United States Department of the Interior
U.S. FISH AND WILDLIFE SERVICE
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In Reply Refer to:
FWS-SB-20F0163-21F1366

December 13, 2021
Sent Electronically

Colonel Jason A. Clarke
Department of the Army
Headquarters, United States Army Garrison
Building 237, B Avenue, P.O. Box 105021
Fort Irwin, California 92310-5000

Subject: Biological Opinion for the Recovery and Sustainment Partnership Initiative, Use of Additional Maneuver Training Lands, and Operations and Activities at the National Training Center and Fort Irwin, San Bernardino County, California

Dear Colonel Clark:

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion based on our review of the Department of the Army's (Army) proposed actions. The proposed actions are the implementation of the Recovery and Sustainment Partnership Initiative, the use of additional maneuver training lands in the Western Training Area, and all remaining operations and activities at Fort Irwin. We will consider the effects of the proposed actions on the federally threatened desert tortoise (*Gopherus agassizii*) and its critical habitat and on the endangered Lane Mountain milk-vetch (*Astragalus jaegerianus*). This document was prepared in accordance with section 7 of the Endangered Species Act of 1973 (Act), as amended (16 U.S.C. 1531 *et seq.*).

We based this biological opinion on information in previous biological opinions and our files. We also coordinated closely with your staff during the development of the biological opinion.

CONSULTATION HISTORY

The Departments of Defense and the Interior (2018) signed a memorandum of understanding "to establish a mutually beneficial partnership among the Parties to develop and promote effective ecosystem and species conservation initiatives that will "provide for increased flexibility for military mission activities." One of the goals stated in the memorandum of understanding is to "develop innovative regulatory approaches and tools for achieving [Endangered Species Act] objectives in a manner consistent with military needs and objectives." The Army and Service initiated discussion of participation in the Recovery and Sustainment Partnership Initiative at a meeting in Sacramento on May 15 and 16, 2019. We have provided a more detailed description of the proposed action with regard to the Recovery and Sustainment Partnership Initiative, the desert tortoise, and Fort Irwin later in this biological opinion and in Appendix A.

The biological opinion (Service 2012) for the addition of maneuver training lands at Fort Irwin contains a detailed description of the consultation history regarding the expansion of Fort Irwin. We incorporate that discussion by reference.

In addition to consulting on the expansion and use of additional maneuver training lands at Fort Irwin, the Service and Army have consulted on numerous infrastructure actions. To address the Army's needs more efficiently, the Service (2014a) and Army consulted on operations and activities at Fort Irwin.

The Army and Service agreed that the proposed actions currently under consultation would not alter the effects on the Lane Mountain milk-vetch as described under previous biological opinions. The Service and Army also agreed that including the Lane Mountain milk-vetch in this document would be appropriate so that our agencies could rely on a single biological opinion. To that end, we have updated the species' status information and the analysis from our previous biological opinion regarding the use of additional maneuver training lands at Fort Irwin to address information that is new since that biological opinion (Service 2004).

The Service did not designate critical habitat for the Lane Mountain milk-vetch within the boundaries of Fort Irwin. The potential exists for dust to travel from disturbance on the base to critical habitat off-base. However, off-base critical habitat that is adjacent to Fort Irwin is bounded by a conservation area within the base where training would not occur; therefore, we expect that dust from Army activities would have a discountable, if any, effect on off-base critical habitat. Consequently, the Army and Service did not consult on critical habitat with regard to the proposed actions.

This biological opinion addresses the potential effects of recovery actions that will occur on lands outside of Fort Irwin because of the Recovery and Sustainment Partnership Initiative at a programmatic scale. The Service will consult on the specific potential effects of such activities as appropriate in the future.

The Service developed the description of the proposed actions for this biological opinion in close coordination with Army staff at Fort Irwin; we also referenced the draft environmental impact statement for military training and the extension of the public land withdrawal (Army 2021b). The Service (2020) provided a draft biological opinion to the Army and Bureau of Land Management (Bureau) for review and comment on April 24, 2020. The Army (2021a, 2021c) and Bureau (2020) provided comments on the draft biological opinion. We have incorporated the comments into this final biological opinion.

DESCRIPTION OF THE PROPOSED ACTION

Briefly stated, the proposed action comprises current and future training activities within the boundaries of Fort Irwin, including the development, operation, and maintenance of future infrastructure within the installation, and use and maintenance of the Manix Trail. The proposed action also includes measures implemented to protect desert tortoises within Fort Irwin, the translocation of desert tortoises, and the implementation of recovery actions for the desert tortoise within the Western Mojave Recovery Unit (Service 2011).

Current Activities

The U.S. Army (Army) bases its warfighting doctrine on the central idea that Army units seize, retain, and exploit the initiative to gain a position of relative advantage over the enemy. The National Training Center at Fort Irwin provides the opportunity for the Army to use various types of armament during maneuvers over large areas of differing types of terrain. Because of its size, design, and terrain, the National Training Center is one of the few places in the world where brigade-size units (i.e., more than 5,000 soldiers and 1,000 vehicles in a rotation) can test their combat readiness.

"Rotations" are brigade-level training events; during rotations, a visiting unit deploys to Fort Irwin and conducts various types of training. Rotations are highly realistic and stressful training events that incorporate force-on-force and live-fire scenarios to prepare units for combat and security missions. Fort Irwin hosts an average of ten rotations per year. The primary rotational unit is a Brigade Combat Team, which includes either wheeled (Stryker) or tracked armored combat vehicles and all of their support functions. When rotational training is not occurring, individual training areas can be scheduled for specific training events; these are called off-rotation (or non-rotational) training events.

Joint military branches (Marine Corps, Navy, and Air Force), Army Reserve, National Guard, Special Operations Forces, multinational partners, and regular and transitional law enforcement units also train at the National Training Center, along with units stationed at Fort Irwin (home station units). Fort Irwin also serves as a post-mobilization warfighting center for the National Guard.

Fort Irwin comprises a cantonment (or community area), the Range Complex, training areas, the Deep Space Communications Complex (Goldstone Complex), and the Leach Lake Tactical Range. The Goldstone Complex, which the Army leases to the National Aeronautics and Space Administration, is located in the western part of the installation. It consists of a series of deep space radio telescopes and serves as a deep space communication network. The Jet Propulsion Laboratory uses the Goldstone Complex's telescopes to monitor deep space missions.

Rotations and other maneuver training occur primarily in the training areas. Approximately 75 percent of Fort Irwin is suitable for maneuver training. Terrain restricts training in some areas and other areas are off-limits to training (Figure 1). These areas include:

1. The Goldstone Complex, except for use of fixed main supply routes and the unmanned aerial vehicle facility and runway (32,411 acres);
2. Leach Lake Tactical Range, which the Air Force uses as an aerial bombing range. The Army also uses this range as an impact area for artillery training (91,330 acres);
3. The cantonment area (13,976 acres);
4. The Range Complex, which is the primary location for fixed firing ranges (19,608 acres); and
5. Natural and cultural resource conservation areas, including dry lakebeds, sensitive equipment areas, safety restriction areas, and utility corridor areas (41,640 acres).

We used multiple sources of information to prepare this biological opinion. The acreages of the same feature frequently varied among documents; consequently, some of acreages we use in this biological opinion will differ from those in the Army's (2021b) draft environmental impact statement and other documents. We consider these differences to be minor with regard to the analyses in this biological opinion.

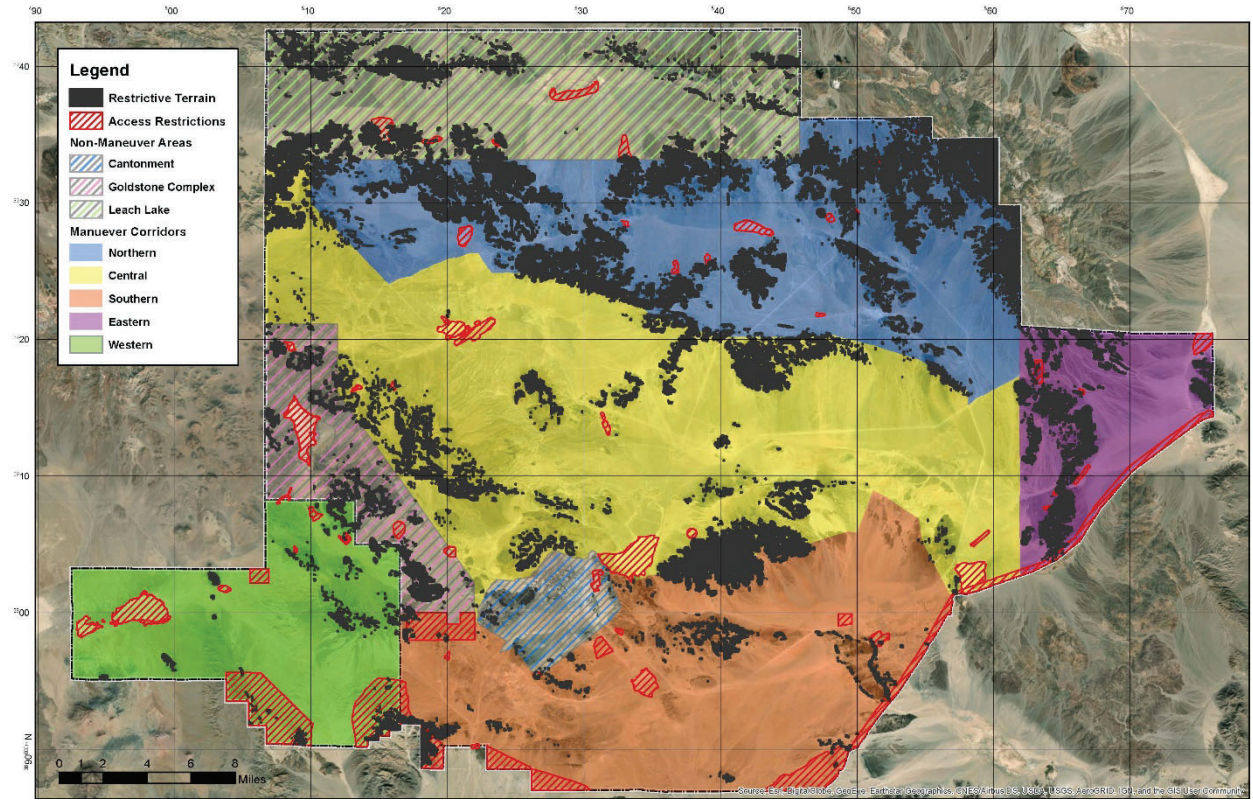


Figure 1. Restricted areas and terrain limitations within the National Training Center.

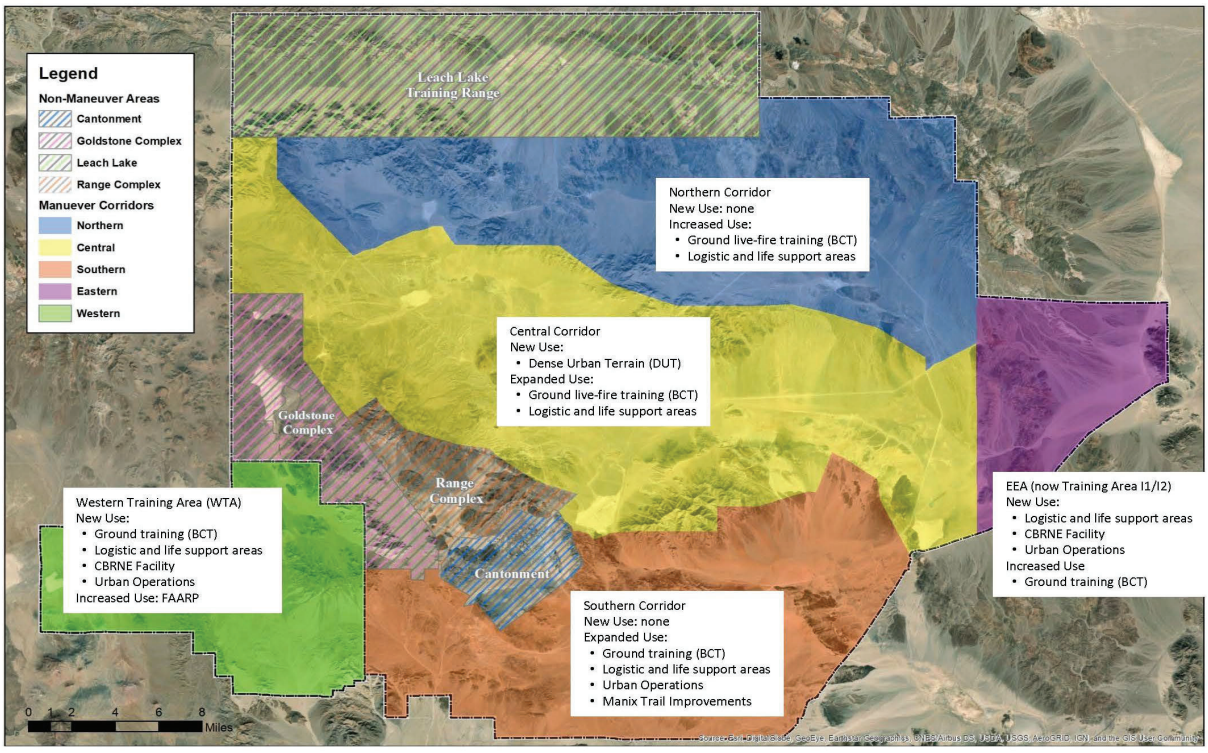
The Army manages a 67-acre off-highway vehicle area for recreation. Fencing to prevent desert tortoises from entering surrounds the area. The Army checks the fence quarterly and after heavy rainfall events for breaches. Walking and bike paths encircle the cantonment area. The Army occasionally hosts mud runs or obstacle challenges and offers tours that take small groups into the training areas via wheeled vehicles. The Army anticipates that it will continue these and similar activities.

The Army also manages 103,000 acres outside of Fort Irwin's boundaries for the conservation of the desert tortoise. These lands are intermixed with Bureau-managed lands where recovery actions would take place. The Army has provided funds for the Bureau to install post-and-cable fencing and route markers on these lands and to close and/or restore unauthorized routes (Housman 2021a).

Changes in Training Activity

The following paragraphs describe the necessary changes in military training projected at Fort Irwin. Given future changes in war-fighting doctrine and technology, the Army will likely need to modify its training and alter its infrastructure beyond what we have described in the following paragraphs. The Army and Service intend to use the guidance provided in this biological opinion to address the effects such future changes may have on the desert tortoise and its critical habitat.

Future changes expected on Fort Irwin within the installation's original footprint will support continued rotational training in existing maneuver corridors, but with greater capacity for live-fire training. The Army will also improve urban operation training around the existing urban area known as Tiefort City located in the Central Corridor. This expanded urban operation site will have a larger footprint and allow for dense urban terrain training. Figure 2 depicts the locations of the anticipated new training.



BCT- Brigade Combat Team; DUT- Dense Urban Terrain; EEA- Eastern Expansion Area; FAARP- Forward Area Arming and Refueling Point; CBRNE- Chemical, Biological, Radiological, Nuclear, Explosive materials

Figure 2. General locations of anticipated changes in training use.

Major changes within the former expansion areas include opening the Western Training Area to ground training (anticipated in 2025) and increasing maneuver training within Training Areas I1 and I2. The Army also anticipates using these training areas to support new urban operation sites, simulated chemical/biological/radioactive/nuclear facilities, forward area arming and refueling

points, and various logistic and life support areas. The Army has not yet determined specific locations for these activities.

These projected changes will occur in both the highly and less-used areas of Fort Irwin as the Army expands its training capabilities. During the development/building phase, the Army would construct new infrastructure and prepare new training sites; these activities would likely involve heavy machinery, excavation or construction, and movement of construction materials to the sites.

Maneuver Training

The Army intends to reconfigure the maneuver space at the National Training Center to replicate the linear and lateral distance of the area that the Brigade Combat Teams would be responsible for when deployed. Reconfiguring the trainings areas would increase the available space and better facilitate realistic combined arms training. For example, new weapon systems typically have greater range and thus require the unit to be further away from the target to replicate real-world standoff distances.

Sustainment Training

Brigade Combat Teams at the National Training Center must train and exercise their support battalions in sustainment operations. The Army trains Brigade Combat Teams to handle the logistics of recovering damaged vehicles, maintenance, and fueling operations over long distances and to provide rear area security. Reconfiguring the training areas would increase the available space and better facilitate realistic sustainment training. The Army will likely use Eastern and Western Training Areas for logistic and life support operations to extend supply lines to replicate real-world distances.

Modification of Training Infrastructure

The Army intends to modify infrastructure at Fort Irwin to meet future training requirements.

Increased Live Weapons Training Capabilities

The National Training Center needs to increase its capability to use live ammunition in rear areas to replicate the security mission that Brigade Combat Teams would experience. The Army will require additional targets to replicate a realistic threat to these rear areas; the units defending these areas will likely establish additional obstacles, force protection berms and security checkpoints.

Until recently, rotational live fire training has occurred primarily in the Northern Corridor. Since 2013, Brigade Combat Teams have become larger; they are now composed of three maneuver battalions instead of two. A brigade combat team requires the space and terrain type to maneuver its three battalions to train properly for combat. To exercise all three battalions simultaneously in a doctrinally correct live-fire training scenario, units need to maneuver and engage targets within

all maneuver corridors. This training will require the development of additional targets, obstacles, and objectives (small clusters of buildings).

Improve Urban Operations Sites

The Army intends to increase the number and complexity of areas where it can conduct urban operations. To accomplish this task, the Army would construct or expand urban areas within current training areas and in the Eastern and Western Training Areas.

Improve Communication Capabilities

The Army intends to improve the ability for training units to communicate during rotations and other training exercises. These improvements could include the construction and operation of cell towers and installation of communication lines.

Create New Facilities for Simulated Chemical, Biological, Radiological, and Nuclear Training

The Army intends to construct new facilities for simulated chemical, biological, radiological, and nuclear training in the Northern, Central, and Southern Corridors and the Eastern and Western Training Areas. The facilities may be under or above ground, in bunkers, or in constructed caves. The Army would site these facilities in secluded areas, so the Brigade Combat Teams have to find, secure, and mitigate the threats. The equipment used to simulate the chemical, biological, radiological, and nuclear threats is inert and not operational.

Forward Area Arming and Refueling Points and Ready Ammunition Storage Areas

The training rotations at the National Training Center require Brigade Combat Teams to train closely with combat aviation support. The Army needs locations throughout Fort Irwin to refuel and maintain helicopters and for the aircraft to obtain necessary supplies, food, and ammunition to resupply ground forces. To meet this training need, the Army will need to establish forward arming and refueling points, ready ammunition storage areas, and other aviation logistic sites throughout the length of the battlefield in the Central and Southern Corridors and Eastern and Western Training Areas. Terrain will dictate the location of these sites, which means that the Army will use certain areas repeatedly; however, the locations are not predetermined and may vary from rotation to rotation.

Land Management

The Army intends to improve existing vehicle trails to provide for safe and efficient movement of soldiers, equipment, and materiel while reducing the potential for erosion and damage to the physical environment. To comply with its environmental guidance, the Army will control erosion and repair maneuver damage, as needed, to maintain the physical conditions of the training areas and maintain realistic training scenarios.

Range Improvements

The Army intends to improve weapon ranges to meet current training requirements. At the current time, Range 1 requires upgrades for use by new weapon systems and to reduce conflicts in usage. The Army will likely require additional upgrades of other weapons ranges in the future as equipment and doctrine change.

Manix Tank Trail Improvements

The Manix Tank Trail is an unpaved 27-mile-long trail between Fort Irwin and Interstate 15; the Army transports rotational units and equipment to and from Fort Irwin via this trail. The Army needs to upgrade the trail to increase the safety and efficiency of logistics before and after rotational training.

Conservation Program

The Army's conservation program for desert tortoises at the National Training Center focuses on two primary goals: Protecting desert tortoises during its activities in a reasonable and prudent manner and providing long-term, consistent assistance to off-installation recovery efforts for the species. The Army and Service developed this strategy to enable the Army to use Fort Irwin for training in the most efficient manner while promoting the long-term survival and recovery of the desert tortoise.

Minimizing Impacts to Desert Tortoises during Activities on Fort Irwin

One of the goals of the Recovery and Sustainment Partnership Initiative is to provide the Department of Defense with greater mission flexibility with regard to on-base operations and activities while conserving listed species. To that end, the Service and Army reviewed the efficacy of the current protective measures for the desert tortoise at Fort Irwin. One aspect we reviewed was how the Army used surveys to protect desert tortoises. To provide clarity to this discussion, we will define the terms we use with regard to surveys.

"Protocol survey" refers to a standardized methodology of searching for desert tortoises in the area of a proposed activity. Federal agencies use the results from protocol surveys to support analyses in biological assessments and documents they prepare under the National Environmental Policy Act. In contrast to that, we refer to surveys intended to remove desert tortoises from an area immediately before its use during a ground-disturbing activity as "clearance surveys."

Because desert tortoises occur in low densities in most of Fort Irwin, the Army and Service have agreed that, in general, the Army would not conduct protocol surveys for desert tortoises when it undertakes construction or maintenance. In the fiscal years from 2017 through 2019, the Army detected 11 desert tortoises during 216 protocol surveys that covered 5,866 acres in preparation for construction or maintenance (Housman 2020a). These results indicate that desert tortoises are not abundant in many areas of Fort Irwin; the Service and Army agreed that adjusting the current

procedures would be appropriate and compatible with the goals of the Recovery and Sustainment Partnership Initiative.

In some situations, the Army may conduct larger activities in areas where desert tortoises may be more abundant. Larger activities require the Army to conduct a review under the National Environmental Policy Act through development of an environmental assessment or environmental impact statement. Such reviews include field work to assess natural and cultural resources. If the biologists conducting the field visits determine that desert tortoises are likely abundant within the boundaries of such projects, the Army will conduct a clearance survey and translocate any desert tortoises it finds to suitable habitat within a conservation area. Alternately, the Army could move these desert tortoises from harm's way, if that is the more appropriate course of action; moving desert tortoises from harm's way involves relatively short-distance movement of the animal into an area where it would be safe from the current Army activity. The Army and Service will make such decisions on a case-by-case basis without re-initiating consultation. If the Army does not prepare an environmental assessment or environmental impact statement, it would not conduct any surveys but would translocate any desert tortoises it finds during its project activities.

Based on recent experience, the Army does not expect that it would prepare environmental assessments or environmental impact statements frequently. The Army and Service also agreed that the procedure described in the previous paragraph would apply in the Western Training Area after the initial translocation of desert tortoises from that area.

Because the Army has not conducted training exercises in the Western Training Area, it will translocate desert tortoises from that area prior to the onset of training. The Army is currently working with the U.S. Geological Survey and Bureau to assess the number of animals that will require translocation, determine one or more appropriate recipient sites, and develop a specific translocation plan for these desert tortoises. The Service will review the translocation plan prior to its implementation. The Army is also conducting an additional National Environmental Policy Act review before it begins using the Western Training Area.

In the fiscal years from 2017 through 2019, personnel conducting rotational and other activities reported 160 sightings of desert tortoises across all current training areas (Housman 2020a). We expect that these sightings do not necessarily represent unique desert tortoises; that is, we expect that personnel observe the same desert tortoise on more than one occasion.

In some circumstances, soldiers and workers may encounter a desert tortoise on a road or at a training or work site. To address this situation, wildlife staff will brief training units and workers, as appropriate, in how to move desert tortoises from harm's way. Alternatively, the soldier or worker will call wildlife staff to obtain directions over the phone. Depending on the situation, the personnel in the field and wildlife staff may elect to leave the desert tortoise in place if the activity is not likely to kill or injure it. The soldier or worker moving the desert tortoise must report the encounter to wildlife staff and include the following information: The location, date, and time of the encounter; where the desert tortoise was released; and whether the desert tortoise voided its bladder. If possible, the soldier or worker should provide pictures of the capture and

release sites and of the desert tortoise. The Army will include information regarding these encounters to the Service in its annual report.

The Army will follow the general guidance contained in the Service's (2009, 2019c or updated versions) field manual and translocation protocol, as appropriate, for all handling of desert tortoises, including survey protocols and disease management. When translocation is the most appropriate course of action, the Army will coordinate with the Service regarding the location of the recipient site, follow-up monitoring, timing, and other issues. The Army will also coordinate closely with affected land managers on the location of recipient and potential dispersal sites if they are proposed on lands that are not managed by the Department of Defense. On a case-by-case basis, the Army and Service may decide to deviate from the guidance in the field manual and translocation protocol, if the specific circumstances warrant. The Army and Service may determine that it is appropriate to hold any desert tortoise in captivity temporarily; the agencies may also decide that head-starting of small desert tortoises is appropriate prior to their translocation.

Off-Installation Recovery Efforts for the Desert Tortoise

The Army will assist the Service and other partners in working towards the recovery of the desert tortoise by contributing to implementation of recovery actions under the Department of Defense's Recovery and Sustainment Partnership Initiative. The Service and the Department of Defense, in coordination with the Bureau and the Desert Tortoise Management Oversight Group, will fully develop a 5-year plan that will identify and prioritize the Department of Defense's recovery activities under this initiative. This plan will contribute to recovery goals outlined in the Service's (2011) recovery plan, fit within the broader interagency recovery effort, and outline the Department of Defense's recovery contributions under the Recovery and Sustainment Partnership Initiative.

Appendix A provides a preliminary framework and budget for the initial 5-year plan, which the Department of Defense and Service, in consultation with the Bureau, will fully develop during the first year of this biological opinion's implementation. Funding or implementation of the plan will primarily require coordination among the Department of Defense, Service, Bureau, California Department of Fish and Wildlife, National Fish and Wildlife Foundation, and local land trusts and non-governmental partners. The Army has provided initial funding of $530,000 to an account that the Marine Corps has established for transferring funds to the National Fish and Wildlife Foundation (Housman 2021b). Additionally, the Department of Defense has provided $1,500,000 for the Recovery and Sustainment Partnership Initiative for the desert tortoise in California. Finally, the National Fish and Wildlife Foundation has begun to draft a request for proposals for the initial on-the-ground recovery actions.

Appendix A also describes "focal areas" for recovery actions. Focal areas comprise regions with higher desert tortoise densities, higher habitat potential values, ecological intactness, and a location that supports landscape-scale connectivity; they would be located within the Superior-Cronese, Fremont-Kramer, or Ord-Rodman Areas of Critical Environmental Concern. The

Service and other parties working on this effort will define the final boundaries of these focal areas during development of the initial 5-year plan.

Although this plan would have a 5-year time horizon, the Service and Department of Defense, in consultation with the Bureau could modify it at any time to adjust implementation priorities in response to changing recovery needs. This shift could then affect what actions and recovery priorities the Army focuses on under the plan. The time-frame for the 5-year plan represents a planning horizon and does not represent the term for the Army's recovery contributions under the Recovery and Sustainment Partnership Initiative. The Department of Defense and Service would work together to update the 5-year plan in coordination with the Bureau and the Desert Tortoise Management Oversight Group when necessary and work with the Army to determine where and how it can best contribute to plan implementation.

The Army will implement or fund various activities under this plan, with a focus on activities to benefit desert tortoise populations in desert tortoise conservation areas defined by the recovery plan (Service 2011). Activities would include, but are not limited to:

1. Permanent habitat conservation (land acquisition, conservation easements, *etc.*),
2. Habitat restoration (including assisting the Bureau in developing seed sources that will be able to provide the necessary native plant materials for future restoration efforts),
3. Fencing of conservation areas, as appropriate,
4. Closing/restoration of unauthorized roads or routes,
5. Funding of visitor-contact patrols,
6. Fencing to exclude desert tortoises from roads,
7. Augmentation of populations of desert tortoises, and
8. Range-wide monitoring.

