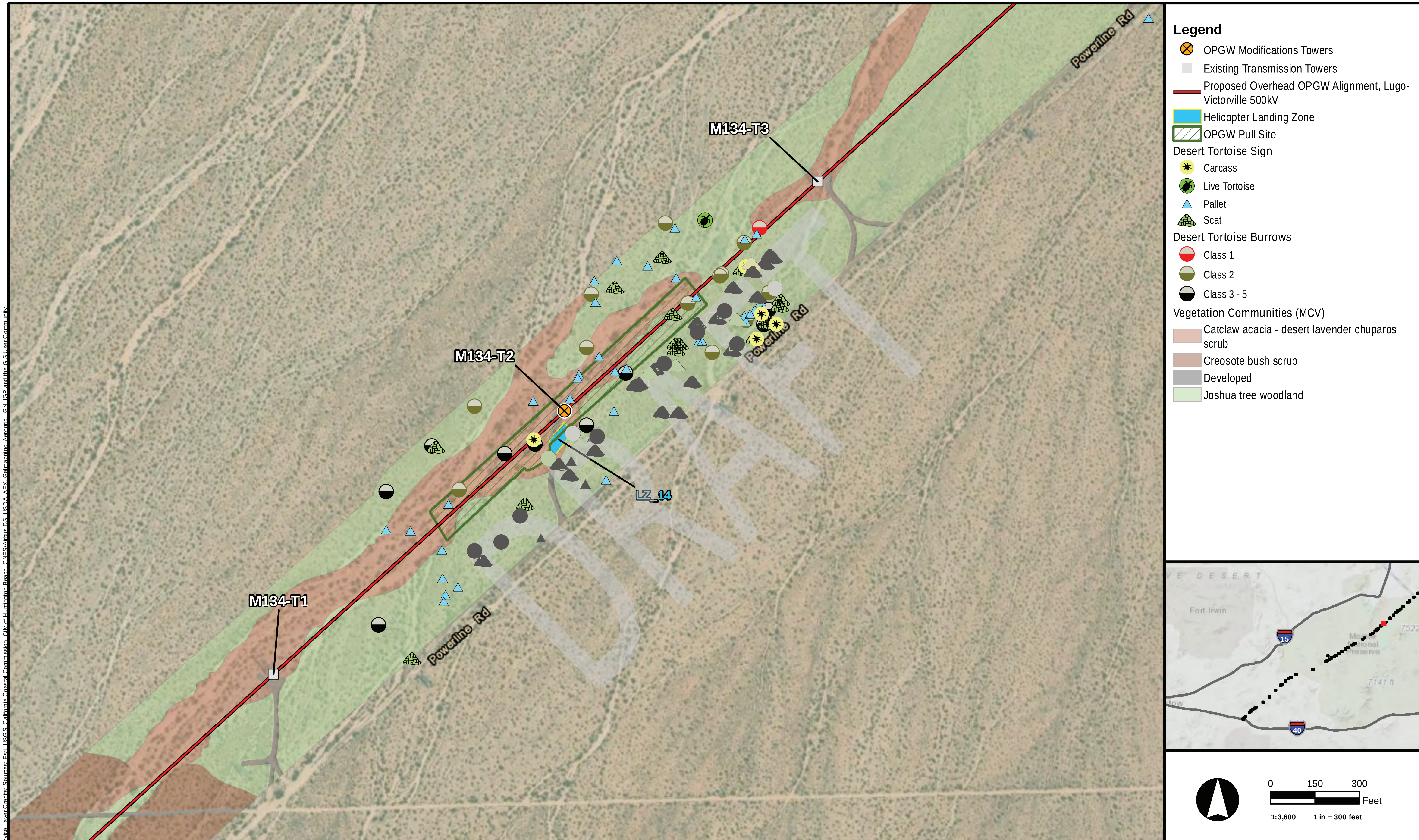


Exhibit 4. Desert Tortoise Survey Results (Page 43 of 56)

Lugo-Victorville 500-kV Transmission Line Remedial Action Scheme Project | San Bernardino County, CA and Clark County, NV

Legend

- Existing Transmission Towers
- Proposed Overhead OPGW Alignment, Lugo-Victorville 500kV
- Helicopter Landing Zone
- OPGW Pull Site

Desert Tortoise Sign
- Carcass
- Live Tortoise
- Pallet
- Scat

Desert Tortoise Burrows
- Class 1
- Class 2
- Class 3 - 5

Vegetation Communities (MCV)
- Catclaw acacia - desert lavender chuparos scrub
- Creosote bush scrub
- Developed
- Joshua tree woodland

0 150 300 Feet

1:3,600 1 in = 300 feet

Environmental Intelligence. Date: 6/20/2019. Q:\SCE\Large Cap On-Call\Projects\012_Gale_Pisgah_EA\02_GIS_Datamaps\2019\BA\EX_4_DT_Results_EI02_20190326.mxd

