study plots established for research on desert tortoise demography and habitat use between 1971 and 1980; and numerous miscellaneous studies.

The strip transects focused on documenting numbers of different types of sign, such as live desert tortoises, cover sites (burrows, dens, pallets), scats, shell-skeletal remains, and tracks. The strip transect technique has been used to determine distribution and relative densities throughout the geographic range of the desert tortoise in the United States (e.g., Berry 1984, Garcia et al. 1982). The technique has been evaluated and analyzed numerous times (Turner et al. 1982, Weinstein 1989, Weinstein and Berry 1988, Weinstein et al. 1987). Data collected using strip transects have been compared with data from the long-term study plots. Data from the long-term study plots are based on mark-recapture studies and provide detailed information on changes in densities, size-age class structure, sex ratios, mortality rates, and causes of death (e.g., see Berry et al. 1986a, 1986b, Berry and Medica 1995, Berry 1997, Brown et al. 1999, Turner and Berry 1984). Determinations of population trends were based on both changes in absolute density

values of live desert tortoises and the appearance of dead marked desert tortoises in the population (allowing calculation of mortality rates).

Between the 1970s and late 1980s, coarse measures of status and trends in desert tortoise populations on a landscape scale were obtained by coupling four types of data: strip transect data, data from long-term study plots, data from special studies, and data on habitat condition and human uses. The 1984 maps of distribution and relative densities indicated that the western Mojave Desert contained broad areas with densities of desert tortoises ranging from 20 to more than 250 animals per square mile (Berry and Nicholson 1984). Absolute density figures calculated from mark-recapture samples of desert tortoises from the long-term permanent study plots supported the density estimates on the maps.

The BLM conducted surveys of the western Mojave Desert in 1998 and 1999 to identify areas that continued to have desert tortoise populations. The surveys were done using essentially the same strip-transect technique of counting desert tortoise sign described previously in this section. In 1998 and 1999, 875 and 1563 transects were walked, respectively. Approximately 64 percent of the transects (N = 1603) were walked in areas that were considered to support the best remaining populations of the desert tortoise and to be the areas where recovery of the species was most likely to occur in this recovery unit; therefore, these areas are likely to be proposed as Desert Wildlife Management Areas in the West Mojave Coordinated Management Plan (LaRue 2000).

Given the difficulties in translating the amount of sign observed into densities of desert tortoises, these surveys could not provide data on the absolute numbers of individuals present in various areas. However, the results of the surveys provide a general distribution pattern of where desert tortoises occur in the proposed conservation areas and elsewhere in the western Mojave Desert. No sign of desert tortoises was found on 433 of the 1603 transects conducted within likely Desert Wildlife Management Areas. In general, these surveys indicated that desert tortoises were absent from, or at best uncommon in, large areas where they were common or at least present in the 1970s. In other areas, their numbers appeared to be greatly reduced from past levels. When information from the 1998 and 1999 transects is combined with the documented loss of individuals on the study plots, a pattern of widespread decline in the number of desert tortoises in the western Mojave Desert is evident.

### *Desert Tortoise Recovery Plan*

The life history strategy of the desert tortoise depends on longevity and iteroparity (reproduction many times per lifetime). This life history strategy is advantageous where availability of resources is unpredictable and juvenile survival rates are highly variable, but even moderate downward fluctuations in adult survival rates can result in rapid population declines (Stearns 1976). Even when adult survivorship is “normal” (approximately 98% per year), desert tortoise populations are not capable of rapid growth. Desert tortoise populations can withstand high rates of natural juvenile mortality as long as the probability of adults surviving each year does not drop

below approximately 98%. Thus, the desert tortoise is extremely vulnerable to extinction in areas in which the probability of adult survival has been significantly reduced and maintaining a high rate of survivorship of adult desert tortoises is the key factor in the recovery of this species (FWS 1994). High adult survivorship means reducing or eliminating sources of adult mortality.

The recovery plan for the desert tortoise notes that at least six populations or groups of populations “show significant differentiation in genetics, morphology, ecology, or behavior....” Consequently, the recovery plan recommended that these six populations or groups of populations be defined as recovery units within the Mojave population of the desert tortoise. These recovery units are:

Northern Colorado Desert      Eastern Colorado Desert      Upper Virgin River  
Eastern Mojave Desert      Northeastern Mojave Desert      Western Mojave Desert

Within each recovery unit, the recovery plan recommends the establishment of one or more Desert Wildlife Management Areas. The recovery plan recommends that the management of these areas be at a level that will ensure the conservation of the desert tortoise. To meet this objective, the recovery plan also recommends the prohibition of general types of activities that adversely affect desert tortoises and their habitat. The recovery plan discusses the basic principles behind its recommendations for the size of the reserves needed to recover the desert tortoise (Service 1994). It notes that Desert Wildlife Management Area “could be somewhere between 200 and 5000 square miles....” The recovery plan further notes that reserves of at least 1000 square miles would “likely provide sufficient buffering from demographic stochasticity and genetic problems at low population densities, and ...” be “large enough to support recovered populations that have reasonable probabilities of persistence into the future.” The configuration of the reserves should be organized to minimize their perimeter relative to their area. Desert Wildlife Management Areas smaller than 1,000 square miles will require more intensive management efforts. Based on these considerations, the delisting criteria in the recovery plan note that “at least one Desert Wildlife Management Area must be established in each recovery unit that is, except under unusual circumstances, at least 1,000 square miles in area” (FWS 1994). In total, the recovery plan recommends that fourteen Desert Wildlife Management Areas be established among the recovery units. The recovery plan further recommends that the specific boundaries of the Desert Wildlife Management Areas be established through bioregional plans; outside of California, all of these planning efforts have been or are nearly completed.

The recovery plan recommends that off-highway vehicle activity, habitat-destructive military maneuvers, grazing by domestic or feral livestock, vegetation harvesting, new landfills, clearing for agriculture, dumping, littering, uncontrolled dogs, and shooting (except for approved hunting) be prohibited within the Desert Wildlife Management Areas. The recovery plan also recommended that at least three Desert Wildlife Management Areas be established in the Western Mojave Recovery Unit due to the wide habitat heterogeneity of the region, heavy human use, and steep population declines.

The Desert Wildlife Management Areas recommended for the Western Mojave Recovery Unit are:

Fremont-Kramer - extending from the Desert Tortoise Natural Area near California City east to the vicinity of Harper Dry Lake and south to approximately the area near Helendale;

Superior-Cronese - extending from the eastern border of the Fremont-Kramer Desert Wildlife Management Area east to the southeastern border of Fort Irwin and south to portions of Highway 58 and Interstate 15;

Ord-Rodman - extending from Highway 247 east to the northeastern corner of the Marine Corps Air Ground Combat Center and south to the southern slope of the Ord Mountains; and

Joshua Tree - the Mojave Desert portion of Joshua Tree National Park.

The recovery plan considered the Fremont-Kramer and the Superior-Cronese Desert Wildlife Management Areas to be the most threatened of the areas; this status remains unchanged. Fort Irwin and the proposed expansion area are located in the Superior-Cronese Desert Wildlife Management Area and the Superior-Cronese Critical Habitat Unit.

The assessment of recovery of the desert tortoise would be made by recovery unit and would be achieved when the population exhibits a statistically significant upward trend or remains stationary for 25 years. To achieve recovery, threats to individuals and their habitat must be reduced and controlled by an active management program.