As stated above, the 5-year plan may change during implementation depending on recovery priorities (*e.g.*, focal areas may shift, priority recovery action categories may change). However, Appendix A provides an approximation of the initial recovery needs that Department of Defense resources would address under the section 7(a)(1) program and provides a means of characterizing the magnitude of the program under the Recovery and Sustainment Partnership Initiative. The development of future 5-year plans, beyond the current plan's time horizon, may address different geographic areas or recovery priorities, but we do not anticipate, and the Army is not committing to, annual funding levels (adjusted for inflation) above that identified for the initial plan. In addition, the Service and Bureau understand that the Army's funding commitments to support plan implementation are subject to the requirements of the Antideficiency Act (31 U.S.C. 1341). The Antideficiency Act prohibits federal agencies from obligating or expending funds in excess of amounts available in appropriations or funds.

None of the recovery activities that the Army would fund as part of the Recovery and Sustainment Partnership Initiative would occur within the boundaries of Fort Irwin, except for possibly within existing conservation areas for the desert tortoise along the southern boundary of the base. (See Figure 1.) These activities would occur in conservation areas for the desert tortoise within the Western Mojave Recovery Unit. We anticipate that other Department of Defense installations are likely to participate in the Recovery and Sustainment Partnership Initiative and fund recovery actions in the Western Mojave Recovery Unit.

Minimizing Impacts to the Lane Mountain Milk-vetch during Activities on Fort Irwin

We have also included here the following conservation measures for the Lane Mountain milk-vetch that the Army and Service developed during the consultation on operations and activities at Fort Irwin (Service 2004). The Army will ensure the long-term survival of the Lane Mountain milk-vetch by:

1. Maintaining the National Training Center-Gemini Conservation Area adjacent to the southern boundary of the Goldstone Deep Space Communications Complex. This 2,471-acre off-limits area was fenced in 2003, restricting most vehicle traffic. Most of this occurrence of the Lane Mountain milk-vetch is contained within this conservation area.

2. Maintaining the 4,300-acre East Paradise Conservation Area. This conservation area contains 80 percent of the Paradise Valley occurrence of the Lane Mountain milk-vetch.

3. Maintaining the 3,700-acre Brinkman Wash Restricted Access Area that contains 1,872 acres of Lane Mountain milk-vetch habitat.

4. Erecting and maintaining signs along the perimeter of the Restricted Access Area at approximately 100-meter intervals and by erecting restricted access signs along all routes that access the Brinkman Wash Restricted Access Area.

5. Incorporating information regarding the off-limits areas into environmental awareness briefings.

6. Delineating all Lane Mountain milk-vetch conservation areas on all training maps.

7. Prohibiting and eliminating all vehicular travel in Lane Mountain milk-vetch conservation areas within Fort Irwin with the following exceptions: (1) access for yearly monitoring and research approved by the Fort Irwin Natural Resources Program Manager; (2) emergency vehicles, particularly those needed for wildfire control; and (3) exceptional natural resource activities, such as roundups of feral burros (*Equus africanus asinus*) or cultural surveys, approved by the Fort Irwin Natural Resources Program Manager.

8. Using observer/controller teams to prevent unnecessary habitat destruction by rotational units unfamiliar with the terrain and travel routes.

9. Identifying and conserving potential habitat for the Lane Mountain milk-vetch within the region. The Army will identify and survey for small pockets of potential habitat, defined by soil, bedrock geology, and elevation, found within the boundaries of Fort Irwin. If potential habitat for the Lane Mountain milk-vetch is found, the Army will attempt to reduce training in the area by reclassifying the area as "No Dig." If reclassification is possible and does not limit the Army's mission, the Army will erect signs and siebert stakes around the periphery of the area and notify Integrated Training Area Management GIS so that the reclassification will appear on the next update of the range map.

10. Conserving host plants and using the viability of host plants as an indicator of ecosystem health in Lane Mountain milk-vetch habitat.

11. Erecting passive dust monitoring stations so that dust deposition can be monitored for impacts to the Lane Mountain milk-vetch from fugitive dust.

12. Appling soil binders to main supply routes and battalion staging areas to reduce dust production.

13. Monitoring and controlling invasive plants and weeds and monitoring and mapping the spread of exotic species in Lane Mountain milk-vetch habitat.

Re-initiation Threshold

As part of its proposed action, the Army will re-initiate formal consultation if it finds 10 desert tortoises that are 180 millimeters or larger that have died because of its use of the Western Training Area and operations and activities in any calendar year within Fort Irwin, along the Manix Trail, or during translocation. The Army cannot monitor the training activities in a practical or reasonable manner that would allow it to find most desert tortoises that die because they are struck by vehicles or ordnance, crushed or entrapped in burrows, or because of some other aspect of training. Large-scale training activities occur over wide areas and at great intensity; on-site monitoring during training could not cover such large areas and would be dangerous to monitors. Post-training monitoring is impractical because of the large areas involved; additionally, scavengers remove the carcasses of any animal soon after death. We recognize that the Army would not find every desert tortoise that dies because of its activities.

At Fort Irwin, all personnel conducting support activities within desert tortoise habitat and undergoing training receive detailed instruction on the environment in which they will be working or training. This instruction includes direction on the appropriate procedures to follow when they encounter a dead or live desert tortoise. The Army will use this reporting system with regard to desert tortoises that may die because of its activities to assess whether it is approaching or has reached the threshold discussed in the previous paragraph.

"During translocation" refers to desert tortoises that die directly because of the translocation process; it does not refer to animals that may die while in the wild after their release. For example, we would consider a desert tortoise to have died during translocation if a biologist left it in a container and it overheated during its processing. The public regularly uses the Manix

Trail outside of Fort Irwin. For that reason, the Army, Service, and Bureau will use the best available information to determine the cause of mortality of any dead desert tortoises found on the portion of the trail outside of Fort Irwin. We have based this re-initiation criterion on desert tortoises of this size because the best available information indicates that surveyors do not see desert tortoises that are smaller than 180 millimeters with the same frequency that they see the large animals (Service 2018).

When it finds a dead desert tortoise, the Army will endeavor to determine the cause and time of death. The Service and Army will consider only desert tortoises that likely died because of Army activities within approximately a year of the time of their finding to apply to the re-initiation criterion.

We have not established a re-initiation criterion for moving desert tortoises from harm's way because we expect those desert tortoises will survive.

Based on past monitoring, we also expect that survival rates will not differ significantly among translocated, resident, and control desert tortoises. Resident desert tortoises are those animals within their home ranges with translocated individuals nearby; control desert tortoises are animals within their home ranges with no translocated individuals nearby. The Army and Service have agreed to develop a monitoring program for desert tortoises from the Western Training Area that will provide additional information on how desert tortoises react to translocation in the long term. To this end, the Army, Service, and U.S. Geological Survey will base a monitoring program on the metrics described in Table 2 of the Service's (2019c) draft translocation protocol. These metrics include comparing the survival and growth rates and evidence of reproduction of translocated and resident individuals. The Service will review this translocation plan; the Army will not translocate desert tortoises until receiving the Service's approval. Translocation onto Bureau-managed lands requires the review and approval by the Bureau. On a case-by-case basis, the Army and Service, in consultation with Bureau, if Bureau-managed lands are involved, may agree to incorporate desert tortoises translocated from other areas of Fort Irwin into other monitoring efforts that may be in progress at the time.

The translocation plan will contain detailed criteria for determining when re-initiation of consultation is appropriate, based on the metrics of success that it will include. If translocation activities directly kill desert tortoises (*e.g.*, if a desert tortoise is crushed by a vehicle that is moving desert tortoises), that mortality would apply to the annual threshold of 10.

Methodology and Reporting

The Army and Service based the methodology on the procedures described in the "Minimizing Impacts to Desert Tortoises during Activities on Fort Irwin" section of this biological opinion.

Activities in Previously Disturbed Areas: In such cases, the Army will move the desert tortoise from harm's way. The soldier or worker moving the desert tortoise will provide the date, time, location, and approximate size of the desert tortoise to the appropriate contact in Fort Irwin's Natural Resources Office. Staff in the Natural Resources Office will compile these data for the annual report.

Intermittent or Occasional Training in Areas with Suitable Habitat: In these situations, the Army will follow the procedures described in the previous paragraph. We consider suitable habitat for desert tortoises to occur in those areas that support its forage species, suitable substrates for burrowing or caliche caves, and shrub cover. The Service and Army recognize that no clear line exists between Previously Disturbed Areas and suitable habitat. The Army's Natural Resources Manager will be responsible for reaching this determination with regard to its activities; the Army may request our technical assistance if it so desires.

Routine Training with Vehicles or Infrastructure Projects in Areas with Suitable Habitat: The Army will work with the Service early in its planning processes to determine the appropriate protective measures to implement. Once the agencies have discussed the situation and determined a course of action, the Army will implement the guidance described in the "Minimizing Impacts to Desert Tortoises during Activities on Fort Irwin" section of this biological opinion for this class of activity. The Service and Army intend that they will resolve these situations as much as reasonably possible without re-initiating formal consultation. If the resolution requires the Army to translocate desert tortoises to other locations, the Army will provide the same information as above, plus the location of the release site(s), tag number(s), and the results of health assessments of the individuals to the Service and Bureau. Staff in the Natural Resources Office will compile these data for the annual report.

The Army will provide the Service and the Bureau with an annual report of the activities that it conducts under the auspices of this consultation by January 31 of each year this biological opinion is in effect. The annual report will include information on any activity in which anyone contacts a desert tortoise when training or working on Army activities associated with Fort Irwin. For example, if someone contacts a desert tortoise on the Manix Trail outside the boundaries of Fort Irwin, they will report that information.

ACTION AREA

The "action area" refers to "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" (50 Code of Federal Regulations (CFR) 402.02). The action area for the proposed action comprises Fort Irwin, the Manix Trail, lands outside of Fort Irwin to which the Army may translocate desert tortoises from Fort Irwin, and the areas in which recovery actions are likely to occur.

ANALYTICAL FRAMEWORK FOR THE JEOPARDY AND ADVERSE MODIFICATION DETERMINATIONS

Jeopardy Determination

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

The jeopardy analysis in this biological opinion relies on four components:

1. The Status of the Species, which describes the range-wide condition of the species, the factors responsible for that condition, and its survival and recovery needs;

2. The Environmental Baseline, which analyzes the condition of the species in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the species;

3. The Effects of the Action, which are all consequences to the species caused by the proposed action that are reasonably certain to occur; and

4. The Cumulative Effects, which evaluates the effects of future, non-Federal activities in the action area on the species.

For the section 7(a)(2) determination regarding jeopardizing the continued existence of the species, the Service begins by evaluating the effects of the proposed Federal action and the cumulative effects. The Service then examines those effects against the current status of the species to determine if implementation of the proposed action is likely to reduce appreciably the likelihood of both the survival and recovery of the species in the wild.

Adverse Modification Determination

Section 7(a)(2) of the Endangered Species Act requires that Federal agencies ensure that any action they authorize, fund, or carry out is not likely to destroy or to adversely modify designated critical habitat. “Destruction or adverse modification” of critical habitat means a direct or indirect alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species (50 CFR 402.02).

The analysis regarding the destruction or adverse modification of critical habitat determination in this biological opinion relies on four elements:

1. The Status of Critical Habitat, which describes the range-wide condition of critical habitat in terms of the physical and biological features that provide for the conservation of the listed species, the factors responsible for that condition, and the intended recovery function of the critical habitat overall;

2. The Environmental Baseline, which analyzes the condition of the critical habitat in the action area, the factors responsible for that condition, and the value of the critical habitat in the action area for the conservation of the listed species;

3. The Effects of the Action, which are all consequences to critical habitat caused by the proposed action that are reasonably certain to occur; and

4. The Cumulative Effects, which evaluate the effects on critical habitat of future non-Federal activities that are reasonably certain to occur in the action area.

For the section 7(a)(2) determination regarding the destruction or adverse modification of critical habitat, the Service begins by evaluating the effects of the proposed Federal action and the cumulative effects. The Service then examines those effects against current status of the critical habitat to determine if implementation of the proposed action appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species.

STATUS OF THE SPECIES AND CRITICAL HABITAT

Desert Tortoise

Listing History

The Service listed the Mojave population of desert tortoise (all desert tortoises north and west of the Colorado River in Arizona, Utah, Nevada, and California) as threatened on April 2, 1990 [55 Federal Register (FR) 12178].

Recovery Plan

In the revised recovery plan for the desert tortoise, the Service (2011) identified the need for "conservation areas" to protect existing desert tortoise populations and habitat. Box 2 and Figure 2 in the recovery plan (Service 2011) describe and depict these areas in a generalized manner, respectively.

The revised recovery plan lists three objectives and associated criteria to achieve delisting. The first objective is to maintain self-sustaining populations of desert tortoises within each recovery unit into the future. The criterion is that the rates of population change for desert tortoises are increasing over at least 25 years (i.e., a single generation), as measured by extensive, range-wide monitoring across conservation areas within each recovery unit and by direct monitoring and estimation of vital rates (recruitment, survival) from demographic study areas within each recovery unit.

The second objective addresses the distribution of desert tortoises. The goal is to maintain well-distributed populations of desert tortoises throughout each recovery unit; the criterion is that the distribution of desert tortoises throughout each conservation area increase over at least 25 years.

The final objective is to ensure that habitat within each recovery unit is protected and managed to support long-term viability of desert tortoise populations. The criterion is that the quantity of desert tortoise habitat within each conservation area be maintained with no net loss until population viability is ensured.

The revised recovery plan (Service 2011) also recommends connecting blocks of desert tortoise habitat, such as critical habitat units and other important areas, to maintain gene flow between populations. Linkages defined using least-cost path analysis (Averill-Murray *et al*. 2013) illustrate a minimum connection of habitat for desert tortoises between blocks of habitat and represent priority areas for conservation of population connectivity.

Threats

The threats described in the listing rule and both recovery plans (Service 1994, 2011) continue to affect the species. The most apparent threats to the desert tortoise are those that result in mortality and permanent habitat loss across large areas, such as urbanization and large-scale renewable energy projects and those that fragment and degrade habitats, such as proliferation of roads and highways, off-highway vehicle activity, wildfire, and habitat invasion by non-native invasive plant species.

We remain unable to precisely quantify how particular threats affect desert tortoise populations relative to other threats. The assessment of the original recovery plan emphasized the need for a better understanding of the implications of multiple, simultaneous threats facing desert tortoise populations and of the relative contribution of multiple threats on demographic factors (i.e., birth rate, survivorship, fecundity, and death rate; Tracy *et al*. 2004).

For example, we have long known that the construction of a transmission line can result in the death of desert tortoises and loss of habitat. We have also known that common ravens (*Corvus corax*), known predators of desert tortoises, use transmission line pylons for nesting, roosting, and perching and that the access routes associated with transmission lines provide a vector for the introduction and spread of invasive weeds and facilitate increased human access into an area. Increased human access can accelerate illegal collection and release of desert tortoises and their deliberate maiming and killing, as well as facilitate the spread of other threats associated with human presence, such as vehicle use, garbage and dumping, and invasive plants (Service 2011). Changes in the abundance of native plants, because of invasive weeds, can compromise the physiological health of desert tortoises, making them more vulnerable to drought, disease, and predation.

Five-Year Review

Section 4(c)(2) of the Endangered Species Act requires the Service to conduct a status review of each listed species once every 5 years. The purpose of a 5-year review is to evaluate whether the species' status has changed since listing (or since the most recent 5-year review); these reviews, at the time of their completion, provide the most up-to-date information on the range-wide status of the species. For this reason, we are incorporating the 5-year review of the status of the desert tortoise (Service 2010) by reference to provide most of the information needed for this section of the biological opinion. The following paragraphs provide a summary of the relevant information in the 5-year review, updated as appropriate with the best available information.

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

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

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

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

"Adult" desert tortoise connotes reproductive maturity. Desert tortoises may become reproductive at various sizes. We have used the term "adult" in this biological opinion to indicate reproductive status. In range-wide monitoring and for pre-project surveys, the Service uses 180 millimeters as its cut-off length for counting desert tortoises, because the best available information indicates that surveyors do not see desert tortoises that are smaller than 180 millimeters with the same frequency that they see larger desert tortoises (Service 2019c).

The vast majority of threats to the desert tortoise or its habitat are associated with human land uses. Using captive neonate and yearling desert tortoises, Drake *et al*. (2016) found that

individuals "eating native forbs had better body condition and immune functions, grew more, and had higher survival rates (>95%) than [desert] tortoises consuming any other diet"; health and body condition declined in individuals fed only grasses (native or non-native). Current information indicates that invasive species likely affect a large portion of the desert tortoise's range. Furthermore, high densities of weedy species increase the likelihood of wildfires; wildfires, in turn, destroy native species and further the spread of invasive weeds.

Drake *et al*. (2015) "compared movement patterns, home-range size, behavior, microhabitat use, reproduction, and survival for adult desert tortoises located in, and adjacent to, burned habitat" in Nevada. They noted that the fires killed many desert tortoises but found that, in the first 5 years post-fire, individuals moved deeper into burned habitat on a seasonal basis and foraged more frequently in burned areas (corresponding with greater production of annual plants and herbaceous perennials in these areas). Production of annual plants upon which desert tortoises feed was 10 times greater in burned versus unburned areas but was dominated by non-native species (e.g., red brome [*Bromus rubens*]) that frequently have lower digestibility than native vegetation. During years six and seven, the movements of desert tortoises into burned areas contracted with a decline in the live cover of a perennial forage plant that rapidly colonizes burned areas. Drake *et al*. (2015) did not find any differences in health or survivorship for desert tortoises occupying either habitat (burned or unburned) during this study or in reproduction during the seventh year after the fire.

Since the completion of the 5-year review, the Service has issued several biological opinions that affect large areas of desert tortoise habitat because of numerous proposals to develop renewable energy within its range. These biological opinions concluded that proposed solar plants were not likely to jeopardize the continued existence of the desert tortoise primarily because they were located outside of critical habitat and areas of critical environmental concern designated by the Bureau that contain most of the land base required for the recovery of the species. The proposed actions also included numerous measures intended to protect desert tortoise during the construction of the projects, such as translocation of affected individuals. In aggregate, these projects would result in an overall loss of approximately 73,644 acres of habitat of the desert tortoise. We also predicted that the project areas supported up to 19,896 desert tortoises; we concluded that most of these individuals were small desert tortoises, that most large desert tortoises would likely be translocated from project sites, and that most mortalities would be small desert tortoises (< 180 millimeters) that were not detected during clearance surveys. To date, 661 desert tortoises have been observed during construction of solar projects (see Appendix B); most of these individuals were translocated from work areas, although some desert tortoises have been killed. The mitigation required by the Bureau and California Energy Commission (the agencies permitting some of these facilities) resulted in the acquisition of private land and funding for the implementation of various actions that are intended to promote the recovery of the desert tortoise. These mitigation measures are consistent with recommendations in the recovery plans for the desert tortoise; many of the measures have been derived directly from the recovery plans and the Service supports their implementation. We expect that, based on the best available scientific information, they will result in conservation benefits to the desert tortoise; however, it is difficult to assess how desert tortoise populations will respond because of the long generation time of the species.

In August 2016, the Service (2016) issued a biological opinion to the Bureau for a land use plan amendment under the Desert Renewable Energy Conservation Plan. The land use plan amendment addressed all aspects of the Bureau's management of the California Desert Conservation Area; however, the Service and Bureau agreed that only those aspects related to the construction, operation, maintenance, and decommissioning of renewable energy facilities were likely to adversely affect the desert tortoise. The land use plan amendment resulted in the designation of approximately 388,000 acres of development focus areas where the Bureau would apply a streamlined review process to applications for projects that generate renewable energy; the Bureau estimated that approximately 11,290 acres of modeled desert tortoise habitat within the development focus areas would eventually be developed for renewable energy. The Bureau also adopted numerous conservation and management actions as part of the land use plan amendment to further reduce the adverse effects of renewable energy development on the desert tortoise.

The land use plan amendment also increased the amount of land that the Bureau manages for conservation in California (e.g., areas of critical environmental concern, California Desert National Conservation Lands, etc.) from 6,118,135 to 8,689,669 acres (Bureau 2015); not all of the areas subject to increased protection are within desert tortoise habitat. The Bureau will also manage lands outside of development focus areas according to numerous conservation and management actions; these conservation and management actions are more protective of desert tortoises than direction contained in the previous land use plan. The Service (2016) concluded that the land use plan amendment was not likely to jeopardize the continued existence of the desert tortoise and would benefit its recovery; the Service also concluded that the proposed action was not likely to result in the destruction or adverse modification of critical habitat.

In addition to the biological opinions issued for solar development within the range of the desert tortoise, the Service (2012) also issued a biological opinion to the Department of the Army (Army) for the use of additional training lands at Fort Irwin. As part of this proposed action, the Army translocated approximately 650 adult desert tortoises from 18,197 acres of the southern area of Fort Irwin, which had been off-limits to training, to lands south of the base that are managed by the Bureau and the Army. The Army would also use an additional 48,629 acres that lie east of the former boundaries of Fort Irwin; much of this parcel is either too mountainous or too rocky and low in elevation to support numerous desert tortoises. As part of the proposed action, the Army also acquired approximately 100,000 acres of non-federal land within the Superior-Cronese Critical Habitat Unit for management for conservation of desert tortoises. It also purchased the base property of three cattle allotments; the Bureau subsequently re-allotted the forage on those allotments to wildlife. The Army also funded several other activities aimed at conserving desert tortoises in the Western Mojave Recovery Unit.

The Service also issued a biological opinion to the Department of the Navy (Navy) that considered the effects of the expansion of the Marine Corps Air Ground Combat Center at Twentynine Palms (Service 2017). We concluded that the Navy's proposed action, the use of approximately 167,982 acres of public and private land for training, was not likely to jeopardize the continued existence of the desert tortoise. Most of the expansion area lies within the Johnson Valley Off-highway Vehicle Recreation Area. As part of this proposed action, the Navy

translocated 998 adult desert tortoises from the expansion area to 4 recipient sites to the north and east of the expansion area (Henen 2019). The Lucerne-Ord and Siberia sites are entirely within Bureau-managed lands, and the Rodman-Sunshine Peak North and Cleghorn sites overlap Bureau-managed lands and lands managed by the Navy. The Lucerne-Ord site lies within the Ord-Rodman Area of Critical Environmental Concern. The Navy translocated desert tortoises from the Johnson Valley Off-highway Vehicle Recreation Area into populations that were below the Service's established minimum viable density, to attempt to augment these populations and make them more viable in the long-term.

The Service also issued a biological opinion to the Navy that considered the effects of the expansion of the Naval Air Weapons Station at China Lake (Service 2019a). We concluded that the Navy's proposed action, the use of approximately 2,777 acres of the 26,509-acre Cuddeback Range expansion area, was not likely to jeopardize the continued existence of the desert tortoise. The Cuddeback Range lies within the Superior-Cronese Critical Habitat Unit. However, all of the disturbance would occur in a previously disturbed area that the U.S. Air Force historically used as a target zone. The Navy will include the entire Cuddeback Range in its Integrated Natural Resource Management Plan and construct a perimeter fence around the range to prevent trespass by the public. These actions will provide conservation benefits for plants, fish, and wildlife within the area, including the desert tortoise. Because the Navy will not disturb most of the area, it did not translocate any desert tortoises as part of this action.

The incremental effect of the larger actions (i.e., solar development, the expansions of Fort Irwin and the Marine Corps Air Ground Combat Center) on the desert tortoise is unlikely to be positive, despite the numerous conservation measures that have been (or will be) implemented as part of the actions. The acquisition of private lands as mitigation for most of these actions increases the level of protection afforded these lands; however, these acquisitions do not create new habitat and federal, state, and privately managed lands remain subject to most of the threats and stresses we discussed previously in this section. Land managers have been implementing measures to manage these threats and we expect, based on the best available scientific information, that such measures provide conservation benefits to the desert tortoise. We have been unable, to date, to determine whether desert tortoise populations have benefited from the measures. This is partly because of the low reproductive capacity of the desert tortoise. Therefore, the conversion of habitat into areas that are unsuitable for this species continues the trend of constricting the desert tortoise into a smaller portion of its range.

As the Service notes in the 5-year review (Service 2010), "[t]he threats identified in the original listing rule continue to affect the [desert tortoise] today, with invasive species, wildfire, and renewable energy development coming to the forefront as important factors in habitat loss and conversion," and "[t]he vast majority of threats to the desert tortoise or its habitat are associated with human land uses."

Recently, illegal marijuana-growing operations have disturbed thousands of acres of desert scrub habitat in the desert portions of Kern, Los Angeles, and San Bernardino counties. Typically, the growers seek out private land, cultivate a single crop, and then abandon the facility. Given the scale and location of these operations, they have almost certainly killed desert tortoises while

preparing sites and while travelling to and from the facilities. The California Department of Fish and Wildlife and local law enforcement are attempting to control these illegal activities.

Climate change is likely to affect the prospects for the long-term conservation of the desert tortoise. Climate change is likely to influence the amount of precipitation within the range of the desert tortoise. Models suggest that temperatures are likely to increase (Christensen *et al*. 2007; Seager *et al*. 2007 and Archer and Predick 2008 in Mitchell *et al*. 2021). Models also suggest changes in precipitation; Guida *et al*. (2019 in Mitchell *et al*. 2021) noted a 20 percent reduction in precipitation in the last 100 years. Other "climate projections disagree about whether precipitation will increase or decrease for this region" (Bachelet *et al*. 2016 in Mitchell *et al*. 2021).

We do not know the effect of increased temperatures on hatchling sex ratios and about the effect of decreased precipitation or increased drought frequency on the egg production and survival of all age classes of desert tortoises (Service 2010, 2011). Research suggests that desert tortoises will produce and lay eggs earlier in a warming climate (Lovich et al. 2012), which could lead to increased annual egg production by providing more time for females to lay additional clutches in a year (Wallis et al. 1999). Shifts in egg production and nesting might not compensate for changes in the environment, depending on factors such as the time nests spend above the critical thermal maximum temperature for eggs and whether the availability of forage necessary to provide the nutrients for egg production synchronizes with shifts in the activity patterns of desert tortoises (Lovich et al. 2017). In addition, declining reproductive output across much of the desert tortoise's range, as estimated between 1990 and 2018, could have a negative population-level effect, especially if precipitation is significantly reduced across the species' range as predicted under some climate models (Mitchell *et al*. 2021). Human-subsidized predation pressure on juvenile desert tortoises, especially by common ravens, will compound the effects of any reduction in reproductive output.

Local-level models projected substantial reductions in and movement upslope of suitable desert tortoise habitat under the anticipated effects of climate change. For example, at moderate predictions of climate change (+2°C maximum July temperature, –50 millimeters annual precipitation), modeled desert tortoise habitat shrank by nearly 66 percent in the Mojave Desert portion of Joshua Tree National Park and nearly 88 percent in its Sonoran Desert portion (Barrows 2011). Similarly, projections of 1 to 3°C warmer maximum July temperatures resulted in modeled habitat reductions of 24 and 55 percent, respectively, in the vicinity of the Marine Corps Air Ground Combat Center at Twentynine Palms (Barrows *et al*. 2016). Models of the region surrounding Lake Mead National Recreation Area using a similar range of climate projections as those above predicted habitat reductions of up to 77 percent (Barrows and Murphy 2011). Much of the predicted habitat east of the Colorado River shifted upslope away from Lake Mead National Recreation Area onto adjacent BLM lands under the warmer and drier scenarios (Barrows and Murphy 2011).

Currently, two research projects are investigating implications of climate change across the desert tortoise's range. One is investigating how both land use and climate change will affect gene flow and corridor functionality using present and future habitat models (Heaton 2020). The

other began with the premise that reliance on standard habitat models for performing climate vulnerability assessments may overestimate the risk from climate change because such assessments place more focus on the nature and magnitude of exposure to change than species' adaptive capacity to change. This project is using data collected across the broadest possible range of environmental conditions to estimate population growth rates of desert tortoises as a function of inter-correlated vital rates, body condition, and spatiotemporally varying environmental conditions; the researchers then plan to assess metapopulation viability under multiple plausible future scenarios (Shoemaker 2020). Both projects are scheduled for completion in mid-2022.