Exhibit 4. Desert Tortoise Survey Results (Page 44 of 56)

Lugo-Victorville 500-kV Transmission Line Remedial Action Scheme Project | San Bernardino County, CA and Clark County, NV

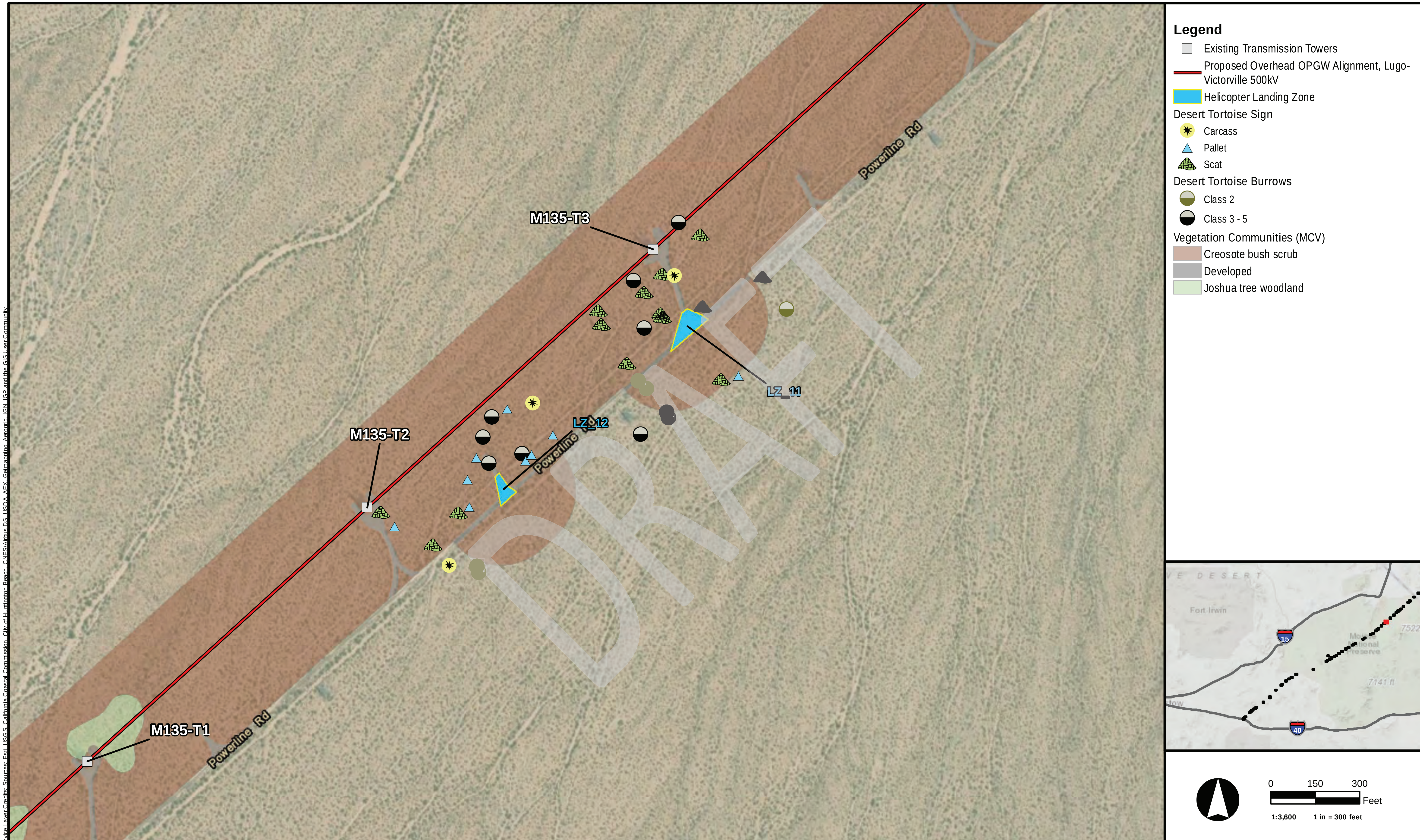


Exhibit 4. Desert Tortoise Survey Results (Page 45 of 56)

Lugo-Victorville 500-kV Transmission Line Remedial Action Scheme Project | San Bernardino County, CA and Clark County, NV

EXHIBIT 4. DESERT TORTOISE SURVEY RESULTS (PAGE 46 OF 56)

LUGO-VICTORVILLE 500-KV TRANSMISSION LINE REMEDIAL ACTION SCHEME PROJECT | SAN BERNARDINO COUNTY, CA AND CLARK COUNTY, NV

Exhibit 4. Desert Tortoise Survey Results (Page 47 of 56)

Lugo-Victorville 500-kV Transmission Line Remedial Action Scheme Project | San Bernardino County, CA and Clark County, NV