#### *Ongoing Threats and Reasons for Declines*

The recovery plan states that most serious problem facing the remaining desert tortoise populations in the Mojave region (the area occupied by the Mojave population of the desert tortoise) is the cumulative load of human and disease-related mortality accompanied by habitat destruction, degradation, and fragmentation. Virtually every extant desert tortoise population has been affected by one or more of these factors. While the recent drought undoubtedly exacerbated already difficult conditions for desert tortoises, current population declines are not simply the result of drought. Drought is a natural occurrence which desert tortoises have experienced and survived for thousands of years (VanDevender et al. 1987 in FWS 1994). The desert tortoise panel report found that the desert tortoise continues to face these threats due to delays in implementing the recovery plan (LaRue 2000).

In spite of the numerous activities that have been implemented to slow the decline of the desert tortoise and to promote its recovery, much of the needed work remains to be done. Desert tortoises within and adjacent to Desert Wildlife Management Areas continue to be killed along

roads, such as Highways 247 and 395 and Fort Irwin Road. Cattle continue to graze within designated critical habitat within the West Mojave Recovery Unit; perhaps more importantly, the BLM has difficulty monitoring all grazing activities to ensure its standards and guidelines are being followed. Route designation has not been completed for most of the recovery unit; we are aware that problems with OHV riders complying with existing routes continue in some areas that are considered important to the recovery of the desert tortoise. Acquired land continues to be affected by unauthorized OHV use and route proliferation, poaching, vandalism, and other surface disturbing activities.

In addition to difficulties associated with restoring and conserving habitat, the number of desert tortoises in the western Mojave Desert has continued to decline. In 1997, Dr. Kristin Berry detected a substantial die-off of desert tortoises in critical habitat on the southern portion of the Goldstone Deep Space Communications Complex, which is located in the southwestern corner of Fort Irwin. The surveys conducted in 1998 and 1999 revealed that this die-off may have extended as far south as the eastern portions of Superior Valley and that another (perhaps separate) mortality event occurred east of Lane Mountain and north of Calico Mountain. In these cases, most of the desert tortoises had died in the last five years. In the Goldstone area, shell disease was observed in both live and dead desert tortoises and upper respiratory tract disease was documented by testing and cultures in some live animals. No cause for the population decline has been identified.

The emergency listing of the desert tortoise was prompted, in part, by declines in the number of desert tortoises in portions of the desert where an upper respiratory tract disease was prevalent. Since the listing, this disease has continued to spread across the western Mojave Desert and elsewhere within the range of the species. Additionally, desert tortoises appear to be afflicted with another disease, cutaneous dyskeratosis, that affects their shells (Homer et al. 1998, Homer et al. 2001, Jacobson et al. 1994). Necropsies and elemental analysis of liver, kidney, scute, and bone indicate statistically significant differences in levels of potentially toxic elements in ill desert tortoises when compared with control animals (i.e., healthy animals salvaged due to trauma from vehicles or other types of mortality) (Homer et al. 1998, Homer, Berry, Alley, and Ross, in prep). All the ill desert tortoises, whether they had mycoplasmosis, metabolic disease, cutaneous dyskeratosis, or other infectious diseases, had significantly elevated levels of arsenic (N = 41, ANOVA, P < 0.05) (Homer, Berry, Alley and Ross, in prep.). Other diseases, such as herpesvirus, may also be affecting desert tortoise populations (Christopher et al. 2001, Origgii et al, 2001, Homer and Berry 2001). Desert tortoises with antibodies to herpesvirus have been found in wild populations in the western Mojave Desert (Berry, personal communication). Diseases may be most serious near the interfaces of urban and wild areas. Released captive desert tortoises often carry diseases that can spread to the wild population (Johnson et al. 2001), and we have seen increased prevalence of upper respiratory tract disease in populations of gopher tortoises (*G. polyphemus*) in Florida that are adjacent to or within urbanized areas (McLaughlin, pers. comm.).

Existing data show that numerous desert tortoises are also being killed by a variety of factors in the western Mojave Desert. Predation by common ravens and by feral and domestic dogs, poaching, and mortality along roads continue to exert unnatural pressure on desert tortoise populations. Wild fire, caused by escaped camp fires, car fires that spread from the side of roads into wildlands, lightning, and shooting, and carried by non-native annual plants, destroys habitat of the desert tortoise and kills individual animals. In the central Mojave Desert alone (the area where the recovery plan calls for the establishment of the Superior-Cronese Desert Wildlife Management Area), over 9,000 acres have been burned. Because of the difficulty in monitoring an area as vast as the western Mojave Desert, we cannot quantify with accuracy the level of mortality that continues to occur as a result of these factors over the entire area. However, because the various sources of mortality have been observed in widely scattered locations, the western Mojave Desert does not likely support any area that is completely free of these factors. Given its reproductive ecology, the desert tortoise cannot withstand the mortality rate these sources impose upon it.

#### *Conservation Actions That Have Been Implemented*

Since the emergency listing of the desert tortoise as endangered in 1989 and its subsequent listing as threatened in 1990, federal agencies that have permitted, funded, and implemented actions in the western Mojave Desert have included numerous measures to protect desert tortoises and their habitat in their project proposals. When additional protective measures were deemed necessary, the FWS added terms and conditions to the numerous biological opinions that it has issued regarding these actions. Generally, these protective measures seem to have been effective in reducing the numbers of individual desert tortoises that have been killed or injured during the implementation of projects. A 1995 study looked at mortality of desert tortoises associated with 171 projects that received a biological opinion from the FWS in Nevada and California (Circle Mountain Biological Consultants 1995). Although the biological opinions cumulatively anticipated the deaths of approximately 1,100 desert tortoises, the study revealed that only 53 individuals were reported to have died during project implementation. Approximately 1,455 desert tortoises were moved out of harm's way; other measures, such as awareness programs and delineating the project area, are credited with keeping actual mortality far below the levels anticipated.

The large discrepancy between the number of individuals that we anticipated may be killed and the actual number that died may result from several factors. First, the number of desert tortoises likely to be found in a project area was often extrapolated from the densities of individuals predicted by Berry's maps; this method was used most frequently if the action included a large area. By 1989, when the desert tortoise was listed, the density of individuals had likely already decreased in many areas from that predicted in the maps. However, the large numbers of individuals moved indicates the desert tortoises were encountered on project areas with relative

frequency. Another factor to consider is that the measures to reduce mortality of desert tortoises proposed by action agencies and the FWS's terms and conditions were largely untested; we simply did not know how well some of these measures would work. The large number of individuals moved from harm's way and the low number of mortalities seem to indicate that the methods employed to reduce the effects of proposed projects on the desert tortoise have been successful.

Other conservation measures have also proved to have been beneficial. The Federal Highway Administration and the California Department of Transportation fenced a portion of Highway 58 to prevent desert tortoises from being killed by vehicle traffic. These fences reduced all mortality of all vertebrates by as much as 88 percent, which also minimized the amount of road-killed animals available to common ravens. Similar fences have been placed along Highway 14 (along the western edge of the Mojave Desert) and along Fort Irwin Road, through Jackhammer Pass. In other areas, the BLM has removed sheep grazing from most of desert tortoise critical habitat. It also recently completed an off-highway vehicle route designation pilot study in the Ord Mountain area. In addition, the BLM, California Department of Fish and Game, and conservation groups have acquired thousands of acres of private lands through land exchanges and outright purchase.