Core Criteria for the Jeopardy Determination

When determining whether a proposed action is likely to jeopardize the continued existence of a species, we are required to consider whether the action "reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR 402.02). We have used the best available information to summarize the status of the desert tortoise with respect to its reproduction, numbers, and distribution.

Reproduction

In the 5-year review, the Service notes that desert tortoises increase their reproduction in high rainfall years; more rain provides desert tortoises with more high quality food (i.e., plants that are higher in water and protein), which, in turn, allows them to lay more eggs. Conversely, the physiological stress associated with foraging on food plants with insufficient water and nitrogen may leave desert tortoises vulnerable to disease (Oftedal *et al*. 2002), and the reproductive rate of diseased desert tortoises is likely lower than that of healthy animals. Young desert tortoises also rely upon high-quality, low-fiber plants (e.g., native annual plants) with nutrient levels not found in the invasive weeds that have increased in abundance across its range (Oftedal *et al*. 2002; Tracy *et al*. 2004). Compromised nutrition of young desert tortoises likely represents an effective reduction in reproduction by reducing the number of animals that reaches adulthood; see previous information from Drake *et al*. (2016). Consequently, although we do not have quantitative data that show a direct relationship, the abundance of weedy species within the range of the desert tortoise has the potential to affect the reproduction of desert tortoises and recruitment into the adult population in a negative manner.

Various human activities have introduced numerous species of non-native invasive plants into the California desert. Routes that humans use to travel through the desert (paved and unpaved roads, railroads, motorcycle trails, etc.) serve as pathways for new species to enter habitat of the desert tortoise and for species that currently occur there to spread. Other disturbances of the desert substrate also provide invasive species with entry points into the desert. The abundance and distribution of invasive weeds may compromise, at least to some degree in localized areas across its range, the reproductive capacity of the desert tortoise; the continued increase in human access across the desert likely continues to facilitate the spread of weeds and further affect the reproductive capacity of the species.

Numbers

In the 5-year review, the Service discusses various means by which researchers have attempted to determine the abundance of desert tortoises and the strengths and weaknesses of those methods. Due to differences in area covered and especially to the non-representative nature of earlier study sites, data gathered by the Service's current range-wide monitoring program cannot be reliably compared to information gathered through other means at this time.

Data from small-scale study plots (e.g., one square mile) established as early as 1976 and surveyed primarily through the mid-1990s indicate that localized population declines occurred at many sites across the desert tortoise's range, especially in the western Mojave Desert. Spatial analyses of more widespread surveys also found evidence of relatively high mortality in some parts of the range (Tracy *et al*. 2004). Although we cannot extrapolate population densities from the local study plots to provide an estimate of the number of desert tortoises on a range-wide basis, historical densities in some parts of the desert exceeded 38 per square kilometer; Tracy *et al*. 2004). The Service (2010) concluded that "appreciable declines at the local level in many areas, which coupled with other survey results, suggest that declines may have occurred more broadly."

The range-wide monitoring that the Service initiated in 2001 is the first comprehensive attempt to determine the densities of desert tortoises in conservation areas across their range. Allison and McLuckie (2018) used annual density estimates obtained from this monitoring effort to evaluate range-wide trends in the density of desert tortoises over time. (All references to the density of desert tortoises within each monitoring area are averages. Some local areas within each monitoring area support higher densities and some lower; desert tortoises do not occur in uniform densities across large areas.) This analysis indicates that densities in the Northeastern Mojave Recovery Unit have increased since 2004, with the increase apparently resulting from increased survival of adults and sub-adults moving into the adult size class. The analysis also indicates that the populations in the other four recovery units are declining; Table 1 depicts the estimated abundance of desert tortoises within the recovery units and the change in abundance. Surveys did not include the steepest slopes in these desert tortoise conservation areas; however, the model developed by Nussear *et al*. (2009) generally rates steep slopes as less likely to support desert tortoises.

Table 1. Change in desert tortoise abundance in recovery units (Allison and McLuckie 2018)*.

Recovery Units	Modeled Habitat (km^2)	2004 Abundance	2014 Abundance	Change in Abundance
Western Mojave	23,139	131,540	64,871	-66,668
Colorado Desert	18,024	103,675	66,097	-37,578
Northeastern Mojave	10,664	12,610	46,701	+34,091

Eastern Mojave	16,061	75,342	24,664	-50,679
Upper Virgin River	613	13,226	10,010	-3,216
Total	68,501	336,393	212,343	-124,050

* Allison and McLuckie (2018) used modeled habitat within the entire range of the desert tortoise for this estimate. In other discussions in this biological opinion, we used information only from the area of monitored habitat within desert tortoise conservation areas to estimate the number of desert tortoises in the recovery unit.

To further assess the status of the desert tortoise, the Desert Tortoise Recovery Office (Service 2015a) used multi-year trends from the best-fitting model describing log-transformed density of adult animals per square kilometer. In 2014, three of the five recovery units supported densities below 3.9 adult animals per square kilometer [Western Mojave (2.8), Eastern Mojave (1.5), and Colorado Desert (3.7); see Table 10 in Service 2015b], which is the minimum density recommended to avoid extinction in the 1994 recovery plan. The Northeastern Mojave Recovery Unit supported 4.4 adult desert tortoises per square kilometer and the Upper Virgin River Recovery Unit, which is by far the smallest recovery unit, supported 15.3 adults per square kilometer.

Allison and McLuckie (2018) considered the declines of adult desert tortoises in the Western Mojave and Eastern Mojave recovery units and concluded that these "steep declines" in density are sustainable only if reproduction and the growth and survival of juveniles improved greatly. (Allison and McLuckie used 180 millimeters as the separation point between large and small desert tortoises.) However, they note, "the proportion of juveniles has not increased anywhere since 2007, and in these two recovery units the proportion of juveniles in 2014 has declined to 91% and 77% of their representation in 2004, respectively." In short, as of 2014, small desert tortoises were not moving into the large cohort at a rate that was sufficient to reverse declines.

Distribution

The Service (2010) concluded in its 5-year review that the distribution of the desert tortoise has not changed substantially since the publication of the original recovery plan in 1994 in terms of the overall extent of its range. Prior to 1994, urban and agricultural development, military training, and off-road vehicle use extirpated desert tortoises from large areas within their distributional limits. For example, the cities of Barstow, Lancaster, Las Vegas, and St. George, agricultural areas south of Edwards Air Force Base, the National Training Center at Fort Irwin, and portions of off-road recreation areas managed by the Bureau are located within the range of the desert tortoise. Unauthorized off-highway vehicle use in areas such as east of California City has also affected the distribution of the desert tortoise.

Urban development around Las Vegas has likely been the largest contributor to habitat loss throughout the range since 1994. Desert tortoises have essentially been removed from the 18,197-acre southern expansion area at Fort Irwin (Service 2012). The development of large solar facilities has also reduced the amount of habitat available to desert tortoises. No solar

facilities have been developed within areas of critical environmental concern that the Bureau has designated for the desert tortoise in California, although such projects have occurred in areas that the Service considers important linkages between conservation areas (e.g., Silver State South Project in Nevada).

In recognition of the absence of specific and recent information on the location of habitable areas within the Mojave Desert, especially at the outer edges, Nussear *et al*. (2009) developed a quantitative, spatial habitat model for the desert tortoise north and west of the Colorado River. The model incorporates environmental variables such as precipitation, geology, vegetation, and slope and uses occurrence data of desert tortoises from sources spanning more than 80 years, including data from the 2001 to 2008 range-wide monitoring surveys. The model predicts the relative potential for desert tortoises to be present in any given location, given the combination of habitat variables at that location in relation to areas of known occupancy throughout the range. Calculations of the amount of desert tortoise habitat in the 5-year review (Service 2010) and in this biological opinion use a threshold of 0.5 or greater predicted value for potential desert tortoise habitat. The model does not account for anthropogenic effects to habitat and represents the potential for occupancy by desert tortoises absent these effects.

Table 2 depicts acreages of habitat (as modeled by Nussear *et al*. 2009, using only areas with a probability of occupancy by desert tortoises greater than 0.5 as potential habitat) within the recovery units of the desert tortoise and of impervious surfaces as of 2006 (Fry *et al*. 2011); calculations are by Darst (2014). Impervious surfaces include paved and developed areas and other disturbed areas that have zero probability of supporting desert tortoises. All units are in acres.

Table 2. Modeled habitat of the desert tortoise; all units are in acres.

Recovery Units	Modeled Habitat	Impervious Surfaces (percentage)	Remaining Modeled Habitat
Western Mojave	7,585,312	1,989,843 (26)	5,595,469
Colorado Desert	4,950,225	510,862 (10)	4,439,363
Northeastern Mojave	3,012,293	386,182 (13)	2,626,111
Eastern Mojave	4,763,123	825,274 (17)	3,937,849
Upper Virgin River	231,460	84,404 (36)	147,056
Total	20,542,413	3,796,565 (18)	16,745,848

Since 2010, we again conclude that the species' distribution has not changed substantially in terms of the overall extent of its range. However, solar facilities, military activities, and other developments have removed desert tortoises from several thousand acres within their range.

Summary of the Status of the Desert Tortoise

As noted in the 5-year review and revised recovery plan for the desert tortoise (Service 2010, 2011), the desert tortoise is subject to landscape-level impacts in addition to the site-specific effects of individual human activities. Land managers have undertaken actions to improve the status of the desert tortoise. For example, as part of its efforts to offset the effects of the use of additional training maneuver lands at Fort Irwin (Service 2004), the Department of the Army acquired the private interests in the Harper Lake and Cronese Lakes allotments, which are located within critical habitat in the Western Mojave Recovery Unit; as a result, cattle have been removed from these allotments. The retirement of allotments assists in the recovery of the desert tortoise by eliminating sources of mortality (e.g., trampling by livestock, mortality from maintaining range improvements, reduction in subsidies to common ravens, etc.).

Federal and state agencies and non-governmental organizations have implemented numerous other activities to conserve desert tortoises. For example, they have acquired thousands of acres of habitat, installed fences to prevent desert tortoises from entering highways, begun to control common ravens, and implemented other actions recommended in the recovery plan (Service 2011). However, desert tortoise numbers continue to decline. We expect that drought and mortality from human activities and common ravens are the primary causes.

Critical Habitat of the Desert Tortoise

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

Critical habitat of the desert tortoise would not be able to fulfill its intended recovery function without each of the physical and biological features being functional. For example, critical habitat would not function properly if a sufficient amount of forage species were present but human-caused mortality was excessive. A second example is that critical habitat could not fulfill its intended function for recovery if an area with sufficient space to support viable populations and to provide for movement, dispersal, and gene flow did not support adequate forage species.

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

Since the designation of critical habitat, Congress increased the size of Joshua Tree National Park and created the Mojave National Preserve. A portion of the expanded boundary of Joshua Tree National Park lies within critical habitat of the desert tortoise; portions of other critical habitat units lie within the boundaries of the Mojave National Preserve. Critical habitat within Joshua Tree National Park would no longer be potentially available for multiple use, such as mineral development. Recreational use of the new portions of the park likely changed; we expect that activities associated with hiking likely increased to some degree, while dispersed camping and vehicle-based activity likely decreased. Recreational use of the critical habitat likely increased with the creation of Mojave National Preserve. Conversely, multiple use within critical habitat in the preserve decreased because some activities, such as mineral development, no longer occur. Utilities continue to operate with existing rights-of-way within the Mojave National Preserve; these operations generally have minor effects on critical habitat.

Congress also increased the size of the Johnson Valley Off-highway Vehicle Recreation Area through the passage of the Dingell Act in 2019. This act included 3,471 acres of the Ord-Rodman Critical Habitat Unit in the Johnson Valley Off-highway Vehicle Recreation Area, which represents approximately 1.37 percent of the 253,200-acre critical habitat unit. This action increased the likelihood that more intense vehicular recreation would occur within critical habitat; such recreation would degrade the physical and biological features of critical habitat. We do not know if the level of use has increased since the change in boundaries.

Within each critical habitat unit, both natural and anthropogenic factors affect the function of the physical and biological features of critical habitat. As an example of a natural factor, in some specific areas within the boundaries of critical habitat, such as within and adjacent to dry lakes, some of the physical and biological features are naturally absent because the substrate is extremely silty; desert tortoises do not normally reside in such areas. Comparing the acreage of desert tortoise habitat as depicted by Nussear *et al.*'s (2009) model to the gross acreage of the critical habitat units demonstrates quantitatively that the entire area within the boundaries of critical habitat likely does not support the physical and biological features. In Table 3, the acreage for modeled habitat is for the area in which the probability that desert tortoises are present is greater than 0.5. (We used the 0.5 probability here, rather than the 0.6 value we used to define conservation areas, to depict the broader area that most desert tortoises likely occupy, instead of the slightly more restricted area we consider important for conservation.) The acreages of modeled habitat do not include loss of habitat due to human-caused impacts. The difference

between gross acreage and modeled habitat is 653,214 acres; that is, approximately 10 percent of the gross acreage of the designated critical habitat is unlikely to support the features of habitat that are conducive to the presence of desert tortoises.

Table 3. Acreage of gross and modeled habitat within critical habitat units for the desert tortoise. We have not adjusted the acreage for the Ord-Rodman Critical Habitat Unit in response to the Dingell Act. All units are in acres.

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

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

Condition of the Physical and Biological Features of Critical Habitat

The revised recovery plan (Service 2011) discusses the importance of understanding the combined and synergistic effects of human activities on habitat of the desert tortoise. For example, surface disturbance causes increased rates of erosion and generation of dust. Increased erosion alters additional habitat outside of the area directly affected by altering the nature of the substrate, removing shrubs, and possibly destroying burrows and other shelter sites. Increased dust affects photosynthesis in the plants that provide cover and forage to desert tortoises.

Disturbed substrates and increased atmospheric nitrogen enhance the likelihood that invasive weeds will out-compete native species; the proliferation of weedy species increases the risk of large-scale fires, which further move habitat conditions away from those that are favorable to desert tortoises.

The following paragraphs generally describe how the threats described in the revised recovery plan affect the physical and biological features of critical habitat of the desert tortoise.

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

Urban and agricultural development, concentrated use by off-road vehicles, illegal marijuana facilities, and other activities such as development of transmission lines and pipelines completely remove habitat. Although we are aware of local areas within the boundaries of critical habitat that have been heavily disturbed, we do not know of any areas that have been disturbed to the intensity and extent that compromise the function of this physical and biological feature. To date, the largest single loss of critical habitat is the use of 18,197 acres of additional training land in the southern portion of Fort Irwin. The congressional transfer of 3,471 acres of the Ord-Rodman Critical Habitat Unit to the Johnson Valley Off-highway Vehicle Recreation Area may reduce the space available to support viable populations within the Western Mojave Recovery Unit and to provide for movement, dispersal, and gene flow. The extent to which recreationists use the transferred area will determine the extent of the effect on this and the other physical and biological features.

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

In some cases, major roads likely disrupt the movement, dispersal, and gene flow of desert tortoises. State Route 58 and Highway 395 in the Fremont-Kramer Critical Habitat Unit, Fort Irwin Road in the Superior-Cronese Critical Habitat Unit, and Interstate 10 in the Chuckwalla Critical Habitat Unit are examples of large and heavily travelled roads that likely disrupt movement, dispersal, and gene flow. Roads that have been fenced and provided with underpasses may alleviate this fragmentation to some degree; however, such facilities have not been in place for sufficient time to determine whether they will eliminate fragmentation.

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

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

This physical and biological feature addresses the ability of critical habitat to provide adequate nutrition to desert tortoises. As described in the revised recovery plan and 5-year review,

grazing, historical fire, invasive plants, altered hydrology, drought, wildfire potential, fugitive dust, and climate change/temperature extremes contribute to the stress of "nutritional compromise." Paved and unpaved roads through critical habitat of the desert tortoise provide avenues by which invasive native species disperse; these legal routes also provide the means by which unauthorized use occurs over large areas of critical habitat. Nitrogen deposition from atmospheric pollution likely occurs throughout all the critical habitat units and exacerbates the effects of the disturbance of substrates. Because paved and unpaved roads are widespread through critical habitat, this threat has adversely affected the value of critical habitat for conservation of the desert tortoise throughout its range, to some degree. Since the Service issued its recovery plans and 5-year review, illegal marijuana-growing facilities have removed this physical and biological feature from areas of critical habitat in the western Mojave Desert. These facilities remove the third through fifth physical and biological features from areas also; we will not repeat this information for those physical and biological features.

Suitable substrates for burrowing, nesting, and overwintering

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

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

Burrows, caliche caves, and other shelter sites

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

Sufficient vegetation for shelter from temperature extremes and predators

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

In 2005, wildfires in Nevada, Utah, and Arizona burned extensive areas of critical habitat (Service 2010). Although different agencies report slightly different acreages, Table 4 provides an indication of the scale of the fires. The Service is aware that fires in August 2020 also occurred in critical habitat of the desert tortoise. Table 5 includes the approximate acreages of those fires (Luciani 2021).

Table 4. Summary of total burned area within desert tortoise critical habitat for 2005.

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

Table 5. Summary of total burned area within desert tortoise critical habitat for 2020.

Critical Habitat Unit	Total Area Burned (acres)	Percent of the Critical Habitat Unit Burned
Beaver Dam Slope	51	0.02
Gold-Butte Pakoon	23,684	5
Mormon Mesa	12	<0.01
Upper Virgin River	9,029	17
Ivanpah Valley	42,142	7
Piute-Eldorado	0.1	<0.01

The revised recovery plan notes that the fires caused statistically significant losses of perennial plant cover, although patches of unburned shrubs remained. The percentages of burned habitat do not mean that the fire removed all habitat value for desert tortoises. Drake *et al*. (2015) noted that the production of annual plants was 10 times greater in burned areas compared to unburned areas; however, non-native plants, such as red brome (*Bromus madritensis* ssp. rubens), dominated the burned areas. Desert tortoises continued to use the dead branches of shrubs, such as creosote (*Larrea tridentata*) and burro bush (*Ambrosia dumosa*). Their use of burrows was similar in burned and unburned areas (Drake *et al*. 2015). We cannot quantify precisely the

extent to which these fires disrupted the value of the critical habitat, given the patchiness with which the physical and biological features of critical habitat are distributed across the critical habitat units and the varying intensity of the wildfires. The work by Drake *et al*. (2015) demonstrates that the physical and biological features within burned areas retain at least some of their value for the conservation of desert tortoises but conclude "burned habitat may take years to recover sufficiently to fully support [desert] tortoise populations."

Habitat protected from disturbance and human-caused mortality

In general, the Federal agencies that manage lands within the boundaries of critical habitat have adopted land management plans that include implementation of some or all of the recommendations contained in the original recovery plan for the desert tortoise (see pages 70 to 72 of Service 2010). The Bureau's (Service 2016) land use plan amendment for the Desert Renewable Energy Conservation Plan increased the amount of land under protective status and adopted conservation and management actions that furthered the Bureau's goals for these areas. Areas of critical environmental concern and California Desert National Conservation Lands are the units by which the Bureau manages its lands; for the most part, these management units overlap critical habitat of the desert tortoise.

To at least some degree, the adoption of these plans has resulted in the implementation of management actions that are likely to reduce the disturbance and human-caused mortality of desert tortoises. For example, these plans resulted in the designation of open routes of travel and the closure (and, in some cases, physical closure) of unauthorized routes. Numerous livestock allotments have been relinquished by the permittees and cattle no longer graze these allotments. Because of actions on the part of various agencies, many miles of highways and other paved roads have been fenced to prevent desert tortoises from wandering into traffic and being killed. The Service and other agencies of the Desert Managers Group in California are implementing a plan to remove common ravens that prey on desert tortoises and to undertake other actions that would reduce subsidies (i.e., food, water, sites for nesting, roosting, and perching, etc.) that facilitate common raven abundance in the California desert (Service 2008a).

Despite the implementation of these actions, disturbance and human-caused mortality continue to occur in many areas of critical habitat to the extent that they adversely affect the value of critical habitat for the conservation of the desert tortoise, to some degree. For example, many highways and other paved roads in California remain unfenced. Hughson and Darby (2011) noted that as many as 10 desert tortoises are reported killed annually on paved roads within Mojave National Preserve. Because scavengers quickly remove carcasses from roads, we expect that vehicle use kills more desert tortoises than are reported.

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

Illegal marijuana-growing facilities have introduced additional disturbance and sources of human-caused mortality into areas of critical habitat in the western Mojave Desert. The removal of habitat from areas where cultivation occurs causes disturbance and mortality; vehicles travelling to and from cultivation site on existing routes or on routes they create cause additional disturbance and mortality.

Finally, in California, the Bureau will not allow the development of renewable energy facilities on public lands within the boundaries of areas of critical environmental concern and California Desert National Conservation Lands. Counties have not specifically restricted the development of renewable energy facilities on private lands within the boundaries of areas of critical environmental concern. However, the checkerboard pattern of land ownership would likely necessitate that the Bureau consider issuance of a right-of-way for such a facility, which likely decreases the potential for such proposals in the future.

Summary of the Status of Critical Habitat of the Desert Tortoise

As noted in the 5-year review and revised recovery plan for the desert tortoise (Service 2010, 2011), critical habitat of the desert tortoise is subject to landscape-level impacts in addition to the site-specific effects of individual human activities. Land managers have undertaken actions to improve the status of critical habitat. For example, as part of its efforts to offset the effects of the use of additional training maneuver lands at Fort Irwin (Service 2004), the Department of the Army acquired the private interests in the Harper Lake and Cronese Lakes allotments, which are located within critical habitat in the Western Mojave Recovery Unit; as a result, cattle have been removed from these allotments. The retirement of allotments assists in the recovery of the species by eliminating disturbance to the physical and biological features of critical habitat by cattle and range improvements.

Although human activities have affected the remaining physical and biological features to some degree, these impacts have not, to date, appreciably diminished the value of the critical habitat units for the conservation of the desert tortoise. We have reached this conclusion primarily because the effects are localized and thus do not affect the value of large areas of critical habitat for the conservation of the desert tortoise.

Lane Mountain Milk-vetch

Unless otherwise noted, the following information is from the 5-year review (Service 2008b) and the species report (2014b). The Service prepared the species report in 2014 to collect the best available information regarding the status of the Lane Mountain milk-vetch. We are incorporating the 5-year review and species report by reference to provide much of the information needed in this section of the biological opinion.

Listing History

The Service listed Lane Mountain milk-vetch as endangered on October 6, 1998 (63 FR 53596). The primary threats to Lane Mountain milk-vetch were surface mining, off-highway vehicle

recreation, non-native species, and military training activities.

Species Biology and Life History

Lane Mountain milk-vetch is a perennial plant in the pea family. It typically twines up through a host shrub that it uses for structural support. Although the taproot is perennial, the above-ground portion of the plant is herbaceous; it re-sprouts from the taproot or old stems with the first winter rains and dies back during the drier summer months. Plants may remain dormant during years of low rainfall.

The Service's (2014b) review of the status of the Lane Mountain milk-vetch contains substantial information regarding the biology of the species and its life history.

Recovery Plan

The Service has not completed a recovery plan for this species.

Five-Year Review

At the time of listing, we were aware of few individuals within four occurrences. The Service's 5-year review included the following new information that it had gathered since the listing of the Lane Mountain milk-vetch as endangered:

1. Intensive surveys by the U.S. Army in 2001 revealed that two of those four occurrences were actually a single larger occurrence. The surveys also detected a fourth occurrence and more than 5,700 individuals.

2. Monitoring indicated the numbers of adult and newly recruited individuals have been decreasing since 1999;

3. The U.S. Army had proposed training on approximately 23 percent of the occurrences but most of the rest of the known occupied habitat was in conservation management; and

4. Its life history includes episodic germination events that seem to be tied to medium- and large-scale weather patterns; we have observed die-offs of the Lane Mountain milk-vetch in small areas. Therefore, a high level of uncertainty exists regarding the ability of Lane Mountain milk-vetch to persist through local extirpations and recolonization of suitable habitat.

We concluded that the new information regarding the more widespread distribution of the species, greater numbers of individuals, and the placement of approximately 77 percent of the areal extent of the occurrences into conservation management met the definition of a threatened species.

Species Report

In this report, the Service (2014b) reviewed information that we had received since the completion of the 5-year review. This information included the results of research on the life history of the Lane Mountain milk-vetch and ongoing population monitoring by the Army. The Service also reviewed the legal protections afforded the species and the Army's and Bureau's land management activities and policies.

As a result of this review, the Service (2014b) concluded that the existing laws, regulations, and policies "… mandate[d] consideration, management, and protection of resources that benefit Lane Mountain milk-vetch." Biologically, the Service concluded that climate change and small population size posed "substantial threats" to the Lane Mountain milk-vetch that are not addressed by existing regulatory mechanisms.

Petition Finding

In December 2011, the Pacific Legal Foundation petitioned the Service to reclassify the Lane Mountain milk-vetch to threatened status, based on our finding in the 5-year review. The Service issued a 12-month finding with regard to the petition on May 2, 2014 (79 FR 25084), which summarized information that we had gathered in the species report (Service 2014b).

In the 12-month finding, we noted two long-term studies that indicated that the number of Lane Mountain milk-vetch plants had decreased substantially since 1999, probably in response to a decrease in the amount and frequency of rain over this period. Decreases in rainfall may have the greatest negative effect on the survival of seedlings and their recruitment into the reproducing population. We also noted that military training, off-highway vehicle activities, mining, climate change, and other threats continued as stressors on this species. For these reasons, we concluded that reclassification of the Lane Mountain milk-vetch to threatened status was not warranted.

Core Criteria for the Jeopardy Determination

Reproduction

In the wild, seed production is low, even in years of abundant rainfall. Seed production was much greater under favorable greenhouse conditions; consequently, harsh weather and predation on seeds may limit reproduction in the wild.

Six insect taxa were observed on Lane Mountain milk-vetch during two studies on its pollination ecology; some were likely robbing nectar and were uninvolved with pollination. Leaf-cutter and metal leaf-cutter bees (*Anthidium dammersi, A. emarginatum*, and *Osmia latisculata*) were the most abundant visitors and likely effective pollinators.

Numbers

The Army conducted an intensive survey from 1999 to 2001 to determine the distribution and number of Lane Mountain milk-vetch plants (Service 2014b). The Army counted 5,723 plants

during this study. Some potential exists that the surveys missed a few plants and counted other plants more than once. Despite those limitations, the Army's intensive effort located most of the plants present during this time and represents a valuable data point in understanding the status of the species.

To attempt to track population trends, the Army and others established sampling plots and began tagging individual plants among the four occurrences of the Lane Mountain milk-vetch. Since 2005, botanists have tagged 557 plants (Redhorse Corporation 2021). In 2021, Redhorse (2021) detected 13 live Lane Mountain milk-vetches; one of the observations was of an individual that had not been previously tagged.

The paucity of observed live individuals in 2021 does not necessarily indicate that plants that did not sprout are dead. The Lane Mountain milk-vetch sprouts from a taproot in years of sufficient precipitation. The average precipitation at weather stations within the range of the species during the 2021 growing season was 8.6 millimeters, which is well below the level of rainfall that typically results in the observation of young plants (Redhorse 2021, Figure 9). However, long-term drought is likely to result in an overall decline in the number of individuals.

Distribution

Four occurrences of the Lane Mountain milk-vetch occur in the western Mojave Desert, north of the city of Barstow. The four occurrences cover approximately 21,400 acres. We generally refer to these occurrences as the Goldstone, Brinkman Wash/Montana Mine, Paradise Valley, and Coolgardie Mesa units. Table 6 summarizes the distribution of habitat of the Lane Mountain milk-vetch.

Table 6. Distribution of the Lane Mountain Milk-vetch.