Exhibit 4. Desert Tortoise Survey Results (Page 48 of 56)

Lugo-Victorville 500-kV Transmission Line Remedial Action Scheme Project | San Bernardino County, CA and Clark County, NV

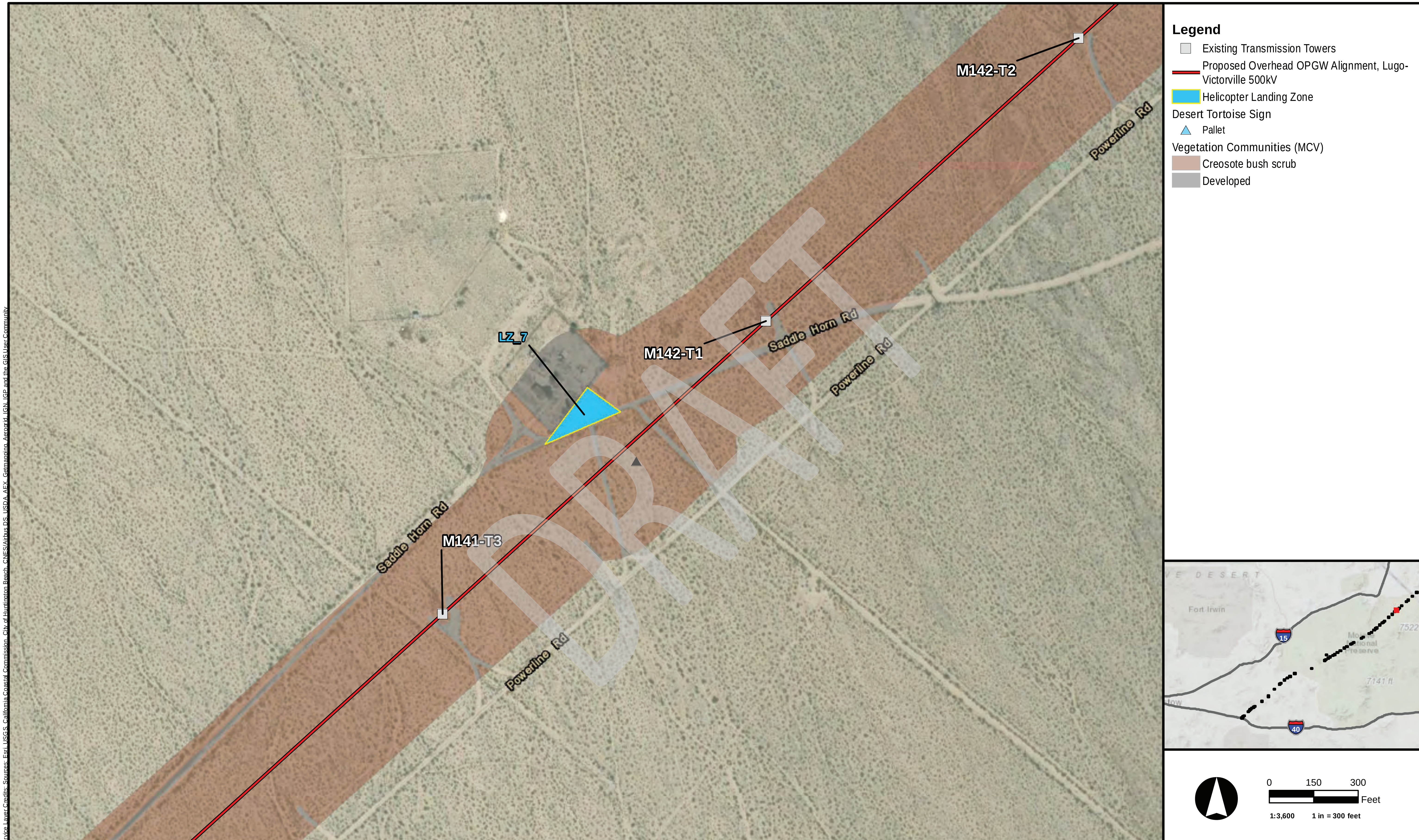


Exhibit 4. Desert Tortoise Survey Results (Page 49 of 56)

Lugo-Victorville 500-kV Transmission Line Remedial Action Scheme Project | San Bernardino County, CA and Clark County, NV

Exhibit 4. Desert Tortoise Survey Results (Page 50 of 56)

Lugo-Victorville 500-kV Transmission Line Remedial Action Scheme Project | San Bernardino County, CA and Clark County, NV

Legend

- Existing Transmission Towers
- Proposed Overhead OPGW Alignment, Lugo-Victorville 500kV
- Helicopter Landing Zone