#### *Status of the Desert Tortoise within the Proposed Expansion Area*

Within the proposed expansion area, desert tortoises are unevenly distributed. Desert tortoises are absent or present in extremely low numbers in the East Gate parcel east of the Avawatz Mountains. Surveys conducted in the area of land between the National Training Center's existing eastern border and the west flank of the Avawatz Mountains detected low densities of sign; the amount of sign detected likely indicates that desert tortoises occur here in low densities. Habitat and animals in this area have been disturbed by Army units training outside the boundary of the National Training Center. At this time, these animals appear to be free of the upper respiratory tract disease; some evidence of shell disease has been detected (Berry, pers. comm.).

Portions of the National Training Center south of the UTM 90 line continue to support desert tortoises. The greatest numbers of desert tortoises generally appear to be located to the north and northwest of the Alvord Mountains, where low to moderate amounts of sign were detected during the 1999 surveys. The area to the northeast of the Alvord Mountains generally yielded low densities of desert tortoise sign. The Army estimates that approximately 22,139 acres of land within the existing National Training Center along the southern boundary would become available for training as part of the expansion. We do not know the precise area that the Army anticipates would be used for training; the fence which is currently used to define the UTM 90 grid line actually does not follow a straight line, but instead tends to be located along features of the terrain. Desert tortoise sign was also found in low to moderate densities to the north of the UTM 90 line in the southwest corner of the National Training Center.

In the Superior Valley parcel, the 1999 surveys detected desert tortoise sign at low to moderate levels from the eastern edge of the Superior Dry Lakes east to the boundary of the National Training Center. High levels of sign were detected in a limited area along the southern border of the proposed expansion area. The amount of sign detected around the Superior Dry Lakes and to the west of the Goldstone Deep Space Communications Complex seemed to show that desert tortoises are less common in these areas.

The greater amounts of sign observed in transects in the Paradise Valley area and south of the UTM 90 line seem to indicate that diseases have not decimated desert tortoise populations in these areas to date. Some biologists speculate that the terrain in this portion of the west Mojave Desert, which consists of smaller valleys separated by mountain ranges, has partially isolated these individuals from diseases. However, incidences of shell disease and upper respiratory tract disease have been documented on the northern slope of the Alvord Mountains (Berry pers. comm., Gully 2000). The remoteness of this region from most human population centers and other areas where people expect to find desert tortoises, such as the Desert Tortoise Natural Area, may have limited the release of diseased captive individuals and thus also delayed the onset of the upper respiratory tract and other diseases. Outside of the expansion area but within the Western Mojave Recovery Unit, the surveys detected substantial amounts of sign in the Mud Hills area north of Barstow, the general vicinity south of the Kramer Hills, and areas east of Highway 247.

### *Summary*

The desert tortoise population in the western Mojave Desert is continuing on the downward trend that began in the 1970s. Large areas of the western Mojave Desert that were likely to have supported large numbers of desert tortoises 20 to 30 years ago now appear to support few individuals. The sources of mortality associated with this decline include disease, common ravens, vehicle use on paved and unpaved roads, authorized and unauthorized off-road use, poaching, and habitat-destructive military maneuvers. We anticipate that the decline will continue for the foreseeable future. Although some sources of mortality can be reduced (e.g., that associated with off-road use and vehicles on paved roads), we do not have the technology to reduce mortality from disease in wild populations of desert tortoises. Mortality associated with other factors, such as common ravens, may be only slightly less difficult than disease to resolve.

Habitat loss, degradation, and fragmentation due to off-road vehicle use, development, agriculture, utility rights-of-way, and habitat-destructive military maneuvers also adversely affects the desert tortoise in the western Mojave Desert. Conversion of desert shrub habitats to annual grasslands dominated by non-native plants is also reducing the value of habitat over large areas for the desert tortoise

To effect recovery of the desert tortoise in the Western Mojave Recovery Unit, sources of mortality must be eliminated, habitat loss in areas that are important to recovery must cease, and degraded habitat within recovery areas must be restored. Maintaining a high rate of adult

survivorship is necessary to effect recovery of the desert tortoise in the Western Mojave Recovery Unit. Preventing loss of habitat and restoring degraded habitat in areas that are important to recovery are key to increasing the rate of adult survivorship. At this time, the best defense against diseases that are affecting the desert tortoise may be restoration and protection of as much habitat as possible to ensure that the remaining individuals are not unduly stressed by environmental factors over which we have some degree of control.

### **Lane Mountain Milkvetch**

The final rule determining endangered status for the Lane Mountain milkvetch was published on October 6, 1998 (63 *Federal Register* 53596). We have not designated critical habitat for this species. Most of the following information is from an unreleased, draft recovery plan (FWS, in prep.).

#### *General Description and Ecology*

The Lane Mountain milkvetch is a wispy perennial herb that becomes somewhat woody at the base during the growing season. The stems wither at the end of each growing season and the plant overwinters as a taproot. The stems are 12 to 20 inches long and often grow in a zigzag pattern, usually up through low bushes. Leaves have 7 to 15 silvery pubescent linear leaflets, 0.2 to 1.0 inch long. The flowers, 5 to 15 per stalk, are cream to purple, or lighter with veins of a deeper color. The keel petals are less than 0.4 inch long. Fruits are pencil-shaped, linear, smooth, and pendant, 0.6 to 1.0 inch long.

Little is known about the life history of the Lane Mountain milkvetch. Presumably, as with other perennial species in the Mojave Desert, the plant begins growth in the late fall or winter, once sufficient soil moisture is available, and goes dormant in the late spring or summer when soil moisture has been depleted (Bagley 1999 in FWS, in prep.). Blooming typically occurs in April and May.

In a very dry year in the late 1980s, the Lane Mountain milkvetch appeared to have a very short growing period in which little new growth and no flowers or fruit were produced (Bagley 1999 in FWS, in prep.). However, in another dry year when annual spring species were scarce, individuals of the Lane Mountain milkvetch appeared relatively robust (C. Rutherford and R. Bransfield, FWS, pers. obs. 1996). The perennial rootstock may allow the Lane Mountain milkvetch to survive occasional dry years, while longer periods of drought might be endured by remaining dormant (Beatley in Bagley 1999 in FWS, in prep.).

To date, all occurrences of the Lane Mountain milkvetch have been found to occur on sandy soils derived from Jurassic or Cretaceous granodiorite. The Lane Mountain milkvetch is found most frequently on low ridges and rocky low hills where bedrock is exposed at or near the surface. Soils tend to be shallower immediate to Lane Mountain milkvetch plants than in the surrounding

landscape; at the Montana Mine site, decomposed, highly weathered granite bedrock was reached within 2 inches of the soil surface (Fahnestock 1999 in FWS, in prep.).

Individuals of the Lane Mountain milkvetch usually grow within low shrubs. The most commonly used shrubs include California buckwheat (*Eriogonum fasciculatum*), Mormon tea (*Ephedra nevadensis*), and Cooper's goldenbush (*Ericameria cooperi*). The shrubs may provide support for the plant's weak stems and protect it from herbivory. The Lane Mountain milkvetch fixes nitrogen; therefore, it may provide some benefit to host shrubs (Prigge *et al.* 2000). The soils where the species occurs are generally poor in nutrients. The Lane Mountain milkvetch may thrive in these areas by tapping water stored in deep cracks within the granitic bedrock (Prigge *et al.* 2000).