Occurrence	Area of the Occurrence (acres) [1]	Percentage of the Species' Habitat[2]	Land Management Status
Goldstone	1,283	6	Entirely within an Army conservation area
Brinkman Wash / Montana Mine	5,497	28	Entirely on Fort Irwin Approximately 1,872 acres within a "no-dig" zone Approximately 3,625 acres within areas available for training
Paradise Valley	4,794	22	Most of the occurrence is on Fort Irwin; some is on Bureau land Approximately 3,634 acres within an Army conservation area

			Approximately 971 acres within Fort Irwin area available for training Approximately 200 acres managed by the Bureau within an area of critical environmental concern
Coolgardie Mesa	9,775	46	Approximately 9,888 acres managed by the Bureau within an area of critical environmental concern[3] Approximately 1,282 acres of Army conservation lands Approximately 2,899 acres of private lands
Total	21,349	100	

[1] We used the acreages from the Service's (2004) biological opinion. The sizes of the occurrences vary to some degree among documents because authors used slightly different ways of defining the boundaries.
[2] We rounded percentages to the nearest whole number.
[3] We used the acreage of critical habitat of the Lane Mountain milk-vetch in this cell because we do not have recent data on land ownership for the Coolgardie Mesa occurrence. The total acreage in this cell exceeds the overall amount of habitat for the Lane Mountain milk-vetch at Coolgardie Mesa because critical habitat extends beyond the occurrence's boundaries to some degree to account for ecosystem processes (76 FR 29108). We expect that the actual acreage of habitat is proportional to that of critical habitat.

Figure 3 depicts the locations of the four occurrences of the Lane Mountain milk-vetch.

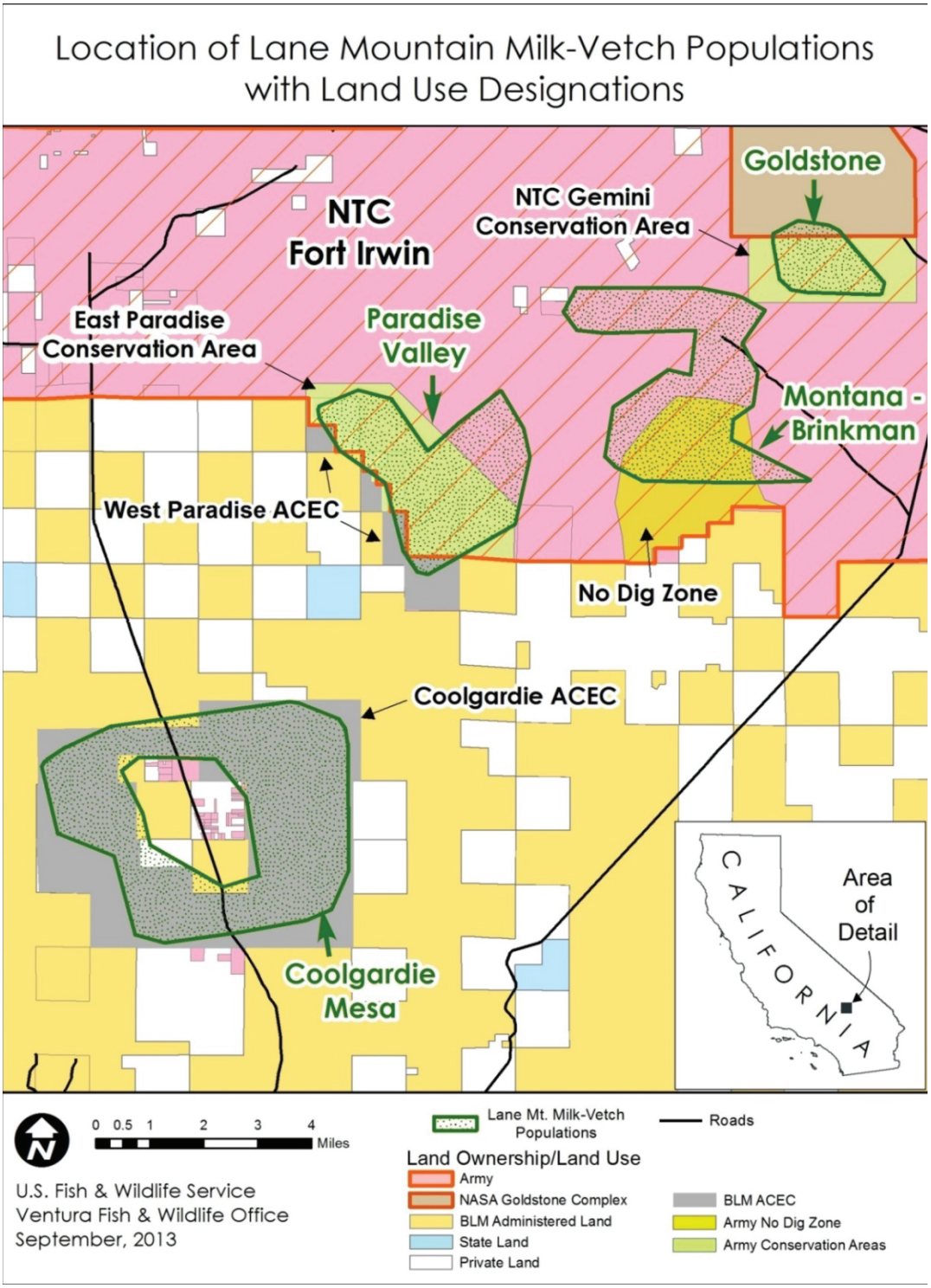


Figure 3. Location of Lane Mountain milk-vetch occurrences with land use designations (from Service 2014b). The words "occurrence" and "population" have the same meaning with regard to the locations where the Lane Mountain milk-vetch occurs.

Summary of the Status of the Lane Mountain Milk-vetch

As noted in the species report (Service 2014b) and the 12-month finding (79 FR 25084), as of 2014, two long-term studies indicated that the number of Lane Mountain milk-vetch plants had decreased substantially since 1999, probably in response to a decrease in the amount and frequency of rain over this period. Ongoing monitoring by the Army since 2015 has generally shown that the number of plants visible in any year is closely related to the amount of rainfall (Redhorse 2021); overall, drought continues to threaten this species. Military training, off-highway vehicle activity, mining, and climate change (e.g., drought) continue as stressors on this species.

ENVIRONMENTAL BASELINE

We have focused the discussion of the environmental baseline in the action area on areas within the boundaries of Fort Irwin. The conditions within other portions of the action area along the Manix Trail and in the areas where translocation and recovery actions would occur are located in the Western Mojave Recovery Unit. We described those conditions in the status section of this biological opinion.

Previous Consultations in the Action Area

The Service and Army have an extensive consultation history regarding the expansion of the National Training Center. The Consultation History section of the Service's (2012) biological opinion regarding the use of additional training lands at Fort Irwin describes those consultations in some detail. The Service's (2012) biological opinion addressed the Army's use of the Eastern and Southern Training Areas; the Status of the Desert Tortoise section of this biological opinion provides additional detail with regard to that consultation. We are incorporating that consultation history into this biological opinion by reference. During that consultation, the Army (2011) informed the Service that it had decided not to pursue training in the Western Training Area at that time but that it would review its training needs and reconsider training there in the future.

The Service (2014a) and Army also consulted on ongoing operations and activities at Fort Irwin. That biological opinion addressed training, management, and safety activities in the training areas. It also addressed activities regarding infrastructure in the cantonment area, alternative energy, recreation, research, and education. The Service concluded that the proposed activities were not likely to jeopardize the continued existence of the desert tortoise or result in the destruction or adverse modification of its critical habitat. Since the Service issued that biological opinion, the Army has reported few deaths of desert tortoises.

The Service and Army have also consulted on numerous small activities within Fort Irwin. The Service concluded in the biological opinions that resulted from these consultations that the proposed actions were not likely to jeopardize the continued existence of the desert tortoise or result in the destruction or adverse modification of its critical habitat. To the best of our knowledge, no desert tortoises died because of these activities. The Previous Consultations in the Action Area section of the Service's (2014a) biological opinion provides additional detail on

some of these consultations; we are incorporating that information into this biological opinion by reference.

Status of the Desert Tortoise in the Action Area

Training activities at Fort Irwin prior to the listing of the desert tortoise altered its distribution within the original boundaries of the installation. Subsequent to the consultation regarding use of the Southern Training Area (Service 2012), the Army removed most desert tortoises from that area. Desert tortoises remain in designated conservation areas on base; these areas are located along the southern edge of the installation and in restricted use zones that the Army has established for the Lane Mountain milk-vetch (Figure 3). A desert tortoise exclusion fence separates the southern boundary of Fort Irwin from habitat to the south; the exclusion fence lies to the north of the Army's conservation areas.

Desert tortoises also remain in small numbers throughout the installation. Of these animals, most reside higher on alluvial fans that are less accessible to most vehicles.

The Army has not undertaken any systematic surveys of the entire area within its boundaries. With a few exceptions, however, the Army and Service have a reasonable understanding of the status of desert tortoises at Fort Irwin. In the following paragraphs, we will provide this information for each general area of the installation.

Leach Lake Gunnery Range

The Army has not conducted surveys for desert tortoises within the Leach Lake Gunnery Range because unexploded ordnance renders the area unsafe. Based on the elevation within the gunnery range and its location within the central Mojave Desert, we expect that some desert tortoises occur in the area. Given its long-time use as a target area, desert tortoises likely exist only in unused areas. The potential exists for desert tortoises to occur on the upper slopes of alluvial fans in this area, away from targets.

Goldstone Deep Space Communications Complex

Information regarding the status of desert tortoises within the Goldstone Deep Space Communications Complex comes from surveys conducted in 1983 and 1989. We have summarized the following description of the status of the desert tortoise in this area from the biological opinion for the complex's routine operation (Service 1998).

Within suitable habitats, desert tortoises are probably more common in less rocky, alluvial areas and less common on rocky hillsides and mountainous areas. Most desert tortoises likely occur in areas that are between 1,600 to 3,600 feet in elevation. Goldstone Deep Space Communications Complex personnel regularly see desert tortoises crossing NASA Road.

Cantonment Area

Most of the cantonment area is developed with infrastructure and is heavily used by Fort Irwin personnel. Consequently, the remaining areas of desert tortoise habitat exist in smaller patches. Desert tortoises occasionally wander into this area but it does not support a viable population.

Downrange Operations Area

Within the boundary of Fort Irwin prior to its expansion, desert tortoises occurred in extremely low numbers in areas that the Army had used for force-on-force training. More desert tortoises occur on the upper slopes of the alluvial fans than on surrounding training areas, probably because the more rugged terrain in these areas is not conducive to the large-scale movement of military vehicles.

The Southern Training Area comprises the southernmost portion of the downrange area. Because of the consultation on the use of additional maneuver training lands, the Army translocated most of the desert tortoises in this area onto Army lands south of the training areas. We expect that the surveys to remove desert tortoises missed a few individuals and that others may have moved into this area from surrounding habitat on Fort Irwin; the Army also left desert tortoises in place that it deemed were not suitable for translocation (*i.e.*, those that had evidence of disease but were not so debilitated that they were euthanized). A mesh fence to exclude desert tortoises separates the Southern Training Area from the conservation areas and other desert tortoise habitat to the south.

The Western Training Area is the westernmost portion of Fort Irwin. Previous survey and research efforts indicated that approximately 450 to 600 “adult” desert tortoises reside in this area (Karl 2002, Esque et al. 2009, Esque et al. unpublished data, and Walde et al. unpublished data in Housman 2021c). The use of the term “adult” in this context does not necessarily mean desert tortoises larger than 180 millimeters; however, it conveys information that numerous large desert tortoises occur within Fort Irwin and that additional smaller individuals and eggs are also present. Desert tortoises generally occur in a patchy distribution in this area. The Army initially separated the Western Training Area from adjacent habitat with a mesh fence to prepare to translocate desert tortoises. In 2014, the Army created approximately 16 3-meter-long openings in the fence to allow passage by desert tortoises. After informally consulting with the Service, the Army closed the openings in 2019. We do not know the extent to which desert tortoises used the openings.

Desert tortoises within the Eastern Training Area generally reside in the area where the alluvial fan joins the mountainous areas to the west of the alluvial fan. The alluvial fan downslope from this area is extremely rocky. The alluvial fan is also somewhat below elevations at which desert tortoises most frequently occur and thus may be hotter and receive less rainfall than areas to the east. These factors may be responsible for desert tortoises being largely restricted to the upper alluvial fan where, presumably, temperatures are cooler and rainfall more abundant. In 2004, the Army estimated that approximately 288 desert tortoises resided in this parcel (Service 2004); if trends in other portions of the western Mojave Desert also occurred here, the number of desert tortoises has likely decreased since that time.

Conservation Areas

These areas to the south of the Southern Training Area generally contain high quality habitat for desert tortoises; surveys completed in preparation for the translocation of desert tortoises from the Southern Training Area indicated that these areas generally supported numerous desert tortoises. Since that time, the Army has translocated additional desert tortoises into these areas.

The Service surveys these areas as part of its range-wide monitoring. We have not attempted to determine densities for these areas. Please refer to the Status of the desert tortoise section of this biological opinion for information on densities in this area of the desert (*i.e.*, the Superior-Cronese Area of Critical Environmental Concern).

Status of Critical Habitat of the Desert Tortoise in the Action Area

The Service (2012) analyzed the effects of use of the Southern Training Area on critical habitat of the desert tortoise and concluded that it would "essentially eliminate the primary constituent elements" (now referred to as physical and biological features) in this area of the Superior-Cronese Critical Habitat Unit. Because of this consultation, we will not discuss the Southern Training Area in this biological opinion.

The condition of the physical and biological features of critical habitat within the remainder of the action area (*i.e.*, the Manix Trail, Western Training Area, translocation sites, and areas of recovery actions) generally reflects that of critical habitat as a whole; we will not repeat that discussion here. Because of the fence that the Army installed around the Western Training Area, it has not received recreational use in recent years.

Status of the Lane Mountain Milk-vetch in the Action Area

Three of the four occurrences of the Lane Mountain milk-vetch occur within Fort Irwin. Table 7 summarizes the environmental baseline with regard to the occurrences of the Lane Mountain milk-vetch within Fort Irwin.

Table 7. Distribution of the Lane Mountain Milk-vetch on Fort Irwin.

Occurrence	Area of the Occurrence on Fort Irwin (acres)	Management Status of the Occurrence
Goldstone	1,283	Located entirely within a conservation area
Brinkman Wash / Montana Mine	5,497	Approximately 1,872 acres within a no-dig area. Training on foot allowed; vehicles prohibited except in some specified areas. Approximately 3,625 acres available for training
Paradise Valley	4,596	Approximately 3,634 acres within a conservation area Approximately 971 acres available for training
Total	11,376	

EFFECTS OF THE ACTION

The implementing regulations for section 7(a)(2) define the effects of the action as "all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action" (50 CFR 402.02).

The implementing regulations also note that "a conclusion of reasonably certain to occur must be based on clear and substantial information, using the best scientific and commercial data available" (50 CFR 402.17(a)). When considering whether activities caused by the proposed action (but not part of the proposed action) or activities reviewed under cumulative effects are reasonably certain to occur, we consider factors such as:

1. Past experiences with activities that have resulted from actions that are similar in scope, nature, and magnitude to the proposed action;

2. Existing plans for the activity; and

3. Any remaining economic, administrative, and legal requirements necessary for the activity to go forward.

In general, the various activities that the Army may undertake at Fort Irwin, as described in the Description of the Proposed Action section of this biological opinion, would have the same effect on the desert tortoise and its habitat, including critical habitat, and the Lane Mountain milk-vetch and its habitat. For example, heavy equipment, whether used in training exercises or in the development of infrastructure would affect listed species in the same general manner. Therefore, we will not discuss how the various types of activities that the Army will conduct (*e.g.*, sustainment training, maneuver training, upgrading of infrastructure, *etc.*) may affect the desert tortoise and its habitat, including critical habitat, and Lane Mountain milk-vetch and its habitat. Instead, we will present an analysis of the overall effects of these activities, based on the Army's strategy for reducing impacts to these species. We will then discuss the Army's off-installation recovery efforts for the desert tortoise. Finally, we will summarize and quantify (where possible) these effects in relation to the appropriate metrics for our determinations with regard to the likelihood of jeopardizing the continued existence of the species and, for the desert tortoise, of resulting in the destruction or adverse modification of its critical habitat.

We do not know the exact location or timing of all of the Army's operations and activities within the entirety of Fort Irwin, including the Western Training Area. However, we are familiar with the nature of training and infrastructure work that the Army is reasonably certain to undertake within the defined boundary of Fort Irwin and the Manix Trail. Therefore, we have analyzed the adverse effects of these activities and operations and addressed them in the incidental take statement of this biological opinion. At this time, we do not know the exact timing, location, or nature of the off-installation recovery activities that are likely to occur during implementation of the Recovery and Sustainment Partnership Initiative. For this reason, although we will provide a

general analysis of the types of activities that we expect will occur, we will not address them in the incidental take statement.

Effects of the Action on the Desert Tortoise

We will analyze the Army's activities within the boundaries of Fort Irwin (i.e., use of the Western Training Area and ongoing activities and operations) separately from the off-installation recovery activities that would occur later in time under the Recovery and Sustainment Partnership Initiative.

Effects of the Army's Use of the Western Training Area and Operations and Activities on the Desert Tortoise

Activities conducted by the Army can kill or injure desert tortoises in various ways, regardless of whether the animals are in previously disturbed or undisturbed habitat. Training vehicles or construction equipment would crush desert tortoises of all sizes. Foot traffic may kill smaller animals. Desert tortoises may fall into trenches or other holes in the ground and die of exposure. Army activities are also likely to crush burrows, which can either trap desert tortoises inside or leave them exposed to predation or extreme weather. Ordnance may occasionally strike desert tortoises. Although these are the most likely threats to desert tortoises from the Army's activities, we do not intend this discussion as presentation of a complete list. Our intent with this biological opinion is to consider all mortalities of desert tortoises that occur because of lawful Army activities as effects of the proposed action.

Activities in Previously Disturbed Areas

The Army is likely to intensify and conduct additional types of training in areas that it has disturbed previously; it may also construct additional infrastructure in these areas. The Army and Service have agreed that the Army will not conduct pre-activity surveys in areas that it has disturbed previously because desert tortoises are usually absent because of the Army's previous activities. If the Army encounters a desert tortoise during these activities, it will either move the individual from harm's way or translocate it to another area, either on- or off-installation. (If circumstances warrant, as described in the Minimizing Impacts to Desert Tortoises during Activities on Fort Irwin section of this biological opinion, the Army may leave the desert tortoise in place.) Whether the Army moves the desert tortoise from harm's way or translocates it will depend on the circumstances. The proximity of suitable, undisturbed habitat nearby and the nature of the Army activity will influence the decision regarding the disposition of the desert tortoise. We will discuss the effects of moving desert tortoises from harm's way and translocation later in this biological opinion.

If the Army does not find a desert tortoise that is present, its activities are likely to kill or injure it. Because small desert tortoises (*i.e.*, those under 180 millimeters) and eggs are harder to see than large desert tortoises, they are more likely to be killed or injured during activities. Few desert tortoises are likely to die in previously disturbed areas, in large part because of previous activities. Also, the Army translocated most desert tortoises from the Southern Training Area in 2013.

Intermittent or Occasional Training in Areas with Suitable Habitat

If the Army encounters a desert tortoise in an area that supports suitable habitat during intermittent or occasional training, it will either move the desert tortoise from harm's way or leave it in place, depending upon the circumstances, as described in the Minimizing Impacts to Desert Tortoises during Activities on Fort Irwin section of this biological opinion.

Areas with suitable habitat are more likely to support desert tortoises than previously disturbed sites. Consequently, the Army is more likely to encounter desert tortoises in these areas than under the previous scenario. However, given the less intense nature of the Army's activities, we expect that few desert tortoises are likely to die or be injured. As we discussed previously, small desert tortoises are more vulnerable than large ones.

Routine Training with Vehicles or Infrastructure Projects in Areas with Suitable Habitat

Large areas within Fort Irwin no longer support suitable habitat because of previous training and infrastructure projects. In contrast, the Army has not conducted much training in other areas, particularly in the Western Training Area; these areas continue to support undisturbed habitat and desert tortoises. Absent protective measures, routine training with vehicles or infrastructure projects in these areas would kill or injure numerous desert tortoises.

As we described in the Description of the Proposed Action section of this biological opinion, the Army and Service will determine, on a case-by-case basis, whether to move desert tortoises from harm's way, remove desert tortoises from the work area during the activity, or translocate them to secure habitat either on or off installation. Regardless of the option the Army and Service choose, the Army will implement the latest Service protocols for handling, translocation, and disease management to protect desert tortoises.

Because desert tortoises spend most of their lives underground and can be difficult to detect even when they are above ground, the potential exists that the Army may not detect some individuals when translocating them from an area. In some cases, the Army may find and translocate these animals later on. Some desert tortoises, either individually or in small groups, are likely to persist within or near some training areas for decades because they reside in areas that are not conducive to training; because these animals are isolated from the desert tortoises outside of Fort Irwin, they cannot contribute to the overall conservation of the species. Some desert tortoises are likely to be killed because of future Army activities; the loss of these animals would not affect the overall conservation of the desert tortoise because of the relatively small number of individuals involved and their isolation from populations outside of Fort Irwin.

Common Ravens, Coyotes, and Other Predators

The Army's activities have the potential to attract common ravens, coyotes, and other mammalian predators, provide subsidies in the form of food, water, and shelter, and allow for an increase in their abundance. These species prey on desert tortoises; increases in their numbers would increase the threat of predation on desert tortoises.

When the Army is constructing or maintaining infrastructure, it will require workers to implement measures to reduce subsidies to predators. These measures would vary on a project-specific basis but would include control of attractants (food, water, and shelter) and implementing adaptive management techniques such as installing devices to discourage predators from using project-related structures.

During training activities, the Army requires soldiers to contain waste materials. That requirement and post-training remediation would reduce the amount of food available to predators. Training likely results in the death of small animals, which predators will scavenge. Given the nature of training, the Army is not capable of reducing that effect.

We cannot reasonably predict how activities at Fort Irwin are likely to alter current levels of predation of desert tortoises within the action area because of the numerous variables involved. For example, the abundance of predators varies with environmental conditions; their numbers will increase after years of abundant rainfall. Some predators, such as common ravens, migrate in and out of the action area. The Service's efforts to control common ravens in the desert may alter their abundance. Best management practices are effective in eliminating some, but not all, use by predators. However, because many predators travel widely and subsidies throughout the action area support these species, we conclude that subsidies provided by the Army's activities do not have a measurable effect on the regional population of predators and, subsequently, on the level of predation on desert tortoises.

Moving Desert Tortoises from Harm's Way

Moving desert tortoises from harm's way involves transporting individuals from the immediate area of an activity that is likely to injure or kill the animals. Depending on the nature of the activity, desert tortoises may be moved up to several hundred feet from the activity.

No one has studied the effects of moving desert tortoises from harm's way. We expect that the placement of the desert tortoise up to several hundred feet from its original location is not likely to adversely affect individuals because they are likely still within their home ranges. (That is, they remain where they are familiar with local resources, such as areas to forage and seek shelter.)

Handling desert tortoises can cause them to void their bladders, which they use to store water. Averill-Murray (2002) found that desert tortoises that voided their bladders during handling had lower survival rates than those that did not. Careful handling while moving desert tortoises from harm's way can reduce the likelihood of their voiding their bladders. Because moving desert tortoises from harm's way does not involve excessive handling and anyone who does so will receive instruction beforehand, we expect that desert tortoises voiding their bladders is likely to occur infrequently.

Translocation of Desert Tortoises

We anticipate that the Army is likely to translocate large numbers of desert tortoises from Fort Irwin to augmentation sites off-installation in preparation of using undisturbed habitat for

training and infrastructure, particularly in the Western Training Area. In recent years, agencies and project proponents have translocated numerous desert tortoises from military training areas and construction sites. Many of these translocations involved various studies to evaluate how the movement affected resident and translocated desert tortoises in relation to control animals. A recent biological opinion discussed the effects of translocation on desert tortoises in detail (Service 2017) and Dickson *et al*. (2019) evaluated the results of a multi-year study of translocation on desert tortoises from the site of a solar project. We have incorporated those analyses into this biological opinion and will not repeat that information here.

In general, studies demonstrate that translocated, resident, and control desert tortoises do not differ significantly in survival rates, levels of stress hormones, movements, susceptibility to predation, and other aspects of behavior. With regard to some aspects that researchers have studied (*e.g.*, movement patterns), the behavior pattern of translocated desert tortoises resembled those of controls and residents after 2 to 3 years. We acknowledge that desert tortoises that spend more time above ground are more vulnerable to predators. Drought likely causes some predators to switch from their normal prey to desert tortoises; desert tortoises near human development seem to be more vulnerable to predation, possibly because coyotes may be more abundant in those areas.

In general, we conclude that translocation is an effective tool for protecting desert tortoises, if those conducting the translocation follow specific protocols designed to increase the chance of success. These protocols include translocating desert tortoises only during appropriate times of the year (*i.e.*, when they are active), only into suitable habitat, and with appropriate consideration of disease issues. Specific circumstances with regard to numerous variables influence the ultimate outcomes of translocation.

The Service and Army will consider disease when translocating desert tortoises. To the best of our knowledge, no wild desert tortoise population is free of disease; Rideout (2015) notes that no wildlife populations are completely free of disease. Consequently, the Army and Service's goal is to ensure that translocated desert tortoises do not affect the prevalence of disease in a negative manner among recipient populations. To achieve this goal, the Army will follow the Service's most recent protocol with regard to management of disease, including the use of an algorithm (Figure 4) to determine whether translocation of any individual is appropriate and an evaluation of the recipient sites to ensure that the sites do not show evidence of an active outbreak of disease (Service 2019b).

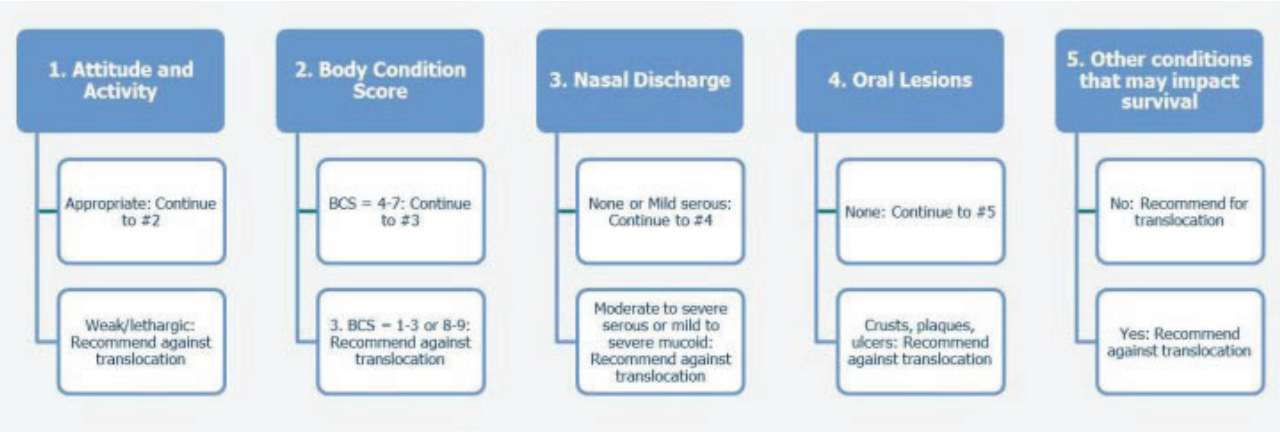


Figure 4. Translocation algorithm from Service (2019b).

The Army and Service expect that new information regarding the management of diseases will emerge over time. We will modify the management of disease when new information is available, in coordination with the Service's Desert Tortoise Recovery Office.

U.S. Geological Survey is currently evaluating habitat conditions and the current density of desert tortoises in potential recipient areas in the Western Mojave Recovery Unit. The purpose of this evaluation is to ensure that the Army can translocate desert tortoises to the most appropriate habitat that currently supports densities that are suitable for receiving additional animals. U.S. Geological Survey's experience with desert tortoises in general and translocation in particular will ensure that the Army and Service are using the most current and best available information to translocate desert tortoises to areas where they are most likely to prosper.