Desert Tortoise Sign
- Carcass
- Pallet
- Scat

Desert Tortoise Burrows
- Class 2
- Class 3 - 5

Vegetation Communities (MCV)
- Creosote bush scrub
- Developed

0 150 300 Feet

1:3,600 1 in = 300 feet

Service Layer Credits: Sources: Esri, USGS, California Coastal Commission, City of Huntington Beach, CNES/Airbus DS, USDA, AEX, Getmapping, Aerogrid, IGN, IGP, and the GIS User Community

Environmental Intelligence. Date: 6/20/2019. Q:\SCE\Large Cap On-Call\Projects\012_Gale_Pisgah_EA\02_GIS_Data\maps\2019\BA\EX_4_DT_Results_EI02_20190326.mxd

Exhibit 4. Desert Tortoise Survey Results (Page 51 of 56)

Lugo-Victorville 500-kV Transmission Line Remedial Action Scheme Project | San Bernardino County, CA and Clark County, NV

Exhibit 4. Desert Tortoise Survey Results (Page 52 of 56)

Lugo-Victorville 500-kV Transmission Line Remedial Action Scheme Project | San Bernardino County, CA and Clark County, NV

Exhibit 4. Desert Tortoise Survey Results (Page 53 of 56)

Lugo-Victorville 500-kV Transmission Line Remedial Action Scheme Project | San Bernardino County, CA and Clark County, NV

Legend

- OPGW Modifications Towers
- Existing Transmission Towers
- Proposed Overhead OPGW Alignment, Lugo-Victorville 500kV
- Helicopter Landing Zone
- OPGW Pull Site

Desert Tortoise Sign
- Pallet

Desert Tortoise Burrows
- Class 2
- Class 3 - 5

Vegetation Communities (MCV)
- Creosote bush - white burr sage scrub
- Developed
- Mojave yucca scrub

0 150 300
Feet
1:3,600 1 in = 300 feet

Service Layer Credits: Sources: Esri, USGS, California Coastal Commission, City of Huntington Beach, CNES/Airbus DS, USDA, AEX, Getmapping, Aerogrid, IGN, IGP and the GIS User Community

Environmental Intelligence. Date: 6/20/2019. Q:\SCE\Large Cap On-Call\Projects\012_Gale_Pisgah_EA\02_GIS_Data\maps\2019\BA\EX_4_DT_Results_EI02_20190326.mxd

Exhibit 4. Desert Tortoise Survey Results (Page 54 of 56)

Lugo-Victorville 500-kV Transmission Line Remedial Action Scheme Project | San Bernardino County, CA and Clark County, NV

Legend

- OPGW Modifications Towers
- Existing Transmission Towers
- Proposed Overhead OPGW Alignment, Lugo-Victorville 500kV
- Helicopter Landing Zone
- OPGW Pull Site

Desert Tortoise Sign

- Pallet

Vegetation Communities (MCV)

- Creosote bush - white burr sage scrub
- Creosote bush scrub
- Developed

0 150 300 Feet

1:3,600 1 in = 300 feet

Exhibit 4. Desert Tortoise Survey Results (Page 55 of 56)

Lugo-Victorville 500-kV Transmission Line Remedial Action Scheme Project | San Bernardino County, CA and Clark County, NV