The longevity, age structure, and levels of recruitment of the Lane Mountain milkvetch have not been determined. The persistence of 8 individuals at the Montana Mine site over a period of 9 years was tracked within a 30-foot by 30-foot grid by Rutherford (2000a in FWS, in prep.). By the end of the 9-year period, 5 individuals occurred within the grid, a net loss of one individual. Of the five, three have persisted over the 9-year period, one has persisted for 5 years, and one has persisted for 2 years.

Most individuals that have been observed in the field have been flower- and fruit-bearing, with very few vegetative, pre-reproductive individuals (juveniles) occurring. The relatively high number of reproductive individuals relative to the total number of individuals observed suggests either that seedlings and juvenile plants are present in only small numbers, indicating limitations in reproduction and recruitment, that the seedling and juvenile plants are difficult to detect, or that they reach reproductive age quickly.

### *Population Trend*

The Lane Mountain milkvetch is known from three locations in the western Mojave Desert. The easternmost occurrence begins on the northeastern flank of the Paradise Range and extends to the north and west along the southern slopes of the unnamed range across the valley to the north of the Paradise Range. Although the area has not been completely surveyed, botanists contracted by the Army found approximately 800 individuals in 1999 (Prigge *et al.* 2000). The eastern portion of this occurrence is within the National Training Center; the western portion is located on lands managed by the BLM. This area, which is referred to as the Brinkman Wash/Montana Mine site, supports the largest known occurrence to date. This site is subdivided with the area on the National Training Center generally referred to as the Brinkman Wash site and the area on BLM lands referenced as the Montana Mine site.

To the southwest of the first occurrence, the second largest known occurrence is located in Paradise Valley to the northeast of Lane Mountain. Surveys of this area also need to be completed. Approximately 150 individuals have been detected to date in this location. Most of

the land where this occurrence is found is managed by the BLM; some lands are privately owned. This site is referred to as the Paradise Valley site.

The third known occurrence is located to the west of the second occurrence on the west flank of Lane Mountain on Coolgardie Mesa; we refer to it as being at the Coolgardie Mesa site. Approximately 100 individuals have been found in this area. Given that suitable habitat appears to be limited, we do not expect to find substantial increases in the numbers of individuals of the Lane Mountain milkvetch at this site. Coolgardie Mesa consists of a patchwork of public and private lands; the known occurrence is on BLM lands.

We anticipate that more individuals will be found within all three known occurrences. The cumulative total number of individuals found from all surveys to date is approximately 1200. Based on an extrapolation of additional individuals that may occur in potentially suitable habitat adjacent to surveyed areas, Prigge *et al.* (2000) believe the number of individuals could be as high as 2,600. The Brinkman Wash/Montana Mine and Paradise Valley occurrences have the greatest potential to support many more individuals because all apparently suitable habitat has not yet been surveyed. Some botanists believe that the higher reaches of the Paradise Range and Lane Mountain may support the Lane Mountain milkvetch because the species seems to require thin, nutrient-poor soils. Other areas on the Naval Air Weapons Station, China Lake, around Superior Valley, and within the Goldstone Deep Space Communications Complex contain thin granitic soils similar to those on which the Lane Mountain milkvetch has been found; to date, no individuals of the species have been found in these areas. In the late 1980s and early 1990s, biologists from the FWS extensively searched the Superior Valley and Coolgardie Mesa areas (outside of the current locations) for the Lane Mountain milkvetch without success. Although some individuals and habitat were likely lost when the existing direct roads were placed through the occurrences, the available information, including historic records and data on current locations, suggests that the distribution of the Lane Mountain milkvetch was likely never substantially greater than currently known.

#### *Lane Mountain Milkvetch Recovery Plan*

The FWS is currently drafting the recovery plan. The recovery plan notes that the current number of individuals is most likely below the minimum number needed to ensure long-term persistence of the species. Consequently, the immediate recovery objective for the Lane Mountain milkvetch is to avert immediate extinction (within the next five years) by preventing the potential loss of any occurrence due to alteration of habitat due to military, recreation, mining, or other human activities. The near-term recovery objective is to conserve viable, self-sustaining populations of the Lane Mountain milkvetch in its natural habitat. Ultimately, the populations at all three sites should be secured through appropriate land use designations and other methods to ensure that no human-caused loss or substantial alteration of habitat occurs. Actions needed to achieve the recovery of this species include protection and management of existing habitat; surveys for additional populations; research on management-oriented issues,

demographics, life history, and ecology; establishment of an off-site seedbank; and restoration of degraded habitat.

### *Conservation Actions That Have Been Implemented*

The BLM has closed one discretionary mining operation for decorative rock that was located in the hills above the Montana Mine site. Although the mining itself was not located near the Lane Mountain milkvetch, the lower slopes nearer to the plant were being used as a staging area.

Sheep grazing previously occurred on BLM lands on Coolgardie Mesa where Lane Mountain milkvetch occurs. The BLM has prohibited grazing in this area since 1992 to protect the desert tortoise. The long-term future of this site in relation to grazing will be determined by the West Mojave Coordinated Management Plan.

The National Training Center fenced off a portion of the Brinkman Wash population in 1992 to protect it from inadvertent impacts from military maneuvers. The National Training Center has provided funding to sponsor surveys to locate additional populations and individuals of Lane Mountain milkvetch.

### *Ongoing Threats and Reasons for Declines*

Absent the inclusion of appropriate conservation measures, the proposed expansion of the National Training Center at Fort Irwin onto surrounding BLM lands poses the most imminent threat to the species. Threats to the Lane Mountain milkvetch include habitat destruction from dry wash gold mining, other mining activities (materials lease mining), rock and mineral collecting, OHV activity, and potentially from increasing fire frequency and any associated fire suppression activities. The proximity of the species to roads, active mining areas, and private lands and dwellings (at the Coolgardie Mesa site) render the Lane Mountain milkvetch vulnerable to unplanned, potentially destructive, human activities, such as land clearing, OHV activity, and unauthorized or unregulated mining.

Non-native annual grasses that have been spread as a result of road grading and grazing activities can facilitate the spread of fire when they occur in desert ecosystems. Where non-native grasses occur in burned areas of the Mojave Desert, seed banks of species present were affected and species richness was reduced (Brooks 1999 in FWS, in prep.). The resulting shifts in species composition could ultimately prove to be deleterious for a species as rare as the Lane Mountain milkvetch.

Because of the small numbers of populations and total number of individuals, Lane Mountain milkvetch is also vulnerable to extinction caused by random (stochastic) natural events. Natural random events, such as fluctuations in climate including short- or long-term drought and severe storm events that cause fire, flooding, erosion, or deposition on habitat for the species, can reduce the viability of populations, or eliminate them altogether. Visits to the Montana Mine and

Coolgardie Mesa sites in the year 2000 revealed that very few individuals grew to a reproductive size. We assume that the perennial rootstocks are still present, but that climatic conditions were somehow unfavorable for growth of Lane Mountain milkvetch in that year (Rutherford, FWS and LaPre, BLM, pers. obs.). Current thinking in conservation biology argues that a species with a small number of populations and individuals may have a higher risk of extinction than those with a larger number of populations and individuals; the risk of extinction is increased with the presence of active threats (Mace and Lande 1991 and Keith 1998 in FWS, in prep.).