Core Criteria for the Jeopardy Determination regarding the Use of the Western Training Area and Ongoing Activities and Operations

As we stated previously in this biological opinion, "jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR 402.02). This regulatory definition focuses on how the proposed action would affect the reproduction, numbers, and distribution of the species under consideration in the biological opinion. For that reason, we have used those aspects of the desert tortoise's status as the basis to assess the overall effect of the proposed action on the species.

Additionally, we determine whether a proposed action is likely "to jeopardize the continued existence of the species" through an analysis of how a proposed action affects the listed taxon within the action area in relation to the range of the entire listed taxon. For the desert tortoise, this process involves considering the effects at the level of the action area, then at the level of the recovery unit, and then finally for the range of the listed taxon. Logically, if a proposed action is unlikely to cause a measurable effect on the listed taxon within the action area, it is unlikely to affect the species throughout the recovery unit or the remainder of its range. Conversely, an

action with appreciable effects on the listed entity in the action area may degrade the status of the species to the extent that it affects the recovery unit or the entire range.

In this section, we will synthesize the analyses contained in the previous paragraphs to determine how the proposed use of the Western Training Area and ongoing operations and activities at Fort Irwin are likely to affect the reproduction, number, and distribution of the desert tortoise. We will then assess the effects of these aspects of the proposed action on the recovery of the species and whether they are likely to appreciably reduce the likelihood of both the survival and recovery of the desert tortoise in the wild.

Reproduction

The proposed action will not affect the reproduction of desert tortoises. We consider effects on reproduction to be those that would alter the reproductive capacity of the species. For example, the use of a pesticide that would disrupt the endocrine system of a species would alter its reproductive capacity.

We acknowledge that repeated training in an area would decrease the abundance of the native annual plants upon which desert tortoises feed and that the loss of forage would likely reduce the ability of females to produce eggs. However, because the Army and Service intend to translocate most individuals from areas of current or future heavy training, the decrease in the amount of forage on base will not affect the reproduction of desert tortoises. Additionally, absent their translocation, the Army's future activities in locations of repeated training would kill most of the desert tortoises, which is a more direct and immediate effect than decreasing the available forage.

Translocation of desert tortoises from the Western Training Area (and in much smaller numbers, from elsewhere on Fort Irwin) would increase their density in recipient areas in the Western Mojave Recovery Unit. Desert tortoises currently occur at densities that are much lower than historic levels. At extremely low densities, individuals become isolated and reproduction becomes less frequent.

As we discussed previously in this biological opinion, female desert tortoises lay eggs after being translocated. Research has also shown that translocated male desert tortoises had, in the short term, not been contributing to local reproduction, although we expect that trend to reverse itself over time. We are unlikely to observe a rapid and appreciable increase in the rate of reproduction after translocation. Desert tortoises have a slow reproductive rate. Weather will also affect their reproduction; reproductive success will likely be higher in years with average and above-average rainfall. In summary, because of translocation, the density of desert tortoises in the recipient areas would increase to some degree, which would reduce the isolation of individuals and facilitate reproduction.

Numbers

The Army has proposed to re-initiate formal consultation if it finds 10 desert tortoises that are 180 millimeters or larger that have died because of its activities within the boundaries of Fort Irwin or along the Manix Trail in any calendar year. We recognize the Army will not detect all

desert tortoises killed by its activities. We do not have any information by which we can predict how many desert tortoises actually die because of an activity based on the number of carcasses that are found, either randomly or during systematic surveys. We also recognize that the degree to which observed annual mortalities represent the actual number of mortalities likely varies over time due to factors unrelated to the detectability of desert tortoises (*e.g.*, scavenger prevalence, the nature of the Army's activities, *etc.*).

From 1994 through 2019, the Army (Service 2014a, Housman 2020b) found 61 desert tortoises that died within the boundaries of Fort Irwin because of its activities. Forty-four of these mortalities occurred between 1994 and 2003. In most years, the Army finds no or one desert tortoise that died because of its activities; in 2015 and 2016, it found six and four desert tortoises, respectively, that died as a result of its activities (Housman 2020b). From 2004 through 2012, the Army encountered 190 live desert tortoises, between 6 and 37 per year (see Table 5 in Service 2014a); we are aware that some of these encounters are with the same individuals. This information indicates that desert tortoises persist in low numbers in areas of Fort Irwin; also, as we mentioned previously, the Army detected 11 desert tortoises during 216 protocol surveys of 5,866 acres in the fiscal years from 2017 through 2019 (Housman 2020a). It also indicates that soldiers and workers are able to detect and avoid killing or injuring them at least some of the time.

To summarize this information, desert tortoises remain within Fort Irwin at low densities; if the Army proceeds with the translocation of desert tortoises from the Western Training Area, the same would likely be true of that portion of the installation. Soldiers and workers occasionally encounter desert tortoises. The Army infrequently finds desert tortoises that died because of its activities.

The Service has no information to estimate the number of desert tortoises that are likely to have died because of Army activities, based on the number of carcasses found where we can attribute the death to training, operations, or maintenance. For the purpose of this analysis, we consider it reasonable and conservative to assume that five large desert tortoises die for each individual that the Army finds. Therefore, if the Army finds 10 large desert tortoises that likely died because of its activities in a year, we assume 50 individuals have died. Again, we note that we are basing this discussion only on large desert tortoises to enable a comparison with data collected during range-wide monitoring. Also, small desert tortoises are difficult to find and methods of estimating their abundance contain more assumptions and therefore more potential for variation than does our method for predicting the number of large desert tortoises.

Finally, we assumed that the current trend of decline of desert tortoises would continue until 2025 and used the data from the Service's (2015a) trend analysis to project the number of large individuals within the Western Mojave Recovery Unit. The results of this extrapolation are in Table 3.

Table 3. Numbers of large desert tortoises in conservation areas of the Western Mojave Recovery Unit in 2014 and extrapolated for 2025[1].

Year	Number of Large Desert Tortoises[1]	Lower 95 Percent Confidence Interval	Upper 95 Percent Confidence Interval
2014	17,645	11,155	27,912
2025	8,108	5,426	12,116

[1] Allison (2020). "Conservation areas" refers only to critical habitat units and other areas where the Service conducts range-wide monitoring.

The numbers in the previous table do not include large desert tortoises that reside outside of conservation areas. Therefore, we emphasize that the following calculations upon which we based this analysis are not precise; however, they allow for a reasonable approach to the analysis based on the best available information and our professional judgment.

This extrapolation allows us to evaluate the loss of 50 large desert tortoises per year compared to the population estimate in 2025. We considered the extrapolation to 2025 to be reasonable to acknowledge that the loss of desert tortoises may be ongoing. The number of desert tortoises killed is likely to decline over time because fewer desert tortoises will remain on base as a result of translocation and mortalities.

The loss of 250 large desert tortoises (50 per year) from 2020 (when we extrapolated the loss over time) to 2025 represents approximately 3.1 percent of the estimated number of large desert tortoises within conservation areas in Western Mojave Recovery Unit at that time (250 / 8,108 x 100 = 3.08).

The loss of 50 large desert tortoises annually and 250 by 2025 through the Army's activities is not likely to appreciably reduce the number of desert tortoises in the Western Mojave Recovery Unit. For this reason, we will not extend our analysis to the entire range of the listed taxon.

Over the previous 25 years, the Army found 61 desert tortoises that died because of its activities. The average number of desert tortoises per year found is 2.44; this number included animals smaller than 180 millimeters. Consequently, the annual loss of 50 desert tortoises larger than 180 millimeters is most likely an overestimate.

Our experience is that approximately one-third of the desert tortoises captured for translocations are smaller than 180 millimeters, with most of those being smaller than 120 millimeters. Mortality rates of smaller desert tortoises are higher than those of larger individuals; therefore, the number present varies more. Consequently, because of this variation and the fact that larger individuals are more important to the overall population, we do not attempt to quantify the number of smaller animals that may be present.

The Army and Service have agreed to re-initiate formal consultation if the Army finds that 10 large desert tortoises died because of its activities in any calendar year. We recognize that the Army will not detect every desert tortoise that dies because of its activities. For that reason,

based on the best available information and our professional judgment, finding 10 desert tortoises that die in any calendar year because of the Army's activities represents a conservative, reasonable, and prudent means of ensuring that the proposed action does not appreciably reduce the number of desert tortoises in the Western Mojave Recovery Unit.

We have not established a re-initiation threshold with regard to translocation at this time. The Service will consider such a threshold after completion of the translocation plan and refinement of the metrics for determining whether translocation is meeting the goals established by the Army, Service, and U.S. Geological Survey. The agencies will base the goals in the translocation plan on the metrics contained in the Service's (2019c) translocation protocol.

Distribution

Although desert tortoises remain at low densities in portions of Fort Irwin within its original boundaries, these animals are generally isolated from the off-installation population, particularly by the exclusion fence along the southern boundary of the base. After the translocation of desert tortoises from the Western Training Area, conditions there will be similar to those throughout the rest of the installation. Consequently, the translocation of desert tortoises from the Western Training Area will reduce the distribution of the desert tortoise in the Western Mojave Recovery Unit.

The translocation of desert tortoises from Western Training Area would essentially reduce the distribution of the desert tortoise in the Western Mojave Recovery Unit by approximately 62,045 acres. We arrived at that conclusion because the Western Training Area covers approximately 70,045 acres (Service 2012). The Army established the 4,300-acre East Paradise Conservation Area and a 3,700-acre "no-dig" area for the Lane Mountain milk-vetch within the Western Training Area. (*I.e.*, 70,045 – (4,300 + 3,700) = 62,045.) The Army has placed exclusion fencing on the northern boundary of the East Paradise Conservation Area so that desert tortoises cannot enter training areas to the north but are able to move onto public lands to the south. The northern boundary of the no-dig area has only barbed wire fencing to exclude vehicles. We expect that few desert tortoises reside in this area because of the terrain. The Army will not translocate desert tortoises from this area; as discussed previously in the biological opinion, the Army will not use this area for training that involves vehicular maneuvers. Consequently, we expect that desert tortoises will continue to reside in this area at low densities. (We expect that the Army would remove desert tortoises from the Desert Cymopterus Conservation Area; this small area is separated from the rest of the Western Training Area only by a barbed wire fence.) See Figure 5 for a map of the fenced areas at Fort Irwin.

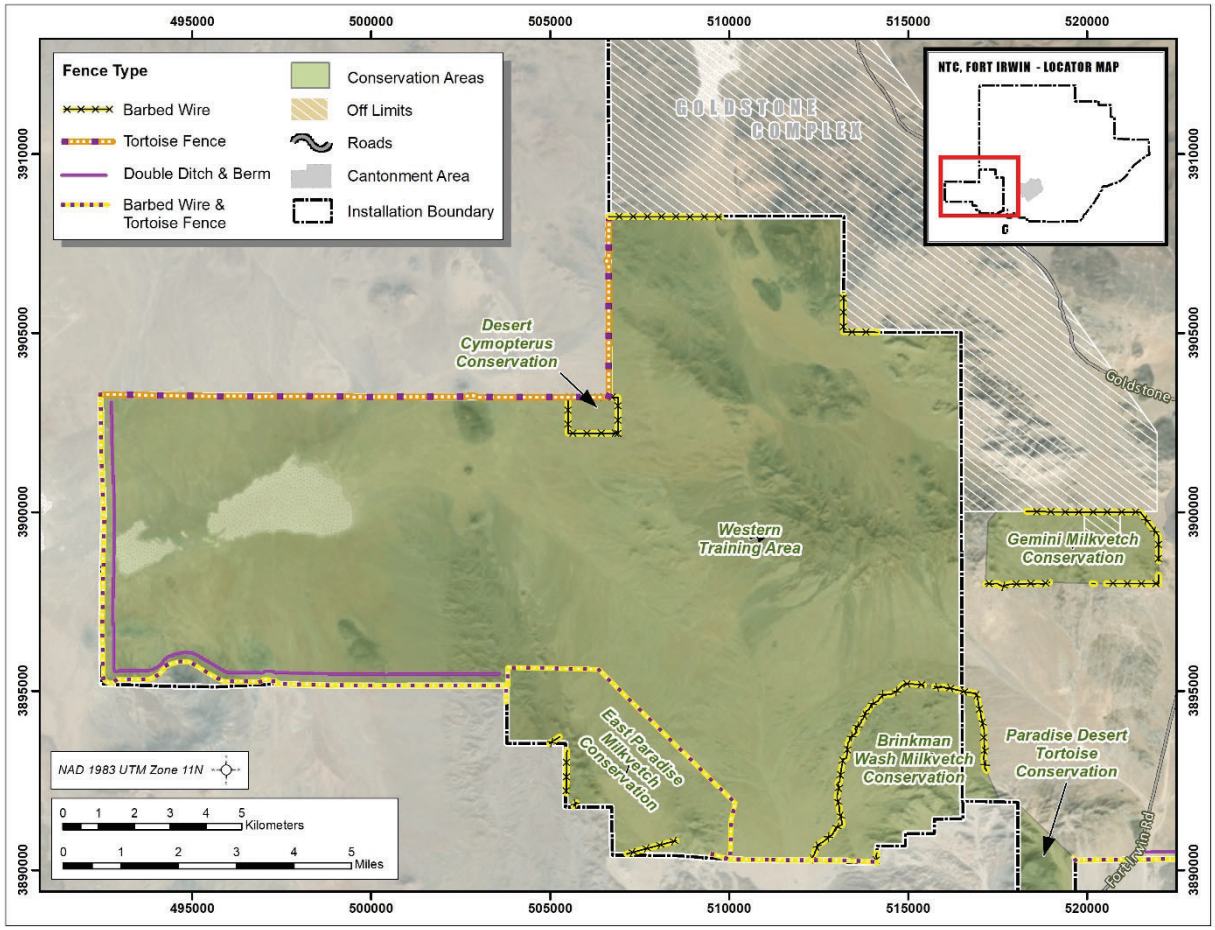


Figure 5. Fencing of the Western Training Area and nearby conservation areas at Fort Irwin.

To assess this effect on desert tortoises, we compared this change in distribution to the acreage of modeled habitat in the Western Mojave Recovery Unit. As we discussed previously in this biological opinion, modeled habitat of the desert tortoise covers approximately 5,595,469 acres in the western Mojave region (*i.e.*, 7,585,312 acres of modeled habitat minus 1,989,843 acres of impervious surfaces). Consequently, the proposed action would reduce the distribution of the desert tortoise in the western Mojave region by approximately 1.11 percent (*i.e.*, 62,045 / 5,717,878 x 100 = 1.109). For the entire range of the listed taxon, the proposed action would reduce the distribution of the desert tortoise by approximately 0.37 percent (*i.e.*, 62,045 / 16,745,848 x 100 = 0.351). In conclusion, the proposed action will not appreciably reduce the distribution of the desert tortoise in the Western Mojave Recovery Unit or range-wide.

Recovery

The translocation and other movement of desert tortoises from Fort Irwin to conservation areas would implement a task in the recovery plan (Service 2011). Specifically, the recovery plan calls for the augmentation of depleted populations through a strategic program. The U.S. Geological Survey is currently identifying depleted areas in the Western Mojave Recovery Unit that would

meet the recovery plan's objectives. The best available information indicates that translocation does not injure desert tortoises, if experienced personnel following appropriate protocols conducted the work. The Service and Army will ensure that translocation occurs in this manner.

As noted previously, the exclusion of desert tortoises from the Western Training Area would reduce the area that the species is able to occupy. Habitat loss remains a threat to the species. The Western Training Area does not harbor any habitat attributes that would render it unique with regard to the recovery of the desert tortoise.

In summary, the translocation of desert tortoises into areas where these animals would likely increase breeding and population growth would promote recovery to some extent. To some extent, the loss of habitat within the Western Training Area would impede recovery. Overall, we conclude that the use of additional maneuver training lands within the Western Training Area and operations and activities at Fort Irwin is not likely to appreciably alter the recovery status of the desert tortoise.

Effects of Off-installation Recovery Efforts on the Desert Tortoise

The recovery plan (Service 2011) describes threats that have "multiple and synergistic effects" on desert tortoises and notes that "few data [are] available to evaluate or quantify the effects of these threats on desert tortoise populations." The recovery plan also states that the "desert tortoise requires 13 to 20 years to reach sexual maturity, has low reproductive rates during a long period of reproductive potential, and individuals experience relatively high mortality early in life. These factors make recovery of the species difficult."

For these reasons, the Army is contributing to an aggressive, multi-pronged approach to conserving desert tortoises through off-base recovery efforts. The Army and Service would implement the recovery efforts through partnerships with the Bureau, the California Department of Transportation, California Department of Fish and Wildlife, and conservation groups. Because desert tortoises endure multiple and synergistic effects of various threats, conservation must occur in a manner that addresses this issue.

Additionally, because desert tortoises occur over large areas, the Service and Army will direct many of their conservation efforts to the focal areas we discussed previously in this biological opinion. The Service selected these focal areas, based on the best available information and after discussion with partners, with regard to occupation by desert tortoises, habitat quality, and land ownership. Specifically, we chose these areas because:

1. They supported high concentrations of observations of desert tortoises (as assessed during range-wide monitoring);

2. They contain habitat with a high potential to support desert tortoises (to provide for habitat that would likely be productive for desert tortoises); and

3. Land ownership was favorable (to allow for access to implement recovery actions).

As we discussed previously in this biological opinion, the Army would fund numerous conservation activities within these focal areas. The Army will also address targeted, high-priority recovery needs outside of the focal areas. The Army's contributions to the Recovery and Sustainment Partnership Initiative recovery program outside of the focal areas would target installation of highway exclusion fencing and population augmentation. We will discuss the conservation activities in focal areas and non-focal areas in the following section and identify the recovery actions from the recovery plan (Service 2011) that they would implement.

In the recovery plan, the Service (2011) defined priorities to each recovery action. A priority 1 action is one that would be necessary "to prevent extinction or to prevent the species from declining irreversibly in the foreseeable future." The Service did not assign this priority to any of the recovery actions discussed in the recovery plan. A priority 2 action is one "that must be taken to prevent a significant decline in species population numbers or habitat quality or some other significant negative impact short of extinction." The Service considers "[a]ll other actions necessary to provide for full recovery of the species" to be priority 3.

Permanent Habitat Conservation

This recovery activity would implement recovery action 2.9, which is to "secure lands/habitat for conservation" through acquisition of real property and easements. The Service (2011) ranked this action as priority 2 in the Western Mojave Recovery Unit because of the greater amount of private land in this region.

The acquisition of lands and their subsequent management for conservation would be protective of desert tortoises because it would preclude future development on those sites; the direct and indirect effects of development within conservation areas for the desert tortoise would hinder overall recovery efforts. The conservation land manager would also be able to close and restore unauthorized vehicle routes on the property; the Bureau may also be able to remove open routes on public lands that provided access to the former private lands. Finally, the Service and other partners could implement additional conservation activities on such lands, if needed.

Habitat Restoration

This recovery activity would implement recovery action 2.6, which is "restore desert tortoise habitat." The Service (2011) ranked this action as priority 2 in all recovery units. Habitat restoration would include, but not be limited to, control of non-native plants and restoration of disturbed areas.

Currently, the control of non-native plants would focus on management or removal of infestations of species that are not widely distributed in the desert. The goal of this work is to keep them from becoming more widely established. The Service and partners may also experiment with management of non-native species that are already wide-ranging, such as Mediterranean grass (*Schismus* spp.); however, the technology does not currently exist to undertake this effort on a large scale.

The restoration of disturbed areas would increase the area where desert tortoises could find shelter under shrubs and forage on native annual plants. Because desert tortoise habitat covers such a large area, the restoration of disturbed areas would not appreciably increase the area where desert tortoises could find shelter and food. Restoration activities would focus in large part on unauthorized routes (*i.e.*, routes that are not part of the land managers' designated route network). This restoration would reduce human use of these areas and thereby reduce the adverse effects of this use, such as killing of desert tortoises and attraction of common ravens to areas because of human use.

Assisting the Bureau with developing seed sources would enable use of the necessary native plant materials for future restoration efforts. Desert tortoises depend on a wide variety of native plants for nutrition. Use of those native forage plants in restoration is likely to increase productivity of these work areas. Consequently, increasing the Bureau's capacity for providing seed sources would promote the restoration goals in the recovery plan.

Fencing to Exclude Desert Tortoises from Roads

This recovery activity would partially implement recovery action 2.5, which is "restrict, designate, close, and fence roads." The Service (2011) ranked this action as priority 2 in all recovery units.

The Service and Army do not have the legal authority to restrict, designate, and close roads on lands managed or owned by other agencies or parties. The Army manages approximately 100,000 acres of lands for the conservation of desert tortoises in the Western Mojave Recovery Unit; it has been working cooperatively with the Bureau in management of the overall route network on these lands.

The Service and Army can work with other agencies to install fencing along roads. Specifically, the recovery plan (Service 2011) states that "[(desert]) [(t])ortoise-barrier fencing should be installed …and maintained along highways in desert tortoise habitat. In particular, all highways and paved roads within or adjacent to [(desert]) tortoise conservation areas should be fenced with appropriate modification to avoid population fragmentation. Fencing projects need to be completely implemented and maintained to ensure effectiveness." This action is of moderate priority in all recovery units.

Nafus *et al*. (2013) found greater proportions of juvenile desert tortoises along a road with 320 to 1,100 vehicles per day than along roads with lower traffic volumes. They concluded that "roads may decrease [(desert]) tortoise populations via several possible mechanisms, including cumulative mortality from vehicle collisions and reduced population growth rates from the loss of larger reproductive animals."

Reducing the number of desert tortoises that die from human activities overall is a key component of recovering the species. Excluding desert tortoises from roads is an important component of that objective particularly since we expect that most road-killed desert tortoises are adults. Adult desert tortoises wander more and are thus more likely to encounter roads. These

individuals are also reproductive; consequently, their protection is a key component of recovery of the species.

Fencing roads has the potential to reduce connectivity and isolate populations. However, exclusion fencing can lead desert tortoises to washes that pass under roads through culverts and bridges. These crossings ensure that populations are not completely isolated. Also, roads alone, absent fencing, can alter gene flow; gene flow is one measure of evaluating whether an activity is fragmenting and isolating populations. Latch *et al*. (2011) evaluated 859 desert tortoises at 16 microsatellite loci in relation to geographic location, sex, elevation, slope, soil type, and spatial relationship to potential anthropogenic barriers south of Fort Irwin. They found two genetically differentiated sub-populations within the area bounded roughly by Interstate 15 to the south and Fort Irwin to the north. The researchers determined that slope, a paved road, and one unpaved route influenced gene flow.

Fort Irwin Road and the Manix Trail influenced gene flow. Fort Irwin Road is paved and is used by large numbers of vehicles, traveling at high speeds. The road was built long ago but heavy use recommenced when Fort Irwin resumed training in the 1970s. In 2002 or 2003, the County of San Bernardino and U.S. Army installed fencing to keep desert tortoises off the road because of the high incidence of mortalities. Manix Trail lies to the east of Fort Irwin Road. It is far wider than most unpaved routes in the desert. The Army maintains it and uses it to move troop rotations to and from the base. The public also uses the trail.

Latch *et al*. (2011) detected that "[d]esert tortoise pairs from the same side of a road exhibited significantly less genetic differentiation than [desert] tortoise pairs from opposite sides" of both Manix Trail and Fort Irwin Road. They note that, given the long generation time for desert tortoises, these slight genetic differences happened relatively recently, perhaps within "dozens" of years ago.

The authors also note "gene flow sufficient to maintain a low level of differentiation among subpopulations could be much less than one migrant per year or even one migrant every few decades in this species." Consequently, culverts and washes under fenced roads should be able to maintain sufficient connectivity.

Closing/Restoration of Unauthorized Roads or Routes

This recovery activity would partially implement recovery actions 2.5 and 2.6, which call for restricting, designating, closing, and fencing roads and restoring habitat, respectively. The Service (2011) ranked these actions as priority 2 in all recovery units.

We discussed the legal aspects of closing roads and routes in the previous section. The Army cooperates with the Bureau with regard to management of the route network on its lands; this recovery action would extend this management more intensively across lands managed by the Bureau and conservation partners. That is, the Army would provide funding to agencies and organizations to restore unauthorized roads and routes, which would allow for the restoration of habitat and decrease mortality of desert tortoises, as we discussed in the "Habitat Restoration" section of this analysis.

Augmentation of Populations of Desert Tortoises

This recovery activity would implement recovery action 3, which is to "augment depleted populations through a strategic program. The Service (2011) ranked the actions associated with augmentation as priority 2 in all recovery units.

As the recovery plan notes (Service 2011), the number of desert tortoises has declined substantially; because of the desert tortoise's reproductive ecology, their recovery will not be rapid. Augmentation, backed by a strategic program of research designed to investigate its effectiveness and that of other recovery actions, will enable the Service to determine the most effective means of managing desert tortoises and possibly providing an initial boost to increasing density so that individuals are not as reproductively isolated.

The Army and Service would use desert tortoises from within the boundaries of Fort Irwin, primarily from the Western Training Area, for this program. The Army may also use desert tortoises from other areas of the installation for other experimental augmentation sites. Because of the translocation of desert tortoises from the Southern Training Area and decades of previous training, the remainder of Fort Irwin will likely not supply numerous desert tortoises to use to augment off-installation populations.

Funding of Visitor-contact Patrols

These recovery activities would implement recovery action 2.3, which is "establish/continue environmental education programs." This recovery action is priority 2 (Service 2011).

The recovery plan notes that people continue to collect desert tortoises illegally, although we cannot quantify this effect. Unauthorized use of the desert (*e.g.*, dumping trash, unauthorized sheep grazing, use of closed roads, driving cross-country, *etc.*) also causes the loss of desert tortoises. Visitor-contact patrols would educate some users of the desert with regard to the sensitivity of habitat and species; ranger patrols may assist in reducing intentionally illegal activity. These activities would decrease the number of desert tortoises that die or are removed from the desert because of human activity and would assist in slowing the current decline in density.

Range-wide Monitoring

This recovery activity would implement recovery action 4.1, which is "monitor desert tortoise population growth." The Service (2011) ranked this task as priority 3. Range-wide monitoring allows the Service and others to track trends in desert tortoise populations, which provide information regarding whether other recovery activities are achieving their intended results. The Service considers this monitoring to be a key component of a recovery strategy for the desert tortoise.

Core Criteria for the Jeopardy Determination regarding the Recovery and Sustainment Partnership Initiative

We have discussed the purpose of this section previously in this biological opinion. Consequently, we will not repeat that discussion here.

In this section, we will synthesize the analyses contained in the previous paragraphs to determine how the proposed Recovery and Sustainment Partnership Initiative is likely to affect the reproduction, number, and distribution of the desert tortoise. We will then assess the effects of this aspect of the proposed action on the recovery of the species and whether it is likely to appreciably reduce the likelihood of both the survival and recovery of the desert tortoise in the wild.

Reproduction

The off-installation recovery efforts that the Army would fund would likely result in an increase in the reproductive capacity of desert tortoises. For example, controlling non-native plants and restoring disturbed habitat with plants that desert tortoises eat would increase available forage. This increase in forage and, as a consequence, reproductive capacity, may result in observable benefits to resident desert tortoises in local areas. The overall increase in reproductive capacity would likely be too minor to measure, at least in the short term, considering the relatively small areas where restoration would occur in relation to the size of the focal areas. Again, average and above-average annual rainfall would likely accelerate restoration to some degree and provide desert tortoises with additional nutrition, which would lead to animals being in generally better condition. Numerous drought years would have the opposite effect. Although climate change is likely to alter "normal" cycles of annual rainfall, we cannot predict with any specificity how climate change is likely to alter weather patterns over the next few decades.

Numbers

The implementation of off-base recovery activities through the Recovery and Sustainment Partnership Initiative is likely to increase the number of desert tortoises; that is the goal of the program. We cannot quantify the amount of the increase because of the numerous variables involved, such as the amount of funding available annually, the nature and location of the implemented recovery activities, and weather conditions.