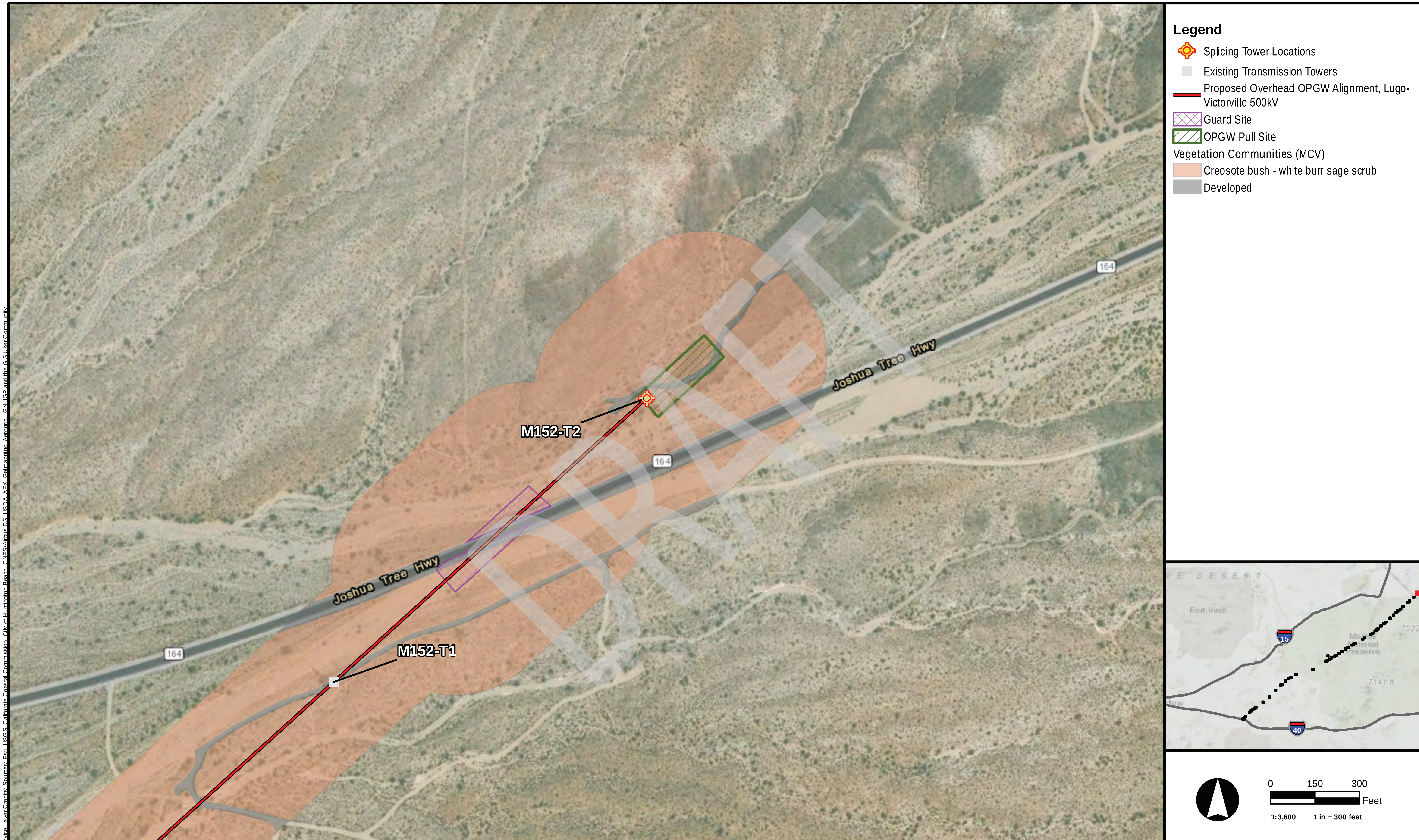


Exhibit 4. Desert Tortoise Survey Results (Page 56 of 56)

Lugo-Victorville 500-kV Transmission Line Remedial Action Scheme Project | San Bernardino County, CA and Clark County, NV

Appendix B:

BIOLOGICAL OPINION FOR THE GENERAL MANAGEMENT PLAN FOR THE MOJAVE NATIONAL PRESERVE

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, California 93003

September 19, 2001

Memorandum

To: Superintendent, Mojave National Preserve, National Park Service, Barstow, California

From: Acting Field Supervisor, Ventura Fish and Wildlife Office, Ventura, California

Subject: Amendment to the Biological Opinion for the General Management Plan for the Mojave National Preserve, San Bernardino County, California (1-8-00-F-36)

We have reviewed your request, dated September 7, 2001, to amend the referenced biological opinion for the Mojave National Preserve's General Management Plan by including an analysis of small game hunting as an activity that may affect the federally threatened desert tortoise (*Gopherus agassizii*) and its critical habitat. The General Management Plan noted that the hunting of upland game birds, small game, and big game would occur within the Mojave National Preserve. During the consultation process, you noted that the National Park Service would not allow small game hunting with the Mojave National Preserve; consequently, the biological opinion analyzed only the potential effects on the desert tortoise of upland bird and big game hunting. We concluded that these activities, when considered in light of status of the desert tortoise in the recovery unit, the environmental baseline in the action area, the effects of the other activities proposed by the National Park Service, and any cumulative effects, were unlikely to jeopardize the continued existence of the desert tortoise or adversely modify its critical habitat. We also included an incidental take statement which noted that activities associated with hunting of upland game birds and big game would be exempted from the prohibitions against take that are contained in section 9 of the Endangered Species Act of 1973, as amended.

Comments received during the public review of the final Environmental Impact Statement and General Management Plan and discussions with the California Department of Fish and Game prompted the National Park Service to reconsider its decision regarding the hunting of small game. Based on this input, the National Park Service desires to include small game hunting as a legitimate recreational activity within the Mojave National Preserve. For the purposes of this consultation, the National Park Service and Service are considering small game to include only Audubon cottontails (*Sylvilagus audubonii*) and black-tailed jack rabbits (*Lepus californicus*);

the National Park Service also proposes that hunting would occur only from September through January.