#### *Status of the Lane Mountain Milkvetch within the Proposed Expansion Area*

As noted previously in this document, the two larger occurrences of this species occur within the proposed expansion area. These occurrences are located in the Brinkman Wash/Montana Mine and Paradise Valley areas.

#### *Summary*

Absent the inclusion of appropriate conservation measures, the most imminent threat to this species is the proposed expansion of the National Training Center. The Lane Mountain milkvetch is one of the most narrowly distributed plant species known from the Mojave Desert. Threats to the Lane Mountain milkvetch include habitat destruction from non-native invasive plants, mining, OHV activity, military activities that removes Lane Mountain milkvetch plants, their host plants, and habitat. The narrow distribution also leaves the Lane Mountain milkvetch populations highly susceptible to being effected stochastic events.

## EFFECTS OF THE PROPOSED EXPANSION ON LISTED SPECIES

### **Desert Tortoise**

Force-on-force training will likely occur within all areas of the training corridors that have slopes of less than 20 percent. We expect that, over time, desert tortoises would be extirpated from all areas which wheeled and tracked vehicles use regularly. In existing training areas on Fort Irwin, desert tortoises have been shown to persist in the foothills of steeper mountain ranges. The 1999 surveys revealed that tortoises are absent from the main maneuver corridors, except for occasional animals that wander into the corridor from adjacent protected areas (usually above 20% slope. Several recently crushed tortoises were found in the corridor, indicating occasional use of that area by tortoises and continued mortality (LaRue, pers. obs.). However, because military vehicles use the washes within the foothills and desert tortoises occasionally travel onto more level ground, mortality of individuals continues to occur. In addition to their isolation from larger populations, these occurrences of desert tortoises, in which the number of individuals is

likely to be declining because of the ongoing mortality associated with military training, cannot contribute to the overall recovery of the species. Without intensive surveys, we cannot predict the number of desert tortoises that would be killed during training exercises.

Force-on-force training would also result in long-term loss of habitat of the desert tortoise. Much of the shrub cover used by desert tortoises to seek shelter from the sun and predators would be destroyed. Some species of shrubs, such as the creosote (*Larrea tridentata*), can persist as crowns and roots, and re-sprout fairly quickly when disturbance is removed. However, individuals of most other species will be destroyed. Training activities would also alter the ground's surface, limiting its habitat value. Substrates might be compacted or altered to the degree that desert tortoises could not burrow in the most heavily used areas, and surface crusts and cryptogams would be destroyed, increasing the rate of erosion resulting from wind and rain. The disruption of normal surface processes will increase the opportunity for non-native plant species to become established. At this time, we are unable to quantify precisely the amount of habitat that would be lost because the areas where training would occur have not been precisely defined.

The installation and maintenance of instruments to monitor training could result in some loss of desert tortoises and habitat in areas that would not be used for force-on-force training. We cannot estimate how many individuals would be killed or much habitat would be disturbed at this time because the Army has not provided information on the locations and size of the monitoring stations. However, we expect that the level of mortality and habitat loss that would occur as a result of these activities would be substantially less than that expected from the force-on-force training.

The Key Elements Report notes that RNAs could be established to protect areas into which desert tortoises from the expansion area could be translocated. The topic of translocation of desert tortoises from within the expansion area has generated much discussion. In general, biologists familiar with the desert tortoise and the upper respiratory tract disease that has likely contributed to its decline in portions of its range are wary of translocating desert tortoises into areas that are considered important for the recovery of the species until the epidemiology of the disease is better understood. Moving desert tortoises into an area where the number of resident individuals is low because of the upper respiratory tract disease could result in more animals being exposed to the causative agents. Translocated animals, possibly stressed by their capture and handling, may be more susceptible to disease transmission from the resident animals. Such a relocation effort may result in depressed population numbers and lengthen the time until this area could begin to develop the population densities needed to be considered for recovery.

Desert tortoises from the expansion area could also be moved into an area that is not considered important for the recovery of the species. Within the western Mojave Desert, large blocks of private lands with substantial development pressures, public lands currently uninhabited by desert tortoises in substantial numbers, or public lands which have management goals other than the conservation are not considered important for the recovery of the species

Most areas containing large blocks of private lands are currently under substantial pressure to be developed. Two exceptions include the vicinity of Brisbane Valley, which is roughly bordered by Victorville, Interstate 15, Barstow, and National Trails Highway, and the undeveloped portion of California City. Suitable habitat occurs in both locations, although human activities have caused much disturbance. In the Brisbane Valley, the BLM has been disposing of land as part of its land tenure adjustment process. The California City area has been in non-federal ownership for many years and many of the parcels have been subdivided. Federally re-acquiring ownership of large portions of either area would be difficult and costly. The planning team for the West Mojave Coordinated Management Plan is evaluating, with the cooperation of the City of California City, the potential of acquiring the northernmost portion of the area to increase the size of any desert wildlife management area formed in the vicinity of the Rand Mountains.

Two areas where desert tortoises previously occurred in substantial numbers include Johnson and Stoddard valleys. Both of these areas are primarily under federal ownership and are managed by the BLM as recreational areas for off-highway vehicles. Portions of these areas have been extensively disturbed by vehicular activity; small portions of these areas continue to support desert tortoises. Ensuring the persistence of resident desert tortoises or any that may be moved to the Johnson and Stoddard valleys from within the expansion would require a substantial change in the BLM's management direction.

As part of the Clark County Habitat Conservation Plan, approximately 2,000 desert tortoises have been collected from urban situations and developing portions of the Las Vegas Valley. Those desert tortoises determined to be healthy are transported to, and released at a translocation site near Jean, Nevada, which supports a resident population of approximately 40 adults per square mile. From the perspective of attempting to augment desert tortoise populations within its historic habitat, this type of translocation is considered to be safe because it does not imperil populations that are required for the species to be considered as recovered. This effort in Nevada is being extensively monitored; after 3 years, the results have been promising because mortality of translocated individuals has been low and most animals have settled into territories. Although some researchers consider the effort to be a success, the very nature of the desert tortoise's ecology should encourage caution before a final opinion is reached. The results of the effort should be evaluated over the course of an entire rainfall cycle of approximately 15 years, including both wet and dry years, before a final verdict on its success can be reached.

Force-on-force training could affect desert tortoise habitat outside the proposed boundaries of the expanded National Training Center. Occasionally, military vehicles stray outside of the training areas; these vehicles can kill or injure desert tortoises and disturb habitat to the degree that recovery could take years. The disturbance of the soil's surface caused by heavy vehicles will result in increased wind erosion and the material eroded from within the training area will be deposited over a wide area, both near and far from where the erosion occurred. These materials could be transported through windstorms and contribute to sand dune formation. Some substrates will likely contribute more wind-carried materials than others. For example, granitic

soils are less likely to be carried far by the wind than clays. From a preliminary analysis of the expansion area's soils, the clays surrounding the Superior Dry Lakes, once they are disturbed, are most likely to be transported long distances. Off-road vehicle use has been identified as a land use that may substantially alter dust generation on a large scale (Reheis 1995).