Implementation of the recovery activities would necessitate vehicular travel on authorized routes within desert tortoise habitat and some work that involve ground disturbance; the amount of ground disturbance involved with restoration or fencing work would be minor. However, any activity that involves vehicular travel and ground disturbance has the potential to kill or injure desert tortoises. These activities are likely to kill or injure few desert tortoises because the recovery workers would be trained to recognize and avoid desert tortoises and the on-the-ground work would involve a relatively small amount of ground disturbance, mostly in previously disturbed areas.

In summary, we expect that the recovery activities associated with the Recovery and Sustainment Partnership Initiative would increase the number of desert tortoises in the Western Mojave Recovery Unit, although these activities could kill or injure a small number of individuals.

Distribution

Recovery activities will be focused on reducing sources of mortality and improving habitat conditions within the existing distribution of the desert tortoise in the Western Mojave Recovery Unit. Therefore, this aspect of the proposed action will not alter the distribution of the desert tortoise.

Recovery

The goal of the Recovery and Sustainment Partnership Initiative is to further the recovery of the desert tortoise. We cannot quantify to what degree that the recovery activities will increase the density of desert tortoises or improve habitat conditions because of the numerous variables involved. However, we expect this aspect of the proposed action to improve the overall condition of the desert tortoise.

Effects of Army Activities on Critical Habitat of the Desert Tortoise

Effects of the Army's Use of the Western Training Area and Operations and Activities on Critical Habitat of the Desert Tortoise

Critical habitat of the desert tortoise occurs in two main areas of Fort Irwin. Approximately 23,214 acres of critical habitat occur along the original southern boundary of Fort Irwin. The Service and Army have previously consulted on the effects of training on these lands (Service 2012). Approximately 19,643 acres now comprise the Southern Training Area; the Army manages approximately 3,571 acres along the southern boundary of Fort Irwin as conservation lands for the desert tortoise. Lands managed by the Bureau lie to the south of these conservation lands. Because previous consultations fully addressed the effects on critical habitat of Army use of these lands, we will not repeat that discussion here. (*I.e.*, Service [2012] addressed future training in the Southern Training Area and Service [2014a] addressed future infrastructure and other activities in the Southern Training Area.)

The second area of critical habitat occurs in the Western Training Area. The Western Training Area includes approximately 70,045 acres of critical habitat of the desert tortoise (Service 2012). Because of the East Paradise Conservation Area, the no-dig area, and Desert Cymopterus Conservation Area, approximately 61,697 acres of the Western Training Area would be available for training and support facilities (Housman 2020c).

The Army would not conduct training with vehicles in the East Paradise Conservation Area and the no-dig area. It may locate communications sites and other necessary tracking or monitoring equipment, including environmental monitoring equipment, and the roads to these facilities in these areas. The Army may also conduct orienteering and other training that does not involved ground disturbance in the no-dig area. The Army established the Desert Cymopterus

Conservation Area to protect an occurrence of the sensitive plant species, *Cymopterus deserticola*. The Army prohibits all uses in the 347.8-acre area, except for monitoring of desert cymopterus (Housman 2020c). Although the Army would not disturb the physical and biological features related to substrates and plants in this area, its isolation from larger areas of critical habitat decreases its value for the conservation of the desert tortoise. Consequently, the proposed action would diminish the value of approximately 62,045 acres of critical habitat in the Western Training Area.

Because the Army will use most of the Western Training Area differently than it will use the East Paradise Conservation Area and the no-dig area, we will note how the proposed action would affect the physical and biological features of critical habitat in each sub-area. We will then summarize the overall effects of the proposed action on critical habitat as a whole.

The Manix Trail crosses critical habitat of the desert tortoise. The Army would use this route when rotations enter and leave Fort Irwin; to allow for that use, the Army would maintain the trail. The Army will restrict its maintenance and operational use of the Manix Trail to previously disturbed areas. Because the Army would restrict its activities to the previously disturbed area of the Manix Trail and the physical and biological features of critical habitat are no longer present there, the proposed actions are not likely to adversely affect critical habitat of the desert tortoise in this area.

Western Training Area

Sufficient Space to Support Viable Populations within Each of the Recovery Units and to Provide for Movement, Dispersal, and Gene Flow

Within this training area, the proposed action would essentially eliminate space to support viable populations. It would also prevent the movement, dispersal, and gene flow of desert tortoises within this portion of the critical habitat unit. Within the context of the entire critical habitat unit, critical habitat to the north of the training area would allow for movement, dispersal, and gene flow to the west and then throughout the remainder of the critical habitat unit.

Sufficient Quality and Quantity of Forage Species and the Proper Soil Conditions to Provide for the Growth of these Species; Suitable Substrates for Burrowing, Nesting, and Overwintering; Burrows, Caliche Caves, and other Shelter Sites; and Sufficient Vegetation for Shelter from Temperature Extremes and Predators

We have grouped the second through fifth physical and biological features because they are closely interrelated ecologically and the proposed action would affect them in the same general manner.

Training with vehicles and development of infrastructure would immediately affect these physical and biological features. The physical disturbances associated with these activities would cause the loss of forage plants, disturbance of substrates, crushing of burrows and other shelter sites, and crushing and eventual removal of shrubs that provide cover.

Disturbance of substrates has the potential to allow invasive non-native plant species to spread. An additional concern is that vehicles traveling to Fort Irwin from other areas may introduce novel species.

Training within the original boundaries of Fort Irwin has not caused large infestations of weeds. (Housman 2020d). Based on this observation, we expect that the Army's activities in the Western Training Area are unlikely to cause a substantial increase in the abundance of weeds.

Additionally, the Army washes all rotational vehicles brought on to Fort Irwin for training (Housman 2020d). This precaution greatly reduces the likelihood that rotational vehicles will introduce seeds from outside of the region.

The integrated natural resources management plan (Army 2006-2011) calls for the Army to participate in regional weed management efforts and to control weeds within the conservation areas for the Lane Mountain milk-vetch. The integrated natural resources management plan notes that the Army's control efforts are contingent on funding.

As in other areas of Fort Irwin, these physical and biological features would persist in areas where training does not occur or occurs infrequently. We expect such areas to remain in isolated sites, such as in areas adjacent to the boundaries of the base and in steep, rugged terrain. We do not expect the Army's activities to have a measurable effect on these physical and biological features outside of the Western Training Area (*i.e.*, in the adjacent conservation areas).

Habitat Protected from Disturbance and Human-caused Mortality

The proposed action would disturb habitat and introduce various sources of human-caused mortality throughout most of this training area. As we have discussed previously in this section, the Army may not use areas along the boundary of Fort Irwin and rugged areas that are not as suitable for training. These isolated areas would likely continue to support this physical and biological feature.

East Paradise Conservation Area

Sufficient Space to Support Viable Populations within Each of the Recovery Units and to Provide for Movement, Dispersal, and Gene Flow

Within the East Paradise Conservation Area, the Army may locate communications sites and other tracking equipment; the Army would develop roads to reach these sites. In general, communication and tracking sites are small in area (*e.g.*, hundreds of square feet). Consequently, they would have a discountable effect on the amount of space needed to support a viable population of desert tortoises within the Superior-Cronese Critical Habitat Unit and would not impede movement, dispersal, or gene flow.

Roads to the communication and tracking sites would likely occupy a few acres along several miles of the routes. Development of the roads would involve the loss of a negligible amount of critical habitat; therefore, it would have a discountable effect on the amount of space needed to

support a viable population of desert tortoises within the Superior-Cronese Critical Habitat Unit. Use of the roads would be relatively infrequent and would therefore not impede movement, dispersal, or gene flow.

Sufficient Quality and Quantity of Forage Species and the Proper Soil Conditions to Provide for the Growth of these Species; Suitable Substrates for Burrowing, Nesting, and Overwintering; Burrows, Caliche Caves, and other Shelter Sites; and Sufficient Vegetation for Shelter from Temperature Extremes and Predators

Within the East Paradise Conservation Area, the development of communication and tracking sites and the roads to these sites would remove these physical and biological features from small sites. That is, the disturbance would likely amount to hundreds of square feet for the sites themselves and several acres for the roads. The vast majority of the critical habitat within the East Paradise Conservation Area would continue to support these physical and biological features, which would retain their value for the conservation of the desert tortoise.

The roads to the sites could serve as corridors for the movement of non-native, invasive species. Such species can displace the native annual species included in the second physical and biological feature. Because the Army would use these roads infrequently, we expect that this risk will be less than it is for roads that numerous parties use frequently. To date, the Army has not observed weed infestations in these areas (Housman 2020d).

Habitat Protected from Disturbance and Human-caused Mortality

The location of communications sites, other tracking equipment, and the roads to these sites within the East Paradise Conservation Area would introduce some disturbance and human-caused mortality. Because the tracking sites are small and use of the roads would be infrequent, these activities would have a negligible effect on the value of critical habitat for the conservation of the desert tortoise.

No-dig Area

Sufficient Space to Support Viable Populations within Each of the Recovery Units and to Provide for Movement, Dispersal, and Gene Flow

The Army may locate communications sites and other tracking equipment and develop roads to reach these sites within the no-dig area. The effects of these activities would be the same as for the East Paradise Conservation Area.

The Army would conduct orienteering and other training that does not involve ground disturbance in this area. Such training would not affect this physical and biological feature because it would not involve ground disturbance, other than foot traffic; that is, it would not result in the loss of any critical habitat.

Sufficient Quality and Quantity of Forage Species and the Proper Soil Conditions to Provide for the Growth of these Species; Suitable Substrates for Burrowing, Nesting, and Overwintering; Burrows, Caliche Caves, and other Shelter Sites; and Sufficient Vegetation for Shelter from Temperature Extremes and Predators

The effects of the location of communications sites and other tracking equipment within the no-dig and the development and use of roads to reach these sites would be the same as for the East Paradise Conservation Area.

The orienteering and other training would not involve ground disturbance. Such training would have negligible effects on these physical and biological features because it would involve only foot traffic. Given the rugged nature of the terrain in this area, we expect that at least some portions of the no-dig area would not experience any disturbance.

Habitat Protected from Disturbance and Human-caused Mortality

The effects of the location of communications sites and other tracking equipment within the no-dig and the development and use of roads to reach these sites would be the same as for the East Paradise Conservation Area.

The orienteering and other training would not involve ground disturbance; it would involve a limited amount of disturbance and a low potential of human-caused mortality. (For example, a soldier could step on a small desert tortoise or on a burrow that could collapse and entrap the desert tortoise.) Such training would have a minor effect on this physical and biological feature because it would involve only foot traffic. Given the rugged nature of the terrain in this area, we expect that at least some portions of the no-dig area would not experience any disturbance.

Effects of Off-installation Recovery Efforts on Critical Habitat of the Desert Tortoise

We discussed how the off-installation recovery efforts would promote the conservation of desert tortoises in the Effects of Off-installation Recovery Efforts on the Desert Tortoise section of this biological opinion. Many of these efforts would also assist with the management of critical habitat. We will summarize those effects in the following section; because the beneficial effects to critical habitat overlap to a large degree with those to the desert tortoise, we have not included extensive detail in this section.

Sufficient Space to Support Viable Populations within Each of the Six Recovery Units and to Provide for Movement, Dispersal, and Gene Flow

Permanent habitat conservation would implement recovery action 2.9, which is to "secure lands/habitat for conservation" through acquisition of real property and easements. The acquisition of lands within critical habitat and their subsequent management for conservation would be protective of this physical and biological feature because it would preclude future development on those sites, which would maintain space to support a viable population within the Superior-Cronese Critical Habitat Unit and to provide for movement, dispersal, and gene flow.

Sufficient Quality and Quantity of Forage Species and the Proper Soil Conditions to Provide for the Growth of these Species; Suitable Substrates for Burrowing, Nesting, and Overwintering; Burrows, Caliche Caves, and other Shelter Sites; and Sufficient Vegetation for Shelter from Temperature Extremes and Predators

We have grouped the second through fifth physical and biological features because they are closely interrelated ecologically and conservation activities would affect them in the same general manner.

Habitat restoration would implement recovery action 2.6, which is "restore desert tortoise habitat." The restoration of disturbed areas within critical habitat would increase the functionality of at least three of the four physical and biological features; it may not improve substrates that have been heavily compacted. Because desert tortoise habitat covers such a large area, the restoration of disturbed areas would not appreciably increase the area in which the physical and biological features are restored. Restoration activities would focus in larger part on unauthorized routes (*i.e.*, routes that are not part of the land managers' designated route network). However, restoration would reduce human use of these areas and thereby reduce the likelihood that such use increases.

Assisting the Bureau with developing seed sources would enable use of the necessary native plant materials for future restoration efforts. Increasing the prevalence of native forage plants in restoration is likely to increase productivity of these work areas. Consequently, increasing the Bureau's capacity for providing seed sources would promote the functionality of the second physical and biological feature, which is, in part, the sufficient quality and quantity of forage species.

Fencing to exclude desert tortoises from roads would partially implement recovery action 2.5, which is "restrict, designate, close, and fence roads." This recovery action would prevent desert tortoises from entering roads; in cases where roads do not have controlled access, these fences would also prevent vehicles from entering desert tortoise habitat. Specifically, it would be most effective along roads where either the California Department of Transportation or counties have not already controlled access. (Drivers cannot leave the road at any point on roads with controlled access, such as interstate highways because such roads already have barbed wire fencing.) Reducing the availability of unauthorized routes through fencing would allow for the active or passive restoration of critical habitat, which would increase the value of these physical and biological features for the conservation of the desert tortoise.

The closing/restoration of unauthorized roads or routes would partially implement recovery actions 2.5 and 2.6, which call for restricting, designating, closing, and fencing roads and restoring habitat, respectively. These recovery actions within critical habitat would also increase the value of these physical and biological features for the conservation of desert tortoises, as discussed in the previous sections.

Funding of visitor-contact patrols would implement recovery action 2.3, which is "establish/continue environmental education programs." This recovery action would assist in

reducing unauthorized use of the desert (*e.g.*, dumping trash, unauthorized sheep grazing, use of closed roads, driving cross-country, *etc.*) within critical habitat and thereby increase the value of these physical and biological features for the conservation of desert tortoises.

Habitat Protected from Disturbance and Human-caused Mortality

Several of the recovery actions would serve to reduce disturbance and human-caused mortality. For example, land management agencies and non-governmental organizations can manage habitat more effectively for conservation and reduce disturbance resulting from recreation and development when it is permanently conserved (recovery action 2.9). Restored habitat (recovery action 2.6) discourages unauthorized recreation. Fencing and closing/restoration of unauthorized roads or routes (recovery actions 2.5 and 2.6) prevent disturbance associated with unauthorized use by off-highway vehicles. These recovery actions within critical habitat would increase the functionality of this physical and biological feature for the conservation of desert tortoises.

Summary

The proposed action would result in the long-term loss of the physical and biological features of critical habitat from approximately 62,045 acres of the Superior-Cronese Critical Habitat Unit. (*I.e.*, the area of the entire Western Training Area minus the areas of the East Paradise Conservation Area and the no-dig area; 70,045 – [4,300 + 3,700] = 62,045.) The Army is unlikely to use small areas of the most rugged terrain where the physical and biological features of critical habitat would persist. This reduction represents approximately 8.3 percent of the Superior-Cronese Critical Habitat Unit, in which the Western Training Area is located. (*I.e.*, 62,045 / 747,257 x 100 = 8.30. We revised the acreage of the Superior-Cronese Critical Habitat Unit to reflect the loss of the Southern Training Area; *i.e.*, 766,900 – 19,643 = 747,257.) As a whole, the proposed action would remove the physical and biological features of critical habitat from approximately 0.97 percent of critical habitat of the desert tortoise. (*I.e.*, 62.045 / 6,426,557 x 100 = 0.965. We also revised the acreage of all critical habitat to reflect the loss of the Southern Training Area.)

Effects of the Action on the Lane Mountain Milk-vetch

As indicated previously, we will analyze the Army's activities within the boundaries of Fort Irwin (i.e., use of the Western Training Area and ongoing activities and operations) separately from the recovery activities that would occur later in time under the Recovery and Sustainment Partnership Initiative.

Effects of the Army's Use of the Western Training Area and Operations and Activities on the Lane Mountain milk-vetch

The Service (2004) has previously analyzed the effects of the Army's proposed addition of maneuver training lands. Since the issuance of the biological opinion in 2004, the Army has implemented the conservation measures described in the Service's biological opinion and the Army's biological assessment (Charis Professional Services Corporation 2003; Army 2004). We have based the following analysis on that in our 2004 biological opinion; we have included

minor updates based on the best available information. Because the Army has already implemented the conservation measures that it proposed in 2004, we included information on those actions in the Environmental Baseline - Status of the Lane Mountain Milk-vetch in the Action Area section of this biological opinion.

Effects of the Preparation of the Western Training Area

The only preparation that is likely to affect the Lane Mountain milk-vetch is the development of monitoring and communication sites and roads to these sites in the East Paradise Conservation Area and 'no-dig' areas. The Army may disturb a small but unquantified amount of habitat by the clearing of the sites and the construction of the roads. These activities are unlikely to disturb the Lane Mountain milk-vetch to a measurable degree because the roads and facilities would occupy a small portion of the protected areas and the Army has some flexibility to locate the roads and sites to avoid the Lane Mountain milk-vetch.

Construction of the communications sites and roads and subsequent use of the roads would generate dust. Given the small size of the area that the Army would disturb and the generally low use of the roads, we expect that the small amount of dust generated in this manner is likely to have negligible effect on the Lane Mountain milk-vetch. We will discuss the potential effects of dust later in this section.

Effects of the Use of the Western Training Area

Training and Development of Infrastructure

Vehicles associated with training and supporting activities would crush or uproot Lane Mountain milk-vetch plants and their host shrubs. Construction, digging and other earth-moving activities, temporary bivouacs, helicopter landings, and movement of numerous soldiers on foot would also destroy plants and degrade habitat.

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

The Army divided the intensity of impacts to the Lane Mountain milk-vetch within its training areas into three classes (Charis Professional Services Corporation 2003). High-intensity use areas have few, if any, topographic constraints to the movement of vehicles. Training there would be frequent and intense; the Army would use these areas as battle corridors to support exercises

such as force-on-force training. The Army estimates that training would cause the loss of up to 100 percent of the habitat and individuals of the Lane Mountain milk-vetch in such areas.

Moderate-intensity use would occur where the terrain is rocky and uneven. In general, such areas are located at the end of the battle corridors. The Army estimates that this level of training would, over time, render up to 60 percent of the habitat unsuitable for the Lane Mountain milk-vetch by training activities. Outside of restricted areas, such as Superior Dry Lake and the conservation areas, units can generally conduct exercises in any area that meets their training needs. For that reason, we considered these areas as lost to the long-term conservation of the Lane Mountain milk-vetch.

The Army also predicted that low-intensity use would occur on non-maneuverable steep slopes and along the borders of Fort Irwin that it does not expect to receive heavy use. The Lane Mountain milk-vetch and its habitat would likely sustain up to a 20 percent loss of over time.

The Montana Mine-Brinkman Wash occurrence of the Lane Mountain milk-vetch covers approximately 5,499 acres. (See Figure 3 for geographic references.) Approximately 3,627 acres of this occurrence would be subject to high- and moderate-intensity use. We expect that this use would disturb approximately 65.96 percent of the occurrence to the point that the Lane Mountain milk-vetch is unlikely to persist in the training area. The Army has designated approximately 1,872 acres of this occurrence as a “no-dig” area; the biological assessment (Charis Professional Services Corporation 2003) characterized the training in this area as low intensity. Because of the Army’s revised proposal for management of this area, we expect that less disturbance would occur than the Army predicted in the biological assessment and that the no-dig area will function for the long-term conservation of the species.

The Paradise Valley occurrence within Fort Irwin covers approximately 4,596 acres. (Approximately 200 acres of the 4,796-acre occurrence lie outside of Fort Irwin on lands managed by the Bureau.) The Army would conduct high- and moderate-intensity training on approximately 971 acres of this occurrence; this comprises 20.25 percent of the occurrence. The remainder of the occurrence on Army lands (approximately 3,634 acres) is located within the East Paradise Conservation Area.

Dust

Dust generated by training with large numbers of vehicles may affect the Lane Mountain milk-vetch. Our previous biological opinion regarding the Lane Mountain milk-vetch in the Western Training Area (Service 2004) discussed some potential effects of dust; we will not repeat that discussion here.

Wijayratne *et al*. (2009) conducted field and greenhouse studies of the effect of intentionally applied dust on the Lane Mountain milk-vetch. In the field experiments, they found that dust deposition on Lane Mountain milk-vetch reduced shoot growth compared to undusted plants. They also recorded an increase in average net photosynthesis as the dust on leaves increased in concentration; leaf temperatures also increased as dust increased. The effects on the Lane Mountain milk-vetch varied with the seasons. Dust induced increases in leaf temperatures and

photosynthetic rates during early spring and extended the activity period that plants could maintain positive net photosynthetic rates. However, as temperatures increased later in the year, "leaf temperatures of dusted plants likely lowered net photosynthetic rates, thus reducing shoot growth."

Wijayratne *et al*. (2009) also measured the cumulative accumulation of dust in traps. They concluded that "With this low level of ambient cumulative deposition, we expect that (Lane Mountain milk-vetch) plants in (the Coolgardie Mesa) occurrence were not greatly affected by the dust they received from unimproved vehicle routes by the end of the study. In addition, all of our study plants recovered from experimental dusting after heavy winter rains and put out new growth for the 2005 season."

The potential exists that a heavy accumulation of dust could reduce photosynthesis to the extent that it affects growth and reproduction. Wijayratne *et al*. (2009) did not measure flower and fruit production in their study. However, we anticipate that, based the results from Wijayratne *et al*. (2009), dust would not accumulate to such a degree that it would hinder growth to the extent that it would hinder flower and fruit production.

Dust could affect the Lane Mountain milk-vetch indirectly by decreasing pollinator visits. Dust can abrade the integument of arthropods and cause them to lose water more quickly; this effect may reduce their fitness and have long-term negative effects on their populations. Decreases in the populations of pollinators could diminish the amount of pollination of the Lane Mountain milk-vetch and thereby decrease reproduction. We do not know if dust has affected pollinators within the range of the Lane Mountain milk-vetch. However, we expect that the ranges of pollinators do not overlap completely with the Lane Mountain milk-vetch and likely extend beyond areas affected by dust generated by the Army; they also likely extend beyond the range of the listed species. For example, the most common pollinator of Lane Mountain milk-vetch is a solitary bee (*Anthidium dammersi*) (76 FR 29108), which is a generalist that visits many other species of flower found in this area (Gonzalez and Griswold 2013).

The greatest potential source of dust is Superior Dry Lake and the clay sediments surrounding this playa in the western portion of the Superior Valley parcel; these clay sediments will generate much more dust once the surface crusts are broken than the granitic sediments to the east. The Army has designated the lakebed area as off-limits to vehicle use; this measure will eliminate this area as a potential source of dust.

In conclusion, we cannot predict the precise effects of dust on the Lane Mountain milk-vetch because of all of the variables. The amount of training would vary; increased training would generally increase the amount of dust. Wind speed and direction will vary. The distance of plants from training areas would affect the amount of dust they receive. Rainfall will remove dust from leaves; however, the amount and timing of rain is likely to change each year. The plants will drop leaves every year, which would prevent dust from accumulating over years.

Based on the best available information and our professional judgment, dust generated by the Army in the Western Training Area is unlikely to have a measurable effect on most Lane

Mountain milk-vetch plants in the conservation areas within Fort Irwin or in the no-dig area. We expect that plants closest to training areas are likely to experience more dust than other Lane Mountain milk-vetches. Additionally, although we have not studied the specific effects of dust on the reproduction of the Lane Mountain milk-vetch, we anticipate, based on the best available information, that dust would not cause a measurable effect on the species' reproduction.

Obscurants

The Army will likely use obscurants in the Western Training Area; generators emit obscurants to hide the movements of forces during training. Depending on the specific need, the composition of the obscurants may vary. The potential exists that obscurants may contact the Lane Mountain milk-vetch in the East Paradise Conservation Area and in the no-dig area. The effect of obscurants on the Lane Mountain milk-vetch would vary, depending on its composition and the frequency and volume of contact. We do not have specific information on the composition of the obscurants at this time.

We expect that obscurants are likely to contact Lane Mountain milk-vetch plants within conservation areas at a low level. We have reached this conclusion for several reasons. First, units are unlikely to use obscurants frequently adjacent to the conservation areas; that is, off-limit boundaries limit the ability to maneuver so units tend to avoid such areas. Second, if units use obscurants farther from the conservation areas for the Lane Mountain milk-vetch, the obscurants are likely to dissipate before they reach plants. The Army generally would not use obscurants during strong winds because it would be ineffective. Last, the Lane Mountain milk-vetch sheds its leaves every year; in the event that obscurant reached leaves, it would not accumulate over a long time because the species is deciduous. For these reasons, we expect that the use of obscurants is unlikely to have a measurable effect on the Lane Mountain milk-vetch within the East Paradise and National Training Center Goldstone Conservation Areas and the no-dig area. Plants that are located in training areas are more likely to endure more frequent exposure to greater amounts of obscurants.

Core Criteria for the Jeopardy Determination

The core criteria for jeopardy determinations for plants and animals are the same. Consequently, we will not repeat that discussion here. The following analysis differs from that of the desert tortoise in that the Service has not defined any recovery units for the Lane Mountain milk-vetch.

In the following sections, we will synthesize the analyses contained in the Effects of the Action section of this biological opinion to determine how the proposed action affects the reproduction, number, and distribution of the Lane Mountain milk-vetch. We will then assess the effects of the proposed action on the recovery of the species and whether it is likely to appreciably reduce the likelihood of both the survival and recovery of the Lane Mountain milk-vetch in the wild.

Reproduction

As we stated previously, we do not know if dust accumulation affects growth of the Lane Mountain milk-vetch to the extent that it would decrease reproduction. Because Lane Mountain

milk-vetch plants are deciduous and regrow their leaves in the spring of years with sufficient rainfall, we expect that dust is unlikely to accumulate to the extent that it would measurably affect the reproductive capacity of the species. The potential exists that extremely heavy coatings of dust may slow growth to the extent that flowering is inhibited or pollinators cannot access the flowers. Plants closest to training would be at the greatest risk of this effect. However, strong winds, which are routine in the desert, would remove at least some dust from plants. Finally, most of the plants in the Army's conservation areas would be far removed from training areas and thus not exposed to high levels of dust. For these reasons, we conclude that dust is unlikely to affect reproduction of the Lane Mountain milk-vetch in a measurable manner.

Numbers

We expect that high- and moderate-intensity training is likely to remove all Lane Mountain milk-vetch within training areas. Based on the best available information, we expect plants within the East Paradise and NTC Goldstone Conservation Areas and the no-dig area would persist.

No one has conducted a complete survey of all the species' occurrences since the Army's effort from 1999 through 2001. Field workers found 5,723 plants during that survey (Service 2004). Sampling since that time (e.g., Redhorse 2021) indicates that the number of plants on survey plots has declined over time. On a relatively short-term basis, the number of live plants found each year has correlated closely with the amount of rainfall. We do not have information regarding how longer alterations in rainfall patterns, which occur regularly in the Mojave Desert (see Service 2014b) will affect the abundance of the Lane Mountain milk-vetch. Extended drought likely deceases the overall number of plants that survive from year to year.

Plants are not in the same locations as they were during the range-wide survey. That is, some of those plants are still alive, some have died, and others have germinated and grown to reproductive size. Therefore, we do not know the locations of individual plants and cannot predict the number of plants that training will affect outside the conservation areas and no-dig zone.