The biological opinion notes that reducing the amount of hunting (*i.e.*, from all hunting that is regulated by the California Department of Fish and Game to big game and upland game birds) may decrease the availability of carcasses upon which common ravens (*Corvus corax*) can feed, make the Mojave National Preserve less attractive to this species, and thereby reduce the level of mortality that this species inflicts upon desert tortoises in the region. We do not have data that show a relationship between hunting and the abundance of common ravens; the biological opinion merely notes that some relationship may exist. The biological opinion also notes that the hunting of big game and upland game birds would occur only from September through January or early February and that this timing avoids the spring activity period of the desert tortoise; however, hunting would occur during the fall activity period of the desert tortoise. Not all of the hunting discussed in the biological opinion would occur within desert tortoise habitat; bighorn sheep (*Ovis canadensis*) and some other game species tend to occupy higher elevations than the desert tortoise. For these reasons, the biological opinion concluded that authorized hunting is unlikely to substantially affect the desert tortoise.

The addition of Audubon cottontails and black-tailed jack rabbits to the list of animals that could be hunted within the Mojave National Preserve does not substantially change the analysis in the biological opinion. The potential exists that some number of carcasses, above the amount that would have been left with the hunting of only bighorn sheep and upland game birds, may be available to common ravens. However, given that both Audubon cottontails and black-tailed jack rabbits can be eaten by hunters, the amount of potential food left for common ravens may not be substantial. When considered with the amount of food that common ravens can acquire from other anthropogenic and natural sources, the carcasses of Audubon cottontails and black-tailed jack rabbits left by hunters are unlikely to affect the number of common ravens in the region.

The National Park Service would not allow hunting of long-tailed weasels (*Mustela frenata*), badgers (*Taxidea taxus*), striped and spotted skunks (*Mephitis mephitis* and *Spilogale putorius*), rodents, coyotes (*Canis latrans*), European starlings (*Sterna vulgaris*), or English sparrows (*Passer domesticus*). In contrast to game species, most of the carcasses of these animals would likely be available for scavenging. We again note that we do not have data on the level of hunting of these species that would occur or whether these carcasses would, in fact, increase the prey base of the common raven to a noticeable degree.

Desert tortoises could be at additional risk from increased human use of the Mojave National Preserve by hunters specifically traveling to the area to hunt Audubon cottontails and black-tailed jack rabbits. We do not have any information on the number of hunters that would be involved; the number of hunters likely varies from year-to-year in response to the population levels of target species. For most of the time that hunting would be authorized, desert tortoises would be underground because of low temperatures.

The recovery plan notes that "(s)hooting and vandalism of desert tortoises play a major role in losses of desert tortoises in many area, particularly where human visitation is high" (appendix D, page D5). However, we have no data that directly link legitimate hunting with the shooting and vandalism of desert tortoises. During the course of discussions with land managers, hunters, and wardens from the California Department of Fish and Game since the desert tortoise has been listed, we have been told, anecdotally, that legitimate hunting activities do not threaten desert tortoises. We agree, although we do not have supporting data, that most desert tortoises are likely shot by people participating in other types of vandalism.

Consequently, we do not believe that the addition of hunting of Audubon cottontails and black-tailed jack rabbits from September through January would substantially alter the analysis of effects that was included in the biological opinion. Given the nature of the activity, we believe that few additional desert tortoises are likely to be killed or injured as a result of the additional hunting of Audubon cottontails and black-tailed jack rabbits. We and the National Park Service would likely be unable to determine whether any particular desert tortoise is killed or injured as a result of activities specifically related to this type of hunting.

Therefore, this memorandum amends the biological opinion to include small game hunting. Our decision is based on the fact that the biological opinion and this memorandum adequately address the effects to the desert tortoise for activities related to the hunting of big game, upland game birds, and Audubon cottontails and black-tailed jack rabbits. Consequently, the exemption to the prohibitions against take of the desert tortoise is extended to the legitimate hunting of Audubon cottontails and black-tailed jack rabbits. Please note that the activities associated with hunting that are exempted from the prohibitions against take include only legitimate actions, such as driving on open roads, hiking, and camping. Any intentional shooting or vandalism of desert tortoises is not exempted from the prohibitions against take.

Please contact George Walker of my staff at (760) 255-8852 if you have any questions concerning this amendment.

cc: California Department of Fish and Game, Bishop

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, California 93003

July 6, 2001

Memorandum

To: Superintendent, Mojave National Preserve, National Park Service, Barstow, California

From: Field Supervisor, Ventura Fish and Wildlife Office, Ventura, California

Diane K. Noda

Subject: Biological Opinion for the General Management Plan for the Mojave National Preserve, San Bernardino County, California (1-8-00-F-36)

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion for the General Management Plan (GMP) for the Mojave National Preserve and its effects on the federally threatened desert tortoise (*Gopherus agassizii*) and its critical habitat and the federally endangered Mohave tui chub (*Gila bicolor mohavensis*). This biological opinion has been prepared in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act). Your request to reinitiate formal consultation was received on February 17, 2000.

This biological opinion is based on the information you supplied in the General Management Plan that accompanied your request for consultation. A complete administrative record of this consultation is on file at the Service's Ventura Fish and Wildlife Office.