Whether the materials carried off of the National Training Center are heavier particles that drop near the boundaries or fine particles that are carried for greater distances, all have the potential to alter the essential components of habitat that desert tortoises require. Shrubs and annual plants can be buried; substrates can be made unsuitable for burrowing; and nutrients within the wind-borne soils may promote the growth of non-native weedy species. Non-native weedy species can promote the spread and intensity of wild fires. The Mojave Desert ecosystem evolved without the influence of fire; these fires can kill desert tortoises directly and accelerate the conversion of shrub habitats into non-native annual grasslands. Non-native annual grasslands do not support the diversity of plants necessary to sustain desert tortoises on a long-term basis. Finally, dust can affect photosynthesis, respiration, and transpiration of plants and allow the phytotoxic pollutants to penetrate into plants (Farmer 1992); because they are herbivores, such impacts on plants may also affect desert tortoises. Dust can decrease pollinator effectiveness by coating the reproductive organs of plants. It can also alter the species composition of pollinator species; dust abrades the exoskeletons of invertebrates, which leads to their eventual dessication and death. Reducing pollinator effectiveness would decrease the reproductive success of plants and thereby alter the flora of an area.

During training exercises, the Army uses obscurants to hide equipment and troops from the opposing forces. Only heated mineral oil is currently used; however, the Army also wishes to use graphite. Some portion of these materials will be blown off base by winds. The effects of these materials on the desert tortoise have not been studied; we do not know the amount of obscurants that could be ingested by desert tortoises, either through direct inhalation or by consumption of material that has been deposited on plants. Given the presence of upper respiratory tract disease in the general population, other materials that may affect their respiratory systems could further compromise the health of desert tortoises. The obscurants may also inhibit pollination of plants by coating the reproductive organs, as discussed in the previous paragraph regarding the effects of dust.

### **Lane Mountain Milkvetch**

Of the three known occurrences of the Lane Mountain milkvetch, the two largest are located in the proposed expansion area. Force-on-force training will likely occur within all areas of the training corridors that have slopes of less than 20 percent. To date, most individuals of the Lane Mountain milkvetch have been found in areas with slopes of less than 20 percent.

The Lane Mountain milkvetch uses host plants to support its stems. Wheeled vehicles used in training maneuvers would completely remove or crush most of the host shrubs, leaving the Lane Mountain milkvetch without their host plants. Despite the fact that the root systems of the Lane

Mountain milkvetch may persist for several years in the absence of the host shrubs, the stems may not be able to survive and reproduce without the support of their host plants, and would continue to be vulnerable to herbivory or destruction in the next training exercise. Consequently, all individuals within the training corridors within areas where vehicles can travel would eventually be destroyed.

Individuals of the Lane Mountain milkvetch located outside of training corridors could be affected by use of obscurants and dust generated by Army vehicles. We cannot predict the level at which obscurants would be used and how close they would be released in relation to Lane Mountain milkvetch plants outside of the training areas. However, the graphite used as part of the obscurants could cause some increase in the productivity of desert soils and make these soils more suitable for non-native species. (When added to aquatic systems, graphite causes algal blooms; this seems to indicate that it has some nutritive quality.) The mineral oil and graphite used in the obscurants and the dust generated by vehicles could inhibit photosynthesis and transpiration in the Lane Mountain milkvetch; inhibited photosynthesis could hinder the rate of growth, the reproductive capability of these individuals, and ultimately the ability of individuals to persist in adjacent areas. In some cases, dust generated by training activities would simply bury individuals residing in adjacent habitat. Although the reproductive mechanism is currently unknown, if the species is pollinated by animals, dust and obscurants may also inhibit pollination by coating the reproductive organs of the Lane Mountain milkvetch and by affecting pollinator species. Any reduction in the reproductive capacity of such a scarce species would likely cause a decline in the number of individuals.

The effects of training on the Lane Mountain milkvetch would be long-term. Surface crusts and cryptogams would be destroyed, increasing the rate of erosion resulting from wind and rain. The disruption of normal surface processes will increase the opportunity for non-native plant species to become established. The Lane Mountain milkvetch has evolved in low-nutrient soils, without substantial competition for nutrients and water and the addition of non-native species is likely to adversely affect its ability to survive and reproduce. The addition of non-native species would increase the potential for wildfires to occur and the Lane Mountain milkvetch is not fire-adapted.

#### ANALYSIS OF THE POTENTIAL EFFECTIVENESS OF THE PROPOSED CONSERVATION MEASURES

Public Law 106-554 authorizes appropriation of \$75,000,000 to the Secretary of the Army for conservation measures necessary to comply with the Endangered Species Act for the listed species which would be affected by the proposed expansion. In the following section, we have outlined the measures, as they have been presented to the FWS and evaluate their potential effects on the desert tortoise and Lane Mountain milkvetch.

5. The existing Fort Irwin Study Site will be expanded by 484 acres to approximately 2,470 acres.

**Evaluation:** The research conducted at this site has provided valuable insight into the ecology of hatchling desert tortoises. However, the expansion of the site by 484 acres is unlikely to change substantially either the value of the information currently being collected or the effects of the proposed expansion on the desert tortoise.

6. To the extent practicable and consistent with its military needs and the Act, the Army will seek to manage appropriate areas south of the UTM 90 line in such a way as to protect the desert tortoise and its habitat.

**Evaluation:** At this time, the FWS does not have any information regarding the intent of this measure. If training does not occur in certain areas south of the UTM 90 line, desert tortoises might benefit if these areas: 1) support substantial numbers of individuals; 2) can be protected from the direct (vehicles straying from training areas) and indirect (dust and obscuration) effects of training; and 3) are connected to other substantial populations of the desert tortoise outside of the National Training Center. To assess the potential effects of this measure, the Army should clearly define in their biological assessment which areas would be used for training or be available for conservation of the desert tortoise.

7. The BLM will designate an approximately 123,550-acre area south of Fort Irwin as an ACEC. Approximately 3,100 acres of existing Fort Irwin lands will become part of this ACEC.

**Evaluation:** The designation of an ACEC through an amendment to the California Desert Conservation Area Plan could increase protection for the desert tortoise. The level of protection that would be afforded to the desert tortoise by the ACEC would depend primarily on its management prescriptions, which would be subsequently developed in a management plan for the area. To effectively conserve the desert tortoise in this area, the following actions should be required:

- all non-federal lands or their development rights within this area must be acquired;
- the effects of activities that may conflict with conservation of the desert tortoise and Lane Mountain milkvetch must be eliminated or minimized through the land use planning or withdrawal processes;
- a route network for vehicle access must be designated that would ensure large blocks of undisturbed habitat are available for the desert tortoise;
- closed routes must be restored at least to the degree that they can no longer be used by vehicles; and

- an on-the-ground presence must be maintained to ensure compliance with the protective measures for this ACEC.

This proposed ACEC does not appear to contain substantial populations of the desert tortoise. The conservation value of this ACEC would increase if the Army defines lands within the existing National Training Center south of the UTM 90 line supporting substantial numbers of desert tortoises that can be added to this ACEC. We also note that, based on the maps available to us, this ACEC does not seem to include habitat of other sensitive species, such as the Parish's phacelia (*Phacelia parishii*), that are known to occur in this vicinity.