For those reasons, we have based our analysis on the effects of the use of the Western Training Area on the number of Lane Mountain milk-vetch plants on the change in the amount of habitat managed for the species. Training in the Western Training Area would disturb the plants on approximately 4,598 of the 21,349 acres occupied by the Lane Mountain milk-vetch range-wide. The Army is unlikely to conduct vehicular training and cause other substantial ground disturbances (e.g., digging trenches, building facilities) within the steeper, more rugged portions of the training areas. Consequently, Lane Mountain milk-vetch are likely to persist in these areas, although we cannot quantify the extent. Although this disturbance of habitat within training areas comprises a measurable impact with regard to the numbers of individuals, we expect that this impact is unlikely to cause an irreversible decline in the remainder of the Lane Mountain milk-vetch population. Most, if not all, of the remaining Lane Mountain milk-vetch plants are located within either conservation areas maintained by the Army or Bureau; the primary management goal in these areas is the maintenance of the habitat of these populations. All of the conservation areas are large enough to support viable populations. We base this assertion on the fact that the

Goldstone population, which is the smallest in area, covers approximately 1,283 acres and has likely never been substantially larger because the species is restricted to a specific type of substrate. Consequently, the remaining populations of Lane Mountain milk-vetch are likely to persist into the foreseeable future, at least with consideration of the numbers of individuals, as viewed through the amount of occupied habitat.

Distribution

As we discussed previously in this biological opinion, the Army would conduct high- and moderate-intensity training on approximately 4,598 acres of Lane Mountain milk-vetch habitat of the Paradise Valley and Montana Mine-Brinkman Wash occurrences. (*I.e.*, the Army would train on 971 acres of the former location and 3,627 acres of the latter.) As we discussed in the previous section, Lane Mountain milk-vetch plants may persist in the steeper, more rugged portions of training areas but we cannot quantify the extent.

Based on information in the Service's (2004) previous biological opinion for the expansion of Fort Irwin, the Lane Mountain milk-vetch occupies approximately 21,349 acres range-wide. The loss of 4,598 of 21,349 acres of occupied habitat comprises a measurable impact with regard to the distribution of the species. The remaining distribution of the Lane Mountain milk-vetch comprises blocks of habitat that we anticipate will persist over time because they are in conservation management. Although this disturbance of habitat within training areas comprises a measurable impact with regard to the distribution of the species, the remainder of the Lane Mountain milk-vetch habitat is sufficiently large and appropriately distributed. Lane Mountain milk-vetch would continue to be distributed across four separate areas, which reduces the likelihood that a stochastic event would substantially reduce the overall distribution of the species.

Recovery

The proposed action, with regard to the Army's activities in the Western Training Area, has not changed in a measurable way since the 2004 biological opinion. As a result of that consultation, the Army acquired some private lands within habitat of the Lane Mountain milk-vetch. The acquisition of these lands precluded their development and assisted, to some degree, in the long-term conservation of the species.

The loss of habitat and individuals of the Lane Mountain milk-vetch because of training in the Western Training Area and through ongoing operation and activities is likely to impede recovery of the species to some degree. However, the Lane Mountain milk-vetch would retain a sufficient number of individuals and have a sufficient amount of habitat to maintain a viable population at each of the four sites and to persist into the foreseeable future. For this reason, the overall effect on the recovery of the species is likely to be negligible.

Effects of Off-installation Recovery Efforts for the Desert Tortoise on the Lane Mountain Milk-vetch and its Critical Habitat

Off-installation recovery efforts for the desert tortoise may occur within habitat of the Lane Mountain milk-vetch or its critical habitat. The Service will coordinate with the manager of that recovery effort to determine whether the recovery efforts for the desert tortoise may affect the Lane Mountain milk-vetch or its critical habitat at that time.

In general, because of the anticipated nature of the recovery efforts for the desert tortoise, we expect that avoidance of adverse effects to the Lane Mountain milk-vetch and its critical habitat is likely. The potential exists that recovery efforts for the desert tortoise, such as restoration of disturbed areas, may result in some beneficial effects on the Lane Mountain milk-vetch and its critical habitat. For these reasons, we conclude that the off-installation recovery efforts for the desert tortoise may affect, but are not likely to adversely affect, the Lane Mountain milk-vetch and its critical habitat.

CUMULATIVE EFFECTS

"'Cumulative effects' are those effects of future state or private activities, not involving federal activities, that are reasonably certain to occur within the action area of the federal action subject to consultation" (50 CFR 402.02). Future Federal actions are not considered cumulative effects because they are subject to consultation, pursuant to section 7(a)(2) of the Endangered Species Act.

As we described previously in this biological opinion, the action area comprises Fort Irwin, the Manix Trail, and lands outside of Fort Irwin to which the Army may translocate desert tortoises from Fort Irwin and where it would implement recovery actions. The Army manages Fort Irwin and the Manix Trail; therefore, these are Federal lands and actions on these lands are not cumulative effects.

The Army will translocate desert tortoises to conservation areas it manages or to lands managed by the Bureau or non-governmental organizations; it will also conduct recovery actions on these lands. Future actions on federally managed lands are not cumulative effects. Activities on lands managed by non-governmental organizations promote the recovery of the desert tortoise. We are not aware of any actions on lands managed by non-governmental organizations that would adversely affect desert tortoises or the Lane Mountain milk-vetch that are reasonably certain to occur.

For these reasons, we do not anticipate any cumulative effects, as defined by the implementing regulations for section 7(a)(2) of the Endangered Species Act.

CONCLUSIONS

Desert Tortoise

Because we analyzed the effects of the Army's activities on the desert tortoise within the boundaries of Fort Irwin (i.e., use of the Western Training Area and ongoing operations and activities) separately from those of the Recovery and Sustainment Partnership Initiative, we will provide separate conclusions for those two components of the proposed action.

Conclusion regarding the Army's Use of the Western Training Area and Operations and Activities

After reviewing the current status of the desert tortoise, the environmental baseline for the action area, the effects of the Army's use of the Western Training Area and operations and activities, and the cumulative effects, we have determined that this aspect of the proposed action is not likely to jeopardize the continued existence of the desert tortoise. We have reached this conclusion for the following reasons:

1. The proposed action will not affect the reproductive capacity of desert tortoises,

2. The proposed action is not likely to appreciably reduce the number of desert tortoises within the action area and, by extension, throughout the range of the desert tortoise,

3. The proposed action will not appreciably decrease the distribution of the desert tortoise, and

4. The proposed action is not likely to appreciably affect the recovery of the desert tortoise.

Conclusion regarding Off-installation Recovery Efforts

After reviewing the current status of the desert tortoise, the environmental baseline for the action area, the effects of the proposed off-installation recovery efforts, and the cumulative effects, we have determined that this aspect of the proposed action is not likely to jeopardize the continued existence of the desert tortoise. We have reached this conclusion for the following reasons:

1. The proposed action is likely to benefit the reproductive capacity of desert tortoises,

2. The proposed action is likely to result in a small increase in the number of desert tortoises within the action area and, by extension, throughout the range of the desert tortoise,

3. The proposed action will not alter the distribution of the desert tortoise, and

4. The proposed action is likely to promote the recovery of the desert tortoise.

Critical Habitat of the Desert Tortoise

"Destruction or adverse modification means a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species" (50 CFR 402.02). We determine whether a proposed action is likely to result in the destruction or adverse modification of critical habitat through an analysis of how a proposed action affects the physical and biological features of critical habitat within the action area in relation to the entirety of designated critical habitat. For critical habitat of the desert tortoise, this process involves considering the effects at the level of the action area, then at the level of critical habitat unit, and then finally for the entirety of designated critical habitat.

Logically, if a proposed action is unlikely to diminish the conservation value of critical habitat within the action area, it will not affect the conservation value of the critical habitat unit or the remainder of critical habitat. Conversely, an action with appreciable effects on the conservation value of critical habitat in the action area may degrade the status of critical habitat to the extent that it affects the critical habitat unit or the entire designated area of critical habitat.

Conclusion regarding the Army's Use of the Western Training Area and Operations and Activities

The use of the Western Training Area and operations and activities would reduce the amount of space available to support viable populations within the action area and decrease the ability of desert tortoises to move, disperse, and have gene flow north and south across a portion of the Superior-Cronese Critical Habitat Unit. (As a reminder, we considered the effects of the use of the Southern Training Area on critical habitat in a previous biological opinion.) This aspect of the proposed action would reduce the area in which the required substrates and vegetation for desert tortoises are available within the Superior-Cronese Critical Habitat Unit and would degrade the quality of these physical and biological features where training occurs. It would also increase the level of disturbance within the Western Training Area.

As this aspect of the proposed action would decrease the size of the Superior-Cronese Critical Habitat Unit by a measurable amount (i.e., an amount that is more than negligible), the question then is whether this decrease "appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species" (50 CFR 402.02).

After reviewing the current status of the critical habitat, the environmental baseline for the action area, the effects of the proposed use of the Western Training Area and operations and activities, and the cumulative effects, it is our biological opinion that this aspect of the proposed action is not likely to result in the destruction or adverse modification of critical habitat of the desert tortoise. We have reached this conclusion for the following reasons.

1. The Western Training Area does not support any physical and biological features that are unique to the action area, the critical habitat unit, or critical habitat as a whole;

2. Physical and Biological Feature 1. Sufficient space remains within the critical habitat unit to support viable populations and desert tortoises would be able to move, disperse, and have gene flow throughout the critical habitat unit, albeit over greater distances;

3. Physical and Biological Features 2–5. The remainder of the Superior-Cronese Critical Habitat Unit also supports the required substrates and vegetation for desert tortoises; and

4. Physical and Biological Feature 6. Levels of disturbance and human-caused mortality remain at levels that allow for the conservation of the desert tortoise.

Conclusion regarding Off-installation Recovery Efforts

After reviewing the current status of critical habitat of the desert tortoise, the environmental baseline for the action area, the effects of the proposed off-installation recovery efforts, and the cumulative effects, it is our biological opinion that this aspect of the proposed action is not likely to result in the destruction or adverse modification of critical habitat of the desert tortoise. We have reached this conclusion for the following reasons.

1. Physical and Biological Feature 1. This aspect of the proposed action would not further decrease the amount of space available to support viable populations within the action area; to a small extent, it could increase the ability of desert tortoises to move, disperse, and have gene flow within the Superior-Cronese Critical Habitat Unit by restoring disturbed areas that may not currently support desert tortoises.

2. Physical and Biological Features 2–5. The recovery actions that the Service and its partners would implement would improve the condition of these physical and biological features within focal areas of the Superior-Cronese Critical Habitat Unit and thereby enhance the value of critical habitat for the conservation of the desert tortoise.

3. Physical and Biological Feature 6. The recovery actions that the Service and its partners would implement would increase the amount of protection from disturbance and human-caused mortality in the focal areas of the Superior-Cronese Critical Habitat Unit and thereby enhance the value of critical habitat for the conservation of the desert tortoise.

Lane Mountain Milk-vetch

After reviewing the current status of the Lane Mountain milk-vetch, the environmental baseline for the action area, the effects of the proposed use of the Western Training Area and operations and activities, and the cumulative effects, we have determined that the proposed action is not likely to jeopardize the continued existence of the Lane Mountain milk-vetch. We have reached this conclusion for the following reasons:

1. The proposed action is not likely to affect the reproductive capacity of the Lane Mountain milk-vetch.

2. The proposed action is likely to reduce the number of Lane Mountain milk-vetch plants within its range; however, we expect that the number of plants varies to some degree naturally and that sufficient occupied habitat would remain after the onset of training in the Western Training Area to support a viable number of individuals into the foreseeable future.

3. The proposed action will decrease the distribution of the Lane Mountain milk-vetch but not to an appreciable degree; based on its requirement of a specific substrate, the Lane Mountain milk-vetch has naturally been restricted to a small distribution.

4. The Army implemented measures to offset the loss of Lane Mountain milk-vetch plants and habitat as part of its original proposal to use additional maneuver training lands in the Western Training Area (Service 2004). The proposed action with regard to the Western Training Area has not changed in a measurable manner since that time.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. The Service further defines "harm" to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not the purpose of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of an incidental take statement and occurs as a result of the action as proposed.

The measures described below are non-discretionary; the Army must undertake them for the exemption in section 7(o)(2) to apply. The Army has a continuing duty to regulate the activities covered by this incidental take statement. If the Army does not implement the proposed action as described in this biological opinion, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, the Army must report the progress of its action and the impact on the species to the Service as specified in the incidental take statement (50 CFR 402.14(i)(3)).

SCOPE OF THE INCIDENTAL TAKE STATEMENT

The Army's overall proposed action consists of three components: the use of additional maneuver training lands in the Western Training Area, ongoing operations and activities within the entirety of Fort Irwin, and initial implementation of the Recovery and Sustainment Partnership Initiative. The Army would proceed with the first two components of the proposed action after issuing its record of decision for the legislative environmental impact statement for military training and the extension of the public land withdrawal; that is, these actions would proceed without further consultation under section 7(a)(2) of the Endangered Species Act

because the Army has provided sufficient information to the Service to complete its analysis of those actions.

Although the Service had sufficient information to complete its analysis with regard to the overall goals of the Recovery and Sustainment Partnership Initiative, the specific recovery activities that the agencies would implement under that program are not defined and will require additional review by the Army, Bureau, Service, and possibly other partners. Consequently, we do not know the specific location or types of actions that will occur under this program.

For these reasons, we consider the overall proposed action in this biological opinion to be a "mixed programmatic action" (50 CFR 402.02). A mixed programmatic action "means, for purposes of an incidental take statement, a Federal action that approves action(s) that will not be subject to further section 7 consultation, and also approves a framework for the development of future action(s) that are authorized, funded, or carried out at a later time and any take of a listed species would not occur unless and until those future action(s) are authorized, funded, or carried out and subject to further section 7 consultation." In this case, the use of additional maneuver training lands in the Western Training Area and ongoing operations and activities within the entirety of Fort Irwin will not be subject to further section 7 consultation; in contrast, the Recovery and Sustainment Partnership Initiative serves as a framework for future consultation, pursuant to section 7(a)(2) of the Endangered Species Act.

For this reason, we do not address incidental take that may occur as a result of implementation of the Recovery and Sustainment Partnership Initiative in this incidental take statement. The Service will address incidental take associated with the implementation of the Recovery and Sustainment Partnership Initiative in one or more future consultations. The remainder of this incidental take statement addresses the use of additional maneuver training lands in the Western Training Area and ongoing operations and activities within Fort Irwin.

Also, "take" as defined in section 3(19) of the Endangered Species Act does not apply to listed plant species. Consequently, this incidental take statement does not include discussion of the Lane Mountain milk-vetch.

Incidental Take Associated with the Use of Additional Maneuver Training Lands in the Western Training Area and Ongoing Operations and Activities within Fort Irwin

We anticipate that Army activities associated with the use of additional maneuver training lands in the Western Training Area and ongoing operations and activities are reasonably certain to result in the incidental take of most desert tortoises within the boundaries of Fort Irwin. We consider this description to include the Army's activities on the Manix Trail, although the trail is located outside Fort Irwin's boundaries.

Previous survey and research efforts in the Western Training Area indicated that approximately 450 to 600 "adult" desert tortoises reside in this area (Karl 2002, Esque et al. 2009, Esque et al. unpublished data, Walde et al. unpublished data in Housman 2021c). The use of the term "adult" in this context does not necessarily mean desert tortoises larger than 180 millimeters; however, it

conveys information that numerous large desert tortoises occur within Fort Irwin and that additional smaller individuals and eggs are also present.

Most of these individuals are located in the Western Training Area. Desert tortoises remain in the other areas of Fort Irwin; these individuals are generally located in areas where training is limited by steep, rugged terrain. We do not know how many desert tortoises occur in these areas but expect that they are relatively few in number and in fragmented populations.

Forms of Incidental Take

Depending on the circumstances, incidental take will occurs in different forms. We have summarized the amount or extent of the forms of incidental take in the following sections.

Capture

We anticipate that the Army will take most desert tortoises within Fort Irwin in the form of capture. We differentiate capture into translocating desert tortoises from Fort Irwin to off-base recipient sites and moving desert tortoises from harm's way to nearby areas on-base.

Most captured individuals would be in the Western Training Area; the Army will translocate these individuals to recipient sites within the Western Mojave Recovery Unit. The Army may also capture and translocate some desert tortoises from elsewhere in Fort Irwin to recipient sites within the Western Mojave Recovery Unit. Finally, the Army is also reasonably certain to capture some desert tortoises within Fort Irwin and along the Manix Trail and move them from harm's way.

We cannot anticipate the precise numbers of desert tortoises that the Army may capture because the numbers change over time and desert tortoises, particularly smaller individuals and eggs, are difficult to detect. For this reason and because this form of take is unlikely to kill or injure desert tortoises, we do not consider establishing a re-initiation criterion for captured desert tortoises to be reasonable or prudent.

Wound

If an injured (i.e., wounded) desert tortoise survives treatment and can return to the wild, we will not include it as a mortality. We will consider injured desert tortoises that survive but are not suitable for release to the wild because of their injury as mortalities.

Kill

As we discussed previously in this biological opinion, we cannot reasonably estimate the number of desert tortoises that the Army's activities are reasonably certain to kill because of the numerous variables involved. These variables include but are not limited to changes in the number of desert tortoises present within Fort Irwin over time, the unpredictability of when workers or soldiers may encounter a desert tortoise and the outcome of that encounter, and the likelihood that an error in handling of a desert tortoise may cause its death. Other variables, such

as the size of the animals and whether it was underground, affect whether the Army would detect a desert tortoise that its activities have killed. For these and other reasons discussed previously, we used an estimate of the mortality of 50 large desert tortoises per year for the analysis in this biological opinion.

For the purposes of an incidental take statement, the implementing regulations for section 7(a)(2) clarify that the Service may use surrogates to express the amount or extent of anticipated take when "exact numerical limits on the amount of anticipated incidental take may be difficult" (80 FR 26832). The implementing regulations (50 CFR 402.14(i)(1)(i)) require that the Service meet three conditions for the use of a surrogate. To use a surrogate, the Service must:

Describe the causal link between the surrogate and take of the listed species: We are not aware of any research that addresses the ratio of found carcasses to the actual number of mortalities for desert tortoises. We have acknowledged that the Army would not detect every mortality and required that the Army re-initiate formal consultation if it found 10 desert tortoises that died because of its activities within a calendar year. Please refer to the discussion on page 52 of this biological opinion for a full explanation of the use of 10 large desert tortoises as a trigger for re-initiation of formal consultation. Consequently, we consider the finding of 10 large desert tortoises that died because of the Army's activities as a reasonable surrogate.

Describe why it is not practical to express the amount of anticipated take or to monitor take-related impacts in terms of individuals of the listed species: The Army cannot monitor the training activities in a practical or reasonable manner that would allow it to find most desert tortoises that die because they are struck by vehicles or ordnance, crushed or entrapped in burrows, or because of some other aspect of training. Large-scale training activities occur over wide areas and at great intensity; on-site monitoring during training could not cover such large areas and would be dangerous to monitors. Post-training monitoring is impractical because of the large areas involved; additionally, scavengers remove the carcasses of any animal soon after death.

Set a clear standard to determine when the proposed action has exceeded the anticipated amount or extent of the taking: The Army will re-initiate formal consultation when it finds 10 large desert tortoises that have likely died because of its activities in a calendar year.

Accordingly, we establish the surrogate of 10 large desert tortoises found dead because of the Army's activities at Fort Irwin in a calendar year for the re-initiation criterion described in 50 CFR 402.16(a).

We also anticipate that the proposed action is likely to result in the incidental take of small desert tortoises and eggs in the form of mortality. As we discussed previously in this biological opinion, the numbers of small desert tortoises and eggs vary throughout the year. We used large desert tortoises to establish the surrogate for this amount or extent of take because small desert tortoises are difficult to find and the method by which we calculate their abundance contains more assumptions and therefore more potential for variation than does our method for predicting the

number of large desert tortoises. For this reason, we have not established a threshold for the number that the Army is reasonably certain to kill annually.

As we discussed in the Re-initiation Threshold section of this biological opinion, the Army and Service would include any desert tortoise that dies directly because of translocation activities in the annual assessment of the re-initiation threshold of 10 large desert tortoises.

The translocation plan for desert tortoises from the Western Training Area will contain detailed criteria for determining when re-initiation of consultation is appropriate, based on the metrics of success that it will include. We consider it to be reasonable and appropriate to formulate this re-initiation guidance upon development of the translocation plan because using translocation-specific methods, such as comparing survival rates among translocated, resident, and control populations, is appropriate and does not trigger any of the re-initiation criteria at 50 CFR 402.16, which we have listed at the conclusion of this biological opinion.

REASONABLE AND PRUDENT MEASURES AND TERMS AND CONDITIONS

We have not identified any reasonable and prudent measures or terms and conditions that we consider necessary or appropriate to minimize take of the desert tortoise at this time.

REPORTING REQUIREMENTS

Pursuant to 50 CFR 402.14(i)(3), the Army must report the progress of the action and its impact on the species to the Service as specified in this incidental take statement. We have determined that the following is necessary to monitor and report on the impacts described in this biological opinion. The Army must provide an annual report to the Service by January 31 of each year that this biological opinion is in effect. The annual report must include information regarding the death or injury of desert tortoises and the circumstances of such incidents. The Army must also provide information on desert tortoises that it moves from harm's way or translocates. Specifically, the reports must include, at a minimum:

1. The date and time of the incident (or when the Army discovered the carcass or moved it from harm's way);

2. The location, in a manner that we can use for mapping with GIS;

3. The size and condition of the carcass or desert tortoise; and

4. Any other specific information that may be useful to understand the circumstances of the incident; and

5. For translocated desert tortoises, the Army must provide an annual report as described in the final translocation plan.

Appendix A describes additional reporting activities associated with the off-installation recovery efforts for the desert tortoise. That reporting is not a requirement pursuant to 50 CFR 402.14(i)(3).

DISPOSITION OF DEAD OR INJURED DESERT TORTOISES

Within 24 hours of locating a dead desert tortoise, you must notify the Palm Springs Fish and Wildlife Office by telephone (760 322-2070) and by facsimile or electronic mail. The report must include the date, time, and location of the carcass, a photograph, cause of death, if known, and any other pertinent information.

Please notify us immediately if you find an injured desert tortoise. If the injured animal has the potential to survive, the Army must take it to a qualified veterinarian for treatment. If the desert tortoise survives, the Army must contact the Service regarding its final disposition.

After recording all pertinent information, we recommend that the Army dispose of the carcass in a manner that reduces the likelihood that someone else will find and report the same carcass. Appropriate methods of disposal include burying animals in the field or providing them to local animal service for disposal with other carcasses; we recommend that the Army provide the animal service office with a note that explains this arrangement with the Service.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Endangered Species Act directs Federal agencies to use their authorities to further its purposes by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. We offer the following conservation recommendations for your consideration and request that you notify us if you implement them so we may remain apprised of the best available information regarding the species.

We recommend that the Army continue its sampling dust program and monitoring of the Lane Mountain milk-vetch within the East Paradise and NTC Goldstone Conservation Areas and the no-dig area. This monitoring will allow the Army and Service to monitor potential dust accumulation in relation to changes in disturbance in the Western Training Area.

RE-INITIATION NOTICE

This concludes formal consultation on the Army's proposed actions. As provided in 50 CFR 402.16(a), re-initiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if:

1. The amount or extent of incidental take specified in the incidental take statement is exceeded;

2. New information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion;

3. The agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion or written concurrence; or

4. A new species is listed or critical habitat designated that may be affected by the action.

We appreciate the cooperation of your staff during this consultation. If you have any questions, please contact Ray Bransfield of my staff at (805) 677-3398 or Ray_bransfield@fws.gov.

Sincerely,
Scott A. Sobiech
Field Supervisor

Appendices

A. Department of Defense defined conservation commitment for desert tortoise recovery and sustainment partnership initiative.

B. Solar projects for which the U.S. Fish and Wildlife Service has issued biological opinions or incidental take permits.

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APPENDIX A

DEPARTMENT OF DEFENSE
DEFINED CONSERVATION COMMITMENT
DESERT TORTOISE RECOVERY AND SUSTAINMENT PARTNERSHIP INITIATIVE

INTRODUCTION

Desert tortoises (*Gopherus agassizii*) have experienced acute population declines in recent years. Between 2004 and 2014, adult desert tortoise numbers decreased across the range, with some recovery units experiencing a decrease of close to 50 percent. The adult populations in the Western Mojave and Eastern Mojave Recovery Units are 49 percent and 33 percent of their 2004 levels, respectively. The proportion of juveniles in these recovery units has also declined from 2004 levels (Allison and McLuckie 2018). Desert tortoises require 13 to 20 years to reach sexual maturity and experience high juvenile mortality rates, which negatively affects the rate of natural repopulation. Consequently, desert tortoise populations have a low potential for natural recovery without substantial and sustained conservation efforts.

In June 2018, the Department of Defense (DoD) and Department of Interior (DoI) signed a Memorandum of Understanding (MOU) to establish the Recovery and Sustainment Partnership (RASP) initiative to develop species conservation and recovery initiatives and provide increased flexibility for military missions (DoD and DoI 2018a). Stated purposes of the RASP in the MOU were to "develop and promote effective ecosystem and species conservation and recovery initiatives" and to "provide for increased flexibility for military mission activities."

DoD and DoI identified the desert tortoise as a priority species for recovery support through the RASP. DoD and the U.S. Fish and Wildlife Service (USFWS) coordinated on development of a species action plan in December 2018 (DoD and DoI 2018b), and later revised it in September 2019 (DoD and DoI 2019). The goal of the desert tortoise species action plan and RASP partnership is:

> "to identify actions required by DoD and the USFWS to reduce the regulatory burden on DoD for the management of the target species and its designated critical habitat, as part of an overall effort to accelerate the recovery of the desert tortoise in partnership with other federal and state agencies, and other partners. The plan will track the benefits of these contributions and provide a framework for reducing mission restrictions and/or streamlining regulatory processes associated with desert tortoises."

To accomplish this goal, the USFWS, in consultations with the military services, has developed biological opinions (biological opinions) under section 7(a)(2) of the Endangered Species Act to establish a streamlined process to address future training needs on several DoD installations within the range of the desert tortoise. DoD and the USFWS have also worked in partnership to begin developing a companion section 7(a)(1) program for this effort to address training impacts and ensure meaningful, long-term, and coordinated DoD contributions to desert tortoise recovery.

Section 7(a)(1) of the Endangered Species Act requires Federal agencies to use "their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species and threatened species listed ….". This document outlines a long-term section 7(a)(1) program applicable to the desert tortoise RASP initiative over an initial 5-year time horizon and describes its contribution to the broader interagency recovery effort in general terms. It discusses the relationship of the 7(a)(1) program to the section 7(a)(2) biological opinions, establishes program objectives, identifies recovery action types that the program will likely focus on, outlines an implementation process, and provides program-funding estimates. This document represents an outline for an initial 5-year plan, but DoD and the USFWS will coordinate over a one-year period (i.e., from the date we issue biological opinions to the installations) to finalize the initial 5-year plan in coordination with the Bureau of Land Management (BLM) and other recovery partners. Once completed, DoD and the USFWS, in consultation with BLM and other implementing partners, can modify this plan at any time to adjust implementation priorities in response to changing species recovery needs and land use changes that may occur. DoD and the USFWS will work together on updates in coordination with BLM, other parties implementing the plan, and the Desert Tortoise Management Oversight Group, when necessary.

Relationship of RASP Section 7(a)(1) Program to Installation RASP Biological Opinions

The USFWS has developed biological opinions in consultation with several DoD installations within the range of the desert tortoise to support the RASP initiative. These biological opinions achieve one aspect of the 2018 RASP MOU – "provide for increased flexibility for military mission activities." Each biological opinion documents the respective installation's proposed contribution to implementation of this section 7(a)(1) program. DoD and the USFWS intend for the implementation of the section 7(a)(1) program to be a joint effort by all RASP installations.

The RASP biological opinions fall into two categories, based on how the consultation approaches streamlining mission flexibility and how the installation will contribute to the section 7(a)(1) recovery program. The two categories are described below.