CONSULTATION HISTORY

An interagency meeting with the National Park Service (NPS), Bureau of Land Management (Bureau), and Service was held on August 23, 1995, to discuss the issues to be addressed in this planning effort. Following public scoping workshops in April 1997, a two-day interagency meeting was held in Barstow, California to discuss the alternatives and comments heard at the workshops. Additional interagency meetings were held on April 10 and June 11, 1997, to discuss listed and sensitive species in the planning area. Since the decision to issue a revised draft environmental impact statement was made, numerous meetings have been held among NPS, Bureau, Service, U.S. Geological Survey (USGS), and California Department of Fish and Game biologists regarding management strategies for cattle grazing and conservation of the desert tortoise.

Your original request for consultation was submitted August 28, 1998. The initial draft GMP was released for public review in September 1998. Based largely on public comments, the NPS made substantial revisions to the 1998 draft plan. The notice of availability for the revised draft General Management Plan was published on September 6, 2000. The action under consideration in this biological opinion is the revised draft GMP, as modified by the NPS following the public comment period. On May 10, 2001, Service and NPS staff discussed the issue of fencing paved roads through designated critical habitat to reduce mortality of desert tortoises.

In the GMP for the Mojave National Preserve, the NPS uses the terms "category I habitat" and critical habitat somewhat interchangeably. The phrase "category I habitat" was developed by the Bureau as a management tool for its lands; category I lands were generally those areas desert tortoises were numerous and the overall management goal for the area was recovery of the species. The Service's designation of critical habitat in 1994 largely replaced the use of the Bureau's habitat categories. Generally, the critical habitat designation within the Mojave National Preserve overlaps the areas rated by the Bureau as category I habitat. As a result of a discussion between Dennis Schramm of the NPS and Tim Thomas of the Service's Barstow office on June 20, 2001, the Service and NPS decided that the phrase "category I habitat" should be replaced with the phrase "critical habitat" in this biological opinion. We believe that this change better reflects the current management situation, does not alter the NPS's proposed action in any substantive manner, and clarifies the intent of the GMP.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The General Management Plan outlines the proposed management of NPS-administered lands within the 1.6 million acre Mojave National Preserve. The General Management Plan will serve as the initial overall management strategy for the next 10 to15 years. The General Management Plan is general rather than specific in nature. It serves as the overall umbrella guidance for a park unit under which more detailed activity or implementation plans are prepared. The proposed General Management Plan envisions the Mojave National Preserve as a natural environment and a cultural landscape where the protection of native desert ecosystems, natural processes, and historic resources is assured for future generations. The protection and perpetuation of native species in a self-sustaining environment is a primary long-term goal. This means minimizing development inside the Mojave National Preserve, including the proliferation of signs, new campgrounds, and interpretive exhibits. The NPS would rely on adjacent communities to provide most support services (food, gas, and lodging) for visitors. The General Management Plan also seeks to provide the public, consistent with the NPS mission, with maximum opportunities for roadside camping, backcountry camping, and access to the Mojave National Preserve via existing roads. The NPS will seek funding for the complete rehabilitation of the historic Kelso Depot for use as a museum and interpretive facility. The GMP will assist National Park Service staff in moderating the differences between its mission of resource preservation and other mandates from Congress, such as maintaining grazing, hunting, and mining under NPS regulations, and continuing the existence of major utility corridors.

The General Management Plan discusses a multitude of actions; those with the potential to have an effect on the desert tortoise or Mojave tui chub are discussed in more detail in the following sections. However, large portions of the Mojave National Preserve do not contain habitat for the desert tortoise, primarily because they are at elevations above where this species normally occurs. Other aspects of the General Management Plan relate to the NPS's use of buildings in the developed areas of Baker and Barstow; this biological opinion will not evaluate those activities that will not affect desert tortoises. Because geothermal resources, oil, and gas on federal lands within the Mojave National Preserve are not available for extraction or sale, these issues will not be discussed further in this biological opinion.

Fire Management

The current fire policy is to suppress all fires in the Mojave National Preserve until fire history and effects of fire on the area ecosystem are completed and a fire management plan is written and approved. These studies would provide data for determining how to manage fires in the Mojave National Preserve. Minimum impact suppression techniques would be used in all areas of the Mojave National Preserve.

Protection of life and property would be the first priorities of fire management. All human-caused fire would be suppressed and all fire management actions would be implemented using methods, equipment, and tactics that cause the least impact on natural and cultural resources. Heavy equipment, such as bulldozers, would not be used except in emergencies as determined on a case-by-case basis by the superintendent. All staff would receive training on appropriate strategy, tactics and precautions in desert tortoise habitat.

Fire management strategies within wilderness areas would use a "minimum requirement" process that would continue to be used for every fire in wilderness to determine the minimum tool or administrative practice necessary to successfully and safely accomplish the management objective with the least adverse impact on wilderness character and resources. The use of mechanized equipment and transport (*i.e.*, chain saws, portable pumps, vehicles, and aircraft) would remain an exception to be exercised sparingly and only when it meets the test of being the minimum necessary for wilderness purposes. The superintendent or his/her designee must approve such exceptions.