8. Other conservation measures noted in the Key Elements Report include:

1. Establishment of ACECs which encompass wildlife management areas in the western Mojave Desert.

***Evaluation:*** As we discussed in measure 3, ACECs can provide substantial conservation benefits to the desert tortoise and Lane Mountain milkvetch if the appropriate measures are adopted as their management prescriptions. ACECs should be of sufficient area to effectively conserve the desert tortoise in the western Mojave Desert. The ACECs currently being evaluated for the West Mojave Coordinated Management Plan provide reasonable conservation areas for the desert tortoise. Each ACEC should also be managed in a manner that promotes the conservation of the desert tortoise. The management prescriptions listed in measure 3 would likely be appropriate for most ACECs; additional management prescriptions could include, but not be limited to:

- fencing to prevent desert tortoises from entering roads where they may be crushed;
  - examination of potential sources of environmental contamination and remediation of any such areas, if needed;
  - control of feral and domestic dogs; and
  - eliminating threats from mining and other activities that threaten the desert tortoise and the Lane Mountain milkvetch.
2. Establishment of RNAs in the vicinity of the Alvord Mountains and Paradise Valley.

**Evaluation:** The research conducted at such sites may provide valuable insight into the ecology of desert tortoises. However, the establishment of such sites would not offset the effects of the proposed expansion on the desert tortoise.

3. Acquisition of non-federal lands within the wildlife management areas in the western Mojave Desert.

**Evaluation:** The recovery plan for the desert tortoise cites such acquisitions as being important for the long-term survival and recovery of the species. This measure is the most important action for offsetting the impacts of the proposed expansion. In order to achieve the conservation goals of the acquisitions, any areas that are acquired should be managed in the manner described under measures 3 and 4a of this section.

4. Construction of barriers, fences, and other structures that are designed primarily to conserve the endangered or threatened species and their critical habitats.

**Evaluation:** Barriers and fences, if they are properly installed, can substantially reduce the level of mortality being experienced by at least some populations of the desert tortoise. Fencing areas of the expanded National Training Center where substantial numbers of desert tortoises reside adjacent to the base's boundary, in a manner that precludes desert tortoises from entering the facility and prevents military vehicles from leaving, would reduce the effect of the expansion on the desert tortoise. This measure should be implemented to reduce the effect of the expansion. It should not be considered as a means to offset the effects of the expansion.

Fences to preclude desert tortoises from entering roads should be installed along Highway 395, 247, and 58 and Fort Irwin Road; the Army must coordinate with the FWS, California Department of Fish and Game, BLM, and California Department of Transportation to ensure the most effective placement of these fences. This measure would help to compensate for the effects of the proposed expansion.

5. Conducting research studies on protecting and promoting conservation of the desert tortoise, Lane Mountain milkvetch, and other endangered or threatened species and their critical habitats.

**Evaluation:** Research has the potential to provide useful information for the long-term management of the desert tortoise and Lane Mountain milkvetch. Because the FWS would have the final authority on whether a given research proposal would be funded, only relevant studies will be conducted. However,

research, in and of itself, would not offset the adverse effects of the expansion on the listed species. This fact is particularly true for the Lane Mountain milkvetch.

6. Other conservation measures that the Working Group may recommend as being necessary and appropriate to protect and promote the conservation of the desert tortoise and Lane Mountain milkvetch, including:

1. Designation and implementation of a vehicle access network within the Western Mojave Recovery Unit, restoration of closed routes, and installation of signs to direct appropriate use.

***Evaluation:*** These measures would benefit the desert tortoise and Lane Mountain milkvetch if implemented as part of the establishment of any ACEC and land acquisition. The highest priority for implementing such measures should be in the Rand Mountains and Fremont Valley, the Ord and Rodman Mountains, and south of the southeast portion of Edwards Air Force Base areas.

- ii. Establishment of a line distance sampling program for desert tortoise populations.

***Evaluation:*** The recovery plan for the desert tortoise recommends that a method to determine population trends be developed and implemented. Funding of this measure would allow land managers and the FWS to track the response of desert tortoise populations to conservation efforts. However, the sampling, in and of itself, would not offset the adverse effects of the expansion on the desert tortoise.

- iii. An education program that promotes the conservation and recovery of the desert tortoise and the protection of the Western Mojave Recovery Unit.

***Evaluation:*** Information regarding the desert tortoise is currently readily available through the BLM, National Park Service, California Department of Parks and Recreation, and others. We are uncertain whether the dissemination of additional information would appreciably benefit the desert tortoise. If poaching is a substantial problem, an educational program directed towards the groups responsible may benefit the desert tortoise.

- iv. Initial research or analysis to determine impacts of the proposed expansion that may occur outside training areas, such as, but not limited to, the effects of dust and obscurants on the desert tortoise and Lane Mountain milkvetch.

The potential for dust and obscurants to affect the desert tortoise and Lane Mountain milkvetch outside of the expansion area should be comprehensively analyzed prior to completion of consultation. This measure, which could include at a minimum modeling of wind direction, the ability of materials to be transported by winds, the amounts of materials to be transported into habitats, and an analysis of the potential effects of materials on the desert tortoise and Lane Mountain milkvetch, should be implemented to ensure that the effects of the potential expansion are fully understood and minimized to the greatest extent possible. This research must not be considered as a means to offset the effects of the expansion but information that would be included in a complete package initiating formal consultation.

7. Withdrawal of BLM lands identified as necessary for the long-term survival and recovery of the desert tortoise and Lane Mountain milkvetch from mining, location, leasing, sale, entry, and other conflicting land uses to prevent the loss of the conservation value of the lands by these competing and incompatible uses.

***Evaluation:*** A withdrawal is the withholding of an area of public lands from settlement, sale, location or entry under some or all of the general land laws or for transfer of jurisdiction of the lands to another Federal agency. The type of actions prevented are usually those that are either non-discretionary or that lead to conveyance of title out of Federal ownership. The BLM's response to other actions that are discretionary (e.g., permits and rights-of-way,) is guided by land use planning decisions and subsequent plan implementation decisions (i.e., management plans for specific ACECs).

The BLM often uses the land-use planning process to identify areas of the public lands as not available for disposal rather than initiating a withdrawal process. For example, the Resource Management Plan or activity plan (ACEC Plan) could identify that public lands will not be disposed of or exclusion areas where rights-of-way would not be granted by the BLM. When this method is used, the only action that cannot be prevented by planning decisions is location under the mining law. A withdrawal would still be required to prevent mining locations.

To determine the effectiveness of this proposed measure, and of ACEC designation in general, the historic, current, and predicted impacts of the activities needing to be controlled must be identified. Once these activities and their impacts have been identified, the actions necessary to control them, whether land use planning or withdrawal, can be identified.

We recognize the intent of this measure, which could provide substantial benefit to the desert tortoise and Lane Mountain milkvetch. However, a full evaluation of its effectiveness would require the review noted above and an understanding of the areas that are being considered for these actions. This evaluation should be taken within any ACEC that is established to offset the effects of the proposed expansion on the desert tortoise and Lane Mountain milkvetch.

## SUMMARY AND RECOMMENDED CONSERVATION ACTIONS

### **Desert Tortoise**

Given the precarious status of the desert tortoise in the western Mojave Desert, and increasingly throughout California, any evaluation of a project that could potentially result in long-term and widespread adverse effects must be evaluated cautiously. Although the current proposal would result in less loss of habitat and fewer desert tortoises than any expansion previously sought by the Army, a substantial amount of habitat and probably a large number of desert tortoises would be destroyed by force-on-force training. The potential for desert tortoises and their habitat outside of training areas to be adversely affected by straying vehicles, dust, and obscurants also exists. The expansion of the National Training Center, absent measures to offset or reduce impacts, may substantially impair the survival and recovery of the desert tortoise in the western Mojave Desert.