Sustained Participation Biological Opinions

The USFWS is issuing new base-wide biological opinions to DoD installations participating at this level to describe their military mission and recovery program participation. The USFWS worked with DoD in the development of these biological opinions to provide DoD with broad mission flexibility. In these biological opinions, the USFWS concluded that DoD's future mission activities at the installations were not likely to jeopardize the continued existence of the desert tortoise or result in the destruction or adverse modification of critical habitat of its critical habitat. The USFWS is issuing sustained participation biological opinions to the Marine Corps and Army for their training and other activities at the Marine Corps Air Ground Combat Center and the National Training Center at Fort Irwin, respectively. Participation in the RASP's section 7(a)(1) recovery program is subject to availability of funds, but inadequate funding could trigger re-initiation of consultation and may result in loss of this mission flexibility.

Transactional Participation Biological Opinion

The USFWS is developing and will issue a single biological opinion that outlines a streamlined process for approval of new mission actions on participating installations. Approvals under this process are contingent on sufficient accrual of recovery credits under a recovery accounting framework that will accompany that biological opinion. DoD installations participating at this level may accrue recovery value by implementing individual projects within the RASP's section 7(a)(1) recovery program. The USFWS will evaluate the recovery value based on the timeliness and appropriateness of the projects and the DoD's ability to continue funding through the completion of the projects and any and all monitoring and maintenance of the projects in order to meet the goals of the 7(a)(1) program. Those installations may later expend this accrued recovery value to offset new mission impacts or relieve existing biological opinion requirements. The USFWS and DoD will establish value accrual rates for each type of project in the recovery accounting framework; the expenditure requirement will be determined through coordination with the USFWS based on the amount of mission impact the installation desires to offset. Edwards Air Force Base, Marine Corps Logistics Base Barstow, and Naval Air Weapons Station China Lake have elected to participate at this level.

RASP Section 7(a)(1) Recovery Program Objectives

The USFWS identified recovery criteria for the desert tortoise in its 2011 recovery plan (USFWS 2011). These criteria focus on sustaining a trend of increasing population size and distribution within Tortoise Conservation Areas over a 25-year period and maintaining desert tortoise habitat within these areas until population viability is ensured. These Tortoise Conservation Areas encompass desert tortoise critical habitat and certain categories of conservation lands designated under Federal land use plans (*e.g.*, BLM areas of critical environmental concern, Wilderness Areas, National Conservation Lands, *etc.*). The long-term goal of the RASP initiative is to contribute to the achievement of the recovery plan's de-listing criteria in coordination and collaboration with other governmental and non-governmental recovery partners. The RASP section 7(a)(1) recovery program is designed to outline a meaningful DoD contribution toward the achievement of the delisting criteria. DoD and DoI are currently establishing short- and mid-term objectives for the program in an initial 5-year implementation plan that will outline DoD's contribution toward achievement of delisting criteria.

PRELIMINARY FIVE-YEAR ACTION PLAN

The RASP section 7(a)(1) recovery program will operate under the direction of an action plan with a 5-year planning horizon. DoD and the USFWS will fully develop the initial 5-year plan in coordination with BLM and other recovery partners within one year of biological opinion issuance. As stated previously, DoD and the USFWS may choose to modify or update this action plan, in coordination with implementing partners, at any time to adjust implementation priorities in response to changing species recovery needs.

The initial 5-year action plan will primarily focus on the Western Mojave Recovery Unit, as defined in the 2011 recovery plan (see Figure 1). It will identify actions at both a recovery unit

and recovery focal area scale. Recovery unit actions could occur anywhere within the recovery unit but would primarily target Tortoise Conservation Areas. Recovery focal area actions would occur within specific focal areas within the Superior-Cronese, Fremont-Kramer, or Ord-Rodman Areas of Critical Environmental Concern. The final boundaries of these focal areas are being established through development of the initial 5-year plan. Because of the likelihood of mixed ownership within the focal areas, implementation of recovery actions will require coordination with multiple implementation partners.

To allow adequate consideration of the recovery program in the RASP biological opinions, DoD and the USFWS have developed the following subsections to outline potential recovery actions that will be considered during development of the initial 5-year plan along with a discussion of each action's role in recovery. Implementation of all recovery actions under the RASP is dependent on implementation authorization of the underlying landowner. All the incorporated actions are priorities of the Desert Tortoise Management Oversight Group and support the following strategic elements from the 2011 recovery plan:

1. **Recovery Plan Strategic Element 2**: Protect existing populations and habitat; institute habitat restoration, where necessary.
2. **Recovery Plan Strategic Element 3**: Augment depleted populations in a strategic manner.
3. **Recovery Plan Strategic Element 4**: Monitor progress toward recovery.

Although the initial 5-year plan is still under development and may deviate slightly from these priorities, DoD and the USFWS believe they represent actions necessary to address high-priority recovery needs in the Western Mojave Recovery Unit. This document uses them to inform resource and staffing needs and to make funding estimates for the recovery program.

Figure 1. Desert Tortoise Recovery Units delineated in the 2011 desert tortoise recovery plan (USFWS 2011).

Focal Area Actions

Under the RASP recovery program, DoD-supported recovery actions will target specific focal areas within Tortoise Conservation Areas in an effort to focus resources in a way that provides the greatest benefit to recovery of the desert tortoise. The final boundaries of these focal areas will be mapped in the initial 5-year plan but they will occur predominantly on public lands managed by the BLM, within designated critical habitat, and in the vicinity of Mojave DoD installations participating in the RASP. They will encompass subareas of critical habitat that have relatively high habitat potential (Nussear et al. 2009) and habitat intactness value (Randall et al. 2010), concentrations of live desert tortoise observations (USFWS unpublished data), and access to linkages (Averill-Murray et al. 2013). Their location and boundaries will also consider the location of active grazing allotments, open off-highway vehicle areas, and land ownership.

The RASP focal areas will represent areas with higher desert tortoise densities, higher habitat potential values, ecological intactness, and a location that supports landscape-scale connectivity.

In addition, they will minimize overlap with grazing allotments and exclude open off-highway vehicle recreation areas to reduce conflict with achievement of RASP objectives. Accordingly, the USFWS expects these focal areas to respond more readily to conservation investments, due to existing conservation designations and their existing habitat and population characteristics. Within focal areas, DoD and the USFWS anticipate that the initial 5-year RASP recovery plan would target recovery coordination and enforcement, passive or active restoration of unauthorized linear features (e.g., unauthorized routes), habitat restoration, and permanent habitat protection.

Recovery Coordination and Enforcement

Action: Fund BLM visitor contact park rangers to patrol RASP focal areas. These park rangers would provide increased BLM presence within these focal areas, monitor for illegal activity, identify management needs within the focal area, communicate management goals to public land users, and notify law enforcement to address illegal activity, when observed.

Rationale**:** Recovery action 2.4 from the 2011 recovery plan identified increasing law enforcement as a high-priority step for protecting existing desert tortoise populations and habitat in all recovery units. The recovery plan identified this need to address the following threats to the species:

1. Unauthorized off-road vehicle travel that damages habitat and can kill individual desert tortoises.
2. Deliberate maiming and killing of desert tortoises.
3. Unauthorized release of captive desert tortoises that can spread disease to wild populations.
4. Uncontrolled domestic dogs that can prey on desert tortoises.
5. Illegal dumping that damages habitat and can subsidize desert tortoise predators.
6. Illegal poaching/removal of desert tortoises from the wild

All the threats identified above occur at varying levels within the Western Mojave Recovery Unit, with damage from unauthorized off-road vehicle travel being of primary concern in the Superior-Cronese Critical Habitat Unit. Visitor contact patrols targeted at RASP focal areas will reduce these threats and help to protect the conservation investment made through implementation of other RASP focal area projects by providing a consistent BLM presence in these areas that can easily contact law enforcement about issues.

Restoration of Unauthorized Linear Features and other Habitat Restoration

Action: DoD will provide funding to support the BLM's legal authority to close unauthorized and undesignated routes and to implement desert tortoise habitat restoration activities in the RASP focal areas. DoD will also fund activities, such as seed-source development, that are needed to support restoration within the focal areas.

Rationale: Recovery actions 2.5 and 2.6 identify the following as high priorities for the protection of existing populations and habitat, respectively: 1) restrict, designate, close, and

fence roads; and 2) restore habitat. These actions will address the following threats to the species:

1. Injury to and death of desert tortoises due to collision with vehicles.
2. Reduced densities of desert tortoises near routes.
3. Provision of access to remote areas where collection, vandalism, and poaching of desert tortoises may occur.
4. Introduction of invasive plant species by vehicles and humans into desert tortoise habitat.
5. Reduce the potential for wildfire ignition from vehicles and the spread of wildfire by invasive plants that act as fine fuels.

There is an extensive existing route network in the Western Mojave Recovery Unit, including BLM's designated route network (BLM 2019). The threats identified above are present throughout the Western Mojave Recovery Unit. Restoration of unauthorized linear disturbances (i.e., unauthorized routes) within RASP focal areas, which may include installation of barriers to prevent vehicle incursion, will enhance the condition of desert tortoise habitat, which will in turn improve baseline conditions and support the successful implementation of other recovery actions funded through the RASP initiative.

Permanent Habitat Protection

Action: Provide funding for acquisition and conservation of private inholdings within RASP focal areas and establish management endowments or other long-term funding mechanisms for their continued conservation and management needs. Although acquisition could occur in any focal area, the RASP program would focus in areas where there is a checkerboard of BLM and DoD conservation lands and where more rapid reduction of fragmented conservation management may be possible.

Rationale: Recovery action 2.9 from the 2011 recovery plan identifies the need for acquisition of private inholdings within Tortoise Conservation Areas to counter habitat loss and protect tortoises. The recovery plan recommends performing acquisitions strategically in particularly sensitive areas that would connect functional habitat or improve management capability. As discussed above, DoD and the USFWS have identified the RASP focal areas because they continue to support desert tortoise populations at densities where management actions could stabilize and improve population viability without more drastic intervention. However, implementation of these actions requires more management control across the focal areas to be effective.

Recovery Unit Actions

The RASP recovery program will also address targeted, high-priority recovery needs outside of the focal areas. The initial 5-year RASP recovery plan would target installation of highway exclusion fencing and population augmentation.

Highway Exclusion Fencing

Action: Provide funding for fencing of high-priority locations within the range of the desert tortoise with an emphasis on roads in the Western Mojave Recovery Unit.

Rationale: Road mortality contributes substantially to the ongoing range-wide decline of the desert tortoise. Roads deplete populations, shift the demography of desert tortoise populations toward smaller, younger animals; cause habitat and population fragmentation, lead to population as well as genetic isolation; and subsidize predator populations (Boarman and Sazaki 1996, Esque et al. 2010, USFWS 2011, Nafus et al. 2013, Peaden et al. 2015).

Desert tortoise exclusion fence, connected to existing flood control culverts and paired with shade structures, has been shown to increase adult survivorship, increase population connectivity, reduce predator subsidies, and reduce the risk of collection, vandalism, and poaching. This enables repopulation of road-effect zones, where populations have been significantly depleted (Nafus et al. 2013, Peaden et al. 2015). Using the Peaden et al. (2015) description of road-effect zone sizes, the USFWS estimates that the installation of fencing along all major roads within California's designated desert tortoise critical habitat would result in the repopulation over time of approximately 56,664 hectares of critical habitat.

Recovery action 2.5 from the 2011 recovery plan recommends fencing of all highways and paved roads within or adjacent to Tortoise Conservation Areas with appropriate modifications to avoid habitat and population fragmentation. The Desert Tortoise Management Oversight Group has identified installation of highway exclusion fencing as a top priority, and the USFWS has developed models to help prioritize where highway fencing would be most beneficial.

Population Augmentation and Headstarting

Action: In coordination with the USFWS, DoD will use desert tortoises displaced by training activities within the boundaries of heavily used training areas to augment depleted populations in designated off-installation conservation areas. DoD will also continue to fund headstarting research and recovery efforts, such as the Marine Corps Tortoise Research and Captive Rearing Site, to headstart small desert tortoises until they are large enough to be released into the wild to augment populations. Science-based monitoring of augmented populations will be undertaken to gauge the effectiveness of this action. If desert tortoise translocation areas involve checkerboard land ownership, translocation will not occur without an adequate habitat assessment, and the early engagement and subsequent authorization of the respective landowner and landowners/managers of potential dispersal sites.

Rationale: Recovery actions 3.3 and 3.4 from the 2011 recovery plan identify the following as high-priority components to a range-wide strategic program to augment depleted desert tortoise populations, respectively: 1) secure facilities and obtain desert tortoises for use in augmentation efforts; and 2) implement translocations in target areas to augment populations using a scientifically rigorous, research-based approach.

Population augmentation will help to improve population density and thus viability in areas where population density is at levels low enough to preclude or significantly impede natural population recovery. Within all Tortoise Conservation Areas in the western Mojave Desert, desert tortoise densities are below what the USFWS considers to be a minimum viable density threshold of 3.9 adults per square kilometer. Below this threshold, reproductive potential within populations is diminished and the species becomes at risk of losing evolutionary potential and diminished ability to persist long-term (USFWS 1994). Additionally, recruitment of small desert tortoises into reproductive size classes is inhibited by high rates of predation. DoD support to augment depleted populations in the western Mojave Desert will bolster reproductive success by adult desert tortoises and will enhance recruitment of small desert tortoises into adult populations.

PLAN IMPLEMENTATION

Implementation Process

The completed initial 5-year plan will guide implementation of the RASP section 7(a)(1) recovery program. DoD and the USFWS will work with the BLM and other RASP recovery partners and will seek input on the final content of the plan from the Desert Tortoise Management Oversight Group. Once completed, implementation of the initial 5-year plan will proceed under a memorandum of agreement (MOA) between the RASP recovery partners. RASP recovery partners will meet annually to review the 5-year plan, identify recovery actions to implement that year, report out the prior year's work, and identify appropriate contracting/funding mechanisms to meet requirements of the plan. Additional meetings will occur when needed to discuss project designs or implementation, the content of requests for proposals (RFPs), and contractor selection, when applicable.

For recovery actions that occur on its installations, DoD will implement actions through its own in-house resources or through contract. For off-installation activities, DoD will fund recovery actions through one or all of the following mechanisms:

1. *Direct contract* – DoD would contract directly to a third party for implementation of specific actions or sets of actions within the focal areas. For actions contracted to occur on BLM-managed land, a project-specific MOA that ensures BLM's operational control would be established between the BLM, the DoD, and the contractor and BLM would be involved in the contractor selection. For actions on non-BLM lands within the focal areas, the need for project specific agreements for contracted work would be determined with the appropriate landowner/manager.
2. *Military Interagency Purchase Request (MIPR)* - DoD would issue a MIPR to an agency recovery partner that would implement the identified recovery action;
3. *National Fish and Wildlife Foundation (NFWF) Recovery Account* – DoD would place funds in a NFWF account. NFWF would act as a fiduciary and disburse funds for implementation of recovery projects according to the terms of a funding MOA between the RASP recovery partners. Under this option, DoD would make annual payments to the account, but it would not need to perform project-specific contracts or agreements. NFWF could contract for implementation of recovery actions or sets of recovery actions.

DoD and other RASP recovery partners identified in the MOA would help to develop and approve requests for proposals and would select contractors for project implementation. For actions occurring on BLM managed land, a project-specific MOA that ensures BLM's operation control will be established between the BLM, DoD, NFWF, and the contractor and the BLM will be involved in the contractor selection. Currently, DoD and the USFWS anticipate that this funding option will form the basis of most implementation under the recovery program.

Monitoring

Effectiveness Monitoring

DoD and the USFWS intend for the RASP recovery program to be responsive to new information, which includes a formalized process for incorporating effectiveness and baseline data into the management prescription for each focal area. The initial 5-year plan will identify effectiveness monitoring that can be completed with the appropriate funding provided for implementation of recovery actions, where needed. Project-specific recovery actions will include monitoring designs and funding requirements for effectiveness monitoring. The implementing parties, DoD, and the USFWS will use information obtained through effectiveness monitoring to inform future updates to the implementation plan. Not all projects will require effectiveness monitoring. The RASP recovery partners will determine effectiveness monitoring needs during annual 5-year plan reviews and during the project design phase. For projects requiring effectiveness monitoring, appropriate funding will be part of the long-term funding needs for the project.

RASP Objective Monitoring

DoD will fund the implementation of monitoring efforts to determine progress toward the mid-term RASP objectives outlined in the initial 5-year plan. The initial 5-year plan will contain a study design for this monitoring, which will focus on tracking the population trend and demographic variables targeted in the mid-term objectives. Monitoring could include transect surveys, demographic plots, and/or other methods. Data from the USFWS range-wide-monitoring program will be used when/where it overlaps the data needs for mid-term objective monitoring.

Range-wide Monitoring

The recovery units identified in Figure 1 form the basis for monitoring progress toward delisting criteria. To support a future delisting decision, the recovery plan's Recovery Criterion 1 calls for extensive range-wide monitoring across Tortoise Conservation Areas within each recovery unit to document that rates of population change are increasing for a period of at least 25 years. In 1999, the Desert Tortoise Management Oversight Group endorsed the use of line distance sampling, and it has since formed the basis for the USFWS range-wide monitoring effort.

DoD will provide annual funds to contribute to the USFWS range-wide monitoring effort. These contributions will continue DoD's past efforts to help fund this interagency-supported program.

Although some data from this monitoring may overlap data needs for RASP objectives, its primary purpose is to track progress toward achievement of species recovery criteria.

Reporting

The DoD and the USFWS will develop an annual RASP recovery program report in collaboration with BLM and other implementing RASP partners. Annual reports would be tracked and filed by the USFWS and would be presented at annual Desert Tortoise Management Oversight Group meetings to provide information to other interagency recovery partners.

Plan Modification

The DoD and the USFWS will review the RASP recovery plan annually and update it at least every 5 years in collaboration with BLM and other applicable recovery partners. Updates will apply new information gained through monitoring and incorporate new recovery priorities and recommendations from the Desert Tortoise Management Oversight Group, where applicable. Although plan updates may modify the focus of implementation, it will not modify DoD's annual funding commitment under the RASP (see *Funding* section).

Regulatory Compliance

Recovery actions outlined in the 5-year plan are subject to analysis and approval under the National Environmental Policy Act (NEPA), Endangered Species Act (ESA), National Historic Preservation Act (NHPA), and other applicable laws. In some cases, programmatic documents are in place or under development to cover implementation of recovery actions in certain locations. Examples include the BLM's programmatic section 7 consultation for activities in the California deserts, which will cover section 7(a)(2) compliance for the majority of recovery actions taken under the RASP program. The USFWS and BLM are also jointly working on a NEPA document to cover installation of highway exclusion fencing along roadways, which could cover agency decision making on some RASP fencing projects. If additional regulatory compliance is necessary, the RASP partners will complete it on a project-by-project basis and will look for methods to streamline compliance through additional programmatic compliance documents.

RASP Staffing

The RASP section 7(a)(1) program will require staff capacity for implementation of the tasks listed below. Some of these activities are inherently BLM activities and will likely require funding for BLM staff. Final decisions on the level of staffing required for RASP implementation, necessary skill sets, and appropriate placement (i.e., BLM and/or FWS) are being determined during development of the initial 5-year implementation plan.

1. Assist with implementation of RASP biological opinions to provide greater mission flexibility and reduce training restrictions;
2. Coordinate regulatory compliance for recovery actions taken under the RASP 5-year plan(s);

3. Plan, coordinate, and facilitate annual RASP partner meetings, recovery project-design meetings, and RASP monitoring program meetings;
4. Coordinate development of RFPs and Statements of Work and contractor selection, when applicable, for recovery actions;
5. Track contract implementation, monitor contract expenditures and accomplishments, and coordinate QA/QC for monitoring data;
6. Manage NFWF account under the direction of line officers for the agencies who are signatories to the NFWF MOA;
7. Monitor and track overall RASP budget;
8. Perform and/or coordinate additional administrative functions, where needed, for various RASP funding mechanisms;
9. Develop annual RASP reports and give presentations to the Desert Tortoise Management Oversight Group and other RASP partners upon request;
10. Serve as the desert tortoise RASP program's point of contact for all RASP partners, the Desert Tortoise Management Oversight Group, and NFWF; and
11. Coordinate and facilitate updates to the RASP 5-year action plan.
12. Oversee route closure/restoration work;
13. Coordinate with law enforcement for trespass issues or damage to existing restoration, fencing, or facilities;
14. Perform regular monitoring and inspection of all field activities and resolve issues with contracting office or NFWF, as appropriate;
15. Review, comment, and perfect any plans submitted for specific tasks associated with desert tortoise recovery actions on public lands within the California Desert Conservation Area outlined under the RASP recovery program;
16. Ensure the appropriate processes are adhered to related to permitting activities on public lands, including NEPA, NHPA and ESA;
17. Write or lead a team that writes NEPA documents as required for RASP implementation;
18. Ensure contracted individuals tasked with on-the-ground work are performing tasks appropriately under BLM regulation and guidance; and
19. Communicate regularly with the BLM line officer as to status of implementation actions and issues.

FUNDING

DoD will fund implementation of the RASP recovery program as outlined in the initial 5-year plan. Funding for the initial 5-year plan may come through a combination of Readiness and Environmental Protection Integration program funding, DoD Legacy Funds, installation appropriations, or other sources. DoD and the participating installations will work with the USFWS to identify funding sources and develop a funding plan that will accompany the initial 5-year plan. Agreement on installation contributions to the total RASP recovery cost and other details of the funding plan will be addressed in the RASP MOA, where needed. DoD will sustain recovery support until the RASP mid-term recovery objectives, outlined in the initial 5-year plan, are achieved.

As stated in the *Implementation Process* section, funding could occur through direct contracts for implementation, MIPRs, or payment into a RASP NFWF recovery account. The USFWS and DoD consider development of a NFWF account to be the most efficient and effective way to implement the majority of the recovery program. DoD and the USFWS, in collaboration with other RASP partners, will work to develop this account after issuance of the biological opinions.

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APPENDIX B

SOLAR PROJECTS FOR WHICH THE U.S. FISH AND WILDLIFE SERVICE HAS ISSUED BIOLOGICAL OPINIONS OR INCIDENTAL TAKE PERMITS

(AUGUST 2021)

Table A1 summarizes information regarding the solar projects for which the Fish and Wildlife Service has issued a biological opinion, pursuant to section 7(a)(2), or an incidental take permit, pursuant to section 10(a)(1)(B) of the Endangered Species Act, with regard to the desert tortoise. We are aware of five solar projects for which we issued biological opinions that are no longer on the Federal agency's list of projects; we have removed these projects from this list.

Table A1. List of solar projects that have received biological opinions or incidental take permits.

Project	Recovery Unit	Acres of Desert Tortoise Habitat[1]	Desert Tortoises Estimated[2]	Desert Tortoises Observed[3]	Citations[4]
Ivanpah Solar Electric Generating System	Eastern Mojave	3,582	1,136	175	Service 2011a, Davis 2014
Stateline	Eastern Mojave	1,685	947	55	Service 2013a, Ironwood Consulting 2014
Silver State North	Eastern Mojave	685	14	7	Service 2010, Newfields 2011
Silver State South	Eastern Mojave	2,427	1,020	152	Service 2013a, Cota 2014
Nevada Solar One	Eastern Mojave	400	-[5]	-[5]	Burroughs 2012, 2014
Copper Mountain North	Eastern Mojave	1,400	-[5]	-[5]	Burroughs 2012
Copper Mountain	Eastern Mojave	380	-[5]	-[5]	Burroughs 2012, 2014
Townsite	Eastern Mojave	885	-[5]	-[5]	Service 2014b
Techren Boulder City	Eastern Mojave	2,200	-[5]	-[5]	Service 2012b
Valley Electric Association	Eastern Mojave	80	4	4	Service 2015a
Canyon Mesa	Eastern Mojave	123	2	-	Service 2019a
Yellow Pine	Eastern Mojave	4,285	1,032	-	Service 2020b
Mojave	Western Mojave	Primarily in abandoned agricultural fields	4	0	Service 2011b
Cinco	Western Mojave	500	53	2	Service 2015b, Daitch 2015
Soda Mountain	Western Mojave	1,726	78	-	Service 2015c

Project	Recovery Unit	Acres of Desert Tortoise Habitat[1]	Desert Tortoises Estimated[2]	Desert Tortoises Observed[3]	Citations[4]
High Desert	Western Mojave	547	24	4	Service 2019b, ECORP Consulting 2020
Res Americas Moapa Solar Energy Center (MSEC; totals adjusted based on overlapping ACSP acreage)	Northeastern Mojave	104	37	-	Service 2014a
Moapa K Road	Northeastern Mojave	2,141	208	177	Service 2012a, Cardno 2018
Playa	Northeastern Mojave	1,538	258	77	Service 2015d, Ironwood Consulting 2016
Invenergy Harry Allen	Northeastern Mojave	594	242	-	Service 2015d
NV Energy Dry Lake Solar Energy Center	Northeastern Mojave	751	45	-	Service 2015d
NV Energy Dry Lake Solar Energy Center at Harry Allen	Northeastern Mojave	55	15	-	Service 2015d
Aiya	Northeastern Mojave	672	91	-	Service 2015e
Mountainview	Northeastern Mojave	146	-[5]	-[5]	Wise 2018
Gemini	Northeastern Mojave	7,113	5,215	-	Service 2019c
Eagle Shadow Mountain	Northeastern Mojave	2,285	2,941	-	Service 2019d
Arrow Canyon Solar Project (ACSP; MSEC expansion)	Northeastern Mojave	2,124	1,863	-	Service 2020c
Southern Bighorn Solar I	Northeastern Mojave	2,642	3,128	-	Service 2021a
Southern Bighorn Solar II	Northeastern Mojave	1,025	1,336	-	Service 2021b
Genesis	Colorado	1,774	8	0	Service 2010b, Fraser 2014a
Blythe	Colorado	6,958	30	0	Service 2010c, Fraser 2014b
Desert Sunlight	Colorado	4,004	56	7	Service 2011c, Fraser 2014a
McCoy	Colorado	4,533	15	0	Service 2013c, Fraser 2014b
Desert Harvest	Colorado	1,300	5	-	Service 2013b

Project	Recovery Unit	Acres of Desert Tortoise Habitat[1]	Desert Tortoises Estimated[2]	Desert Tortoises Observed[3]	Citations[4]
Rice	Colorado	1,368	18	1	Service 2011d, Fraser 2014a
Palen Solar Power Project	Colorado	3,140	42	0	Service 2018
Desert Quartzite	Colorado	2,831	4	-	Service 2019e
IP Athos	Colorado	3,440	5	-	Service 2019f
Crimson	Colorado	2,201	20	-	Service 2020a
Total		73,644	19,896	661	

[1] The acreages may include substations and other ancillary facilities.

[2] The numbers in this column are not necessarily comparable because the methodologies for estimating the numbers of desert tortoises occasionally vary between projects. The largest numbers included the estimated number of small desert tortoises, which likely far exceeded the numbers of individuals present. In some cases, desert tortoises will remain inside the security fence for the solar project; we anticipated that some mortalities would occur during operation of the facility and included these numbers in the estimated total.

[3] This column reflects the numbers of desert tortoises reportedly taken within project areas. It includes translocated animals and those that were killed by project activities. Project activities may result in the deaths of more desert tortoises than are found. Dashes represent projects for which we have no information at this point; some projects had not broken ground at the time of this biological opinion.

[4] The first citation in this column is for both the acreage and the estimate of the number of desert tortoises. The second is for the number of desert tortoises observed during construction of the project; where only one citation is present, construction has not begun or data are unavailable at this time.

[5] These projects occurred under the Clark County Multi-species Habitat Conservation Plan; the provisions of the habitat conservation plan do not require the removal of desert tortoises. In some case, the Service issued biological opinions for access roads and generator tie-in line for these projects. We did not include the acreages and number of desert tortoises for those aspects of the overall action; we did not want to provide the impression that those effects were directly associated with the solar facility.

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