### **Lane Mountain Milkvetch**

The lands currently proposed for the expansion of the National Training Center support the two largest of the three known occurrences of the Lane Mountain milkvetch. Force-on-force training using heavy vehicles and personnel within the Brinkman Wash/Montana Mine and Paradise Valley sites is likely to completely eliminate these two occurrences of the Lane Mountain milkvetch through direct destruction of individual plants, elimination of their host plants, and disturbance of their habitat. The potential also exists that the Lane Mountain milkvetch and its habitat outside of training areas could be adversely affected by dust and obscurants. Absent the following recommendations, our preliminary review indicates that the loss of these two occurrences would likely jeopardize the continued existence of the Lane Mountain milkvetch.

### **Recommendations**

For the reasons outlined in this Preliminary Review, it is important that any plan for the proposed expansion contain measures to both reduce and offset the adverse effects of the expansion. The above discussion and the Key Elements Report describe several measures that could be taken to reduce or offset the effects of the proposed expansion on the desert tortoise and Lane Mountain milkvetch. In the following preliminary recommendations, we are listing those measures which we believe would be the most important for those two species. We are also including those

measures that we believe would be critical for ensuring that the continued existence of the Lane Mountain milkvetch is not likely to be jeopardized.

Additionally, we are requesting additional information to more accurately assess the extent of impacts of the proposed expansion and accompanying conservation measures. The information provided by the results of the surveys and research will be considered during the formal section 7 consultation process. However, conducting the surveys and research alone would not compensate for the adverse effects of the expansion.

To provide a complete package for initiation of formal consultation, the following information must be obtained.

- Survey suitable habitat for new occurrences of the Lane Mountain milkvetch that can be protected from all adverse effects, including the indirect impacts of training from an expanded National Training Center. In addition to the surveys for new populations, the Army should conduct surveys along the northeast flank of Lane Mountain and in Paradise Valley to determine the full extent of this occurrence. These surveys are critical for determining if the proposed expansion is likely to jeopardize the Lane Mountain milkvetch. **Timeframe:** To allow for an expansion within the time frames desired by the Army, these surveys should be conducted in the springs of both 2001 and 2002 and the full survey results available prior to the time formal section 7 consultation is initiated. The expansion must not proceed until the surveys have been completed and the results fully analyzed.
- Define precisely which areas south of the UTM 90 line will not be used for training. Provide specific information, including detailed maps, to the FWS regarding these areas. **Timeframe:** The specific areas that will not be used for force-on-force training should be identified prior to the time formal section 7 consultation is initiated. Detailed maps of these areas, with overlays of information regarding the habitat types and the local status of the desert tortoise, would be useful. We also recommend that staff from the Army and FWS meet in the field to review the boundary line.
- Develop a research program to determine whether obscurants or dust generated by training would injure individuals of the Lane Mountain milkvetch or degrade its habitat, which includes that of pollinator species, of the outside of the National Training Center. This measure, which could include at a minimum modeling of wind direction, the ability of materials to be transported by winds, the amounts of materials to be transported into habitats, and an analysis of the potential effects of materials on the desert tortoise and Lane Mountain milkvetch to ensure that the effects of the potential expansion are fully understood and minimized to the greatest extent possible. **Timeframe:** The information generated by this research must be available for analysis at the time formal section 7 consultation is initiated. The Army should coordinate with the FWS during the development of the research proposals.

The FWS recommends the following to be included in the project description for the proposed expansion to reduce the adverse effects of the proposed expansion to the desert tortoise and Lane Mountain milkvetch:

- Fully conserve, through land acquisition, route designation, and land use planning or withdrawals, any newly located occurrences of the Lane Mountain milkvetch outside of the proposed expansion area. If substantial new occurrences are found, implementation of this measure would avoid a likely jeopardy determination. **Timeframe:** These conservation measures should be fully implemented prior to the onset of ground-disturbing activities in areas of currently known Lane Mountain milkvetch occurrences.
- If no substantial new occurrences of the Lane Mountain milkvetch are found outside of the proposed expansion area, protect the Lane Mountain milkvetch within the proposed expansion area from the direct and indirect effects of the expansion to the degree that its survival and recovery can be ensured. To protect this occurrence and to avoid a likely jeopardy determination, the southern boundary line for the expansion in the Superior Valley parcel should be moved to the north in the Paradise Valley area, provided that the Paradise Valley occurrence is sufficiently large and would not be adversely affected by the indirect impacts of training on an expanded National Training Center. Moving this boundary to the north would also benefit the desert tortoise. **Timeframe:** Fully implement these conservation measures prior to completion of the section 7 consultation.
- Fence the boundaries of the expanded National Training Center to prevent military vehicles from straying outside of training areas and desert tortoises from entering training areas. Work with the FWS and BLM to determine the specific areas to be fenced and the specific type of fencing to be used. **Timeframe:** The specific areas to be fenced and the specific type of fencing to be used must be identified prior to the time formal section 7 consultation is initiated.
- Develop a research program to determine whether obscurants or dust generated by training would degrade habitat of the desert tortoise outside of the National Training Center. To effectively reduce this potential habitat degradation, develop an adaptive management program that appropriately uses this research and its findings. **Timeframe:** The information generated by this research must be available for analysis at the time formal section 7 consultation is initiated. The Army should coordinate with the FWS during the development of the research proposals.
- Alter the boundaries of the expansion area near the Superior Dry Lakes to avoid clay soils that are highly likely generate substantial dust if they are disturbed. Avoidance of these soil types may eliminate the need for additional measures for offsetting this type of impact. **Timeframe:** The boundaries must be altered prior to the time formal section 7 consultation is initiated.

The FWS recommends the following to be included in the project description for the proposed expansion to offset the effects of the proposed expansion of the National Training Center on the desert tortoise and Lane Mountain milkvetch:

- Direct the majority of the funds to be appropriated to offset the effects of the proposed expansion to land acquisition within the Superior-Cronese and Fremont-Kramer Critical Habitat Units. The Key Elements Report proposes a means to prioritize acquisitions which we believe is reasonable. The FWS should have final approval of any acquisition program.
- Permanently protect all lands set aside for conservation from activities that would inhibit conservation of the desert tortoise and Lane Mountain milkvetch. Such activities include, but are not limited to, grazing, mineral entry, and new rights-of-way.
- Fence Highway 395, where it crosses critical habitat of the desert tortoise, the remainder of Highway 58, and Fort Irwin Road to preclude passage by desert tortoises. This effort should be closely coordinated with the California Department of Transportation.

We note that at least some of these measures are potential components of the West Mojave Coordinated Management Plan and may require amendment of the California Desert Conservation Area Plan to be implemented. We understand that an analysis of the effects of the West Mojave Coordinated Management Plan and the proposed expansion of the National Training Center must be coordinated, pursuant to Public Law 106-554. However, regardless of the outcome of the West Mojave Coordinated Management Plan, the measures discussed above, which are intended to understand, reduce, and offset the effects of the proposed expansion of the National Training Center, should be implemented, unless the formal section 7 consultation process dictates otherwise.

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