The effects of fire on components of desert ecosystems and the extent and degree of its historic role on biota are not well understood. The NPS is assessing and documenting the state of existing fire effects research in desert ecosystems. Over the short term (1 to10 years), fire management strategies would be developed based on the best available science, field observations of fire effects and post-burn monitoring of selected sites. Additionally, in cooperation with other desert parks, allied federal and state land managers, agency and university research staff, the NPS would assess research needs and long-term studies would be initiated. Specific research topics might include fire effects on the desert tortoise and its habitat, post-fire successional trends, or effective post-fire rehabilitation strategies.

Hazardous Materials

Numerous potential hazardous material sites existed within the Mojave National Preserve when it was established. The NPS has removed hazardous materials and conducted cleanup operations on over a dozen sites, including illegal drug labs, abandoned wastes on mining claims, and illegal dumps. New sites are immediately surveyed, and remediated by licensed contractors. These locations are primarily related to mining activities where chemical processing took place; however, illegal waste dumping or clandestine drug lab activities continue to occur. Potential hazards are prioritized and investigated based on the relative threat posed to human health and the environment. Hazards and threats documented through this investigation process are addressed by seeking special project funding for environmental clean up work.

Inventorying and Monitoring

Inventorying and monitoring of the Preserve's natural and cultural resources are necessary to gain a more complete understanding of their value and condition. The NPS plans to assemble baseline inventory data describing the natural and cultural resources under its stewardship and will monitor the resources at regular intervals to detect or predict changes. The resulting information will be analyzed to detect changes that may require intervention and to provide reference points for comparison with other, more altered environments. The NPS would also use this information to manage the integrity of natural systems and to protect the public, staff, and infrastructure. Project priorities are determined on the basis of existing staff availability and funding.

The NPS would develop and implement a systematic, integrated program to identify, inventory, and monitor its natural and cultural resources. This program would be developed through collaborative partnerships with government agencies and public and private organizations with natural and cultural resource management or research expertise. A comprehensive strategy would be developed and implemented to ensure that regional, local or national trends are documented and appropriate actions undertaken. The NPS has identified twelve data sets that each park unit should collect to have a basic understanding of their resources. The NPS is actively working in cooperation with other desert parks on an integrated inventory and monitoring strategy, using the vital signs approach.

Research and Permits

In recognition of the legislative direction and the scientific value of parks as natural laboratories, researchers would be encouraged to use the parks for scientific studies, whenever such use is consistent with NPS policies and law. The NPS would seek to develop a complete inventory of all floristic elements and establish monitoring programs to serve as early warning systems for the Preserve. The NPS would promote cooperative relationships with educational and scientific institutions and qualified individuals with specialized expertise that can provide substantial assistance to the park. The NPS would cooperate with researchers and universities to identify methods and techniques that may be employed to ensure protection of research equipment and plots.

Non-NPS studies are not required to address specifically identified NPS management issues or information needs. However, these studies, including data and specimen collection, require an NPS research or collecting permit. The studies must conform to NPS policies and guidelines regarding publication of data, conduct of studies, wilderness restrictions, and park-specific requirements pursuant to the terms and conditions of the permit. Projects must be administered and conducted only by fully qualified personnel and conform to current standards of scholarship. NPS research/collecting permits may include requirements that permittees provide to the NPS, within certain timeframes, the appropriate field notes, data, information about the data, progress reports, interim and final reports, and publications derived from the permitted activities.

The NPS would be responsible for the review and approval of all proposals for research on Mojave National Preserve lands to ensure that they conform to the management policies and the provisions of 36 CFR 2.5. The superintendent would issue permits for all research and collection. Published research results would be provided to the NPS as a condition of all permits and be made available for use by staff and the public.

Natural Resource Collections

Natural resource collections, including non-living and living specimens, and their associated field records, are managed as NPS museum collections. Guidance for collecting and managing specimens and associated field records is found in 36 Code of Federal Regulations (CFR) 2.5 and NPS guidance documents, including the museum handbook. Commercial application of any specimens, including any components of specimens (natural organisms, enzymes, genetic materials, or seeds) collected under an NPS permit must be done in accordance with a cooperative research and development agreement. Research results derived from collected specimens are to be used for scientific or educational purposes only and may not be used for commercial purposes unless the permittee has entered into a cooperative research and development agreement with the NPS.

Sand and Gravel for Road Maintenance

Sand, gravel, and cinders on federal lands in the Preserve are not available for extraction or sale. Use of borrow materials for road maintenance must conform to existing NPS policy, which requires materials to be obtained from sources outside the Mojave National Preserve unless economically infeasible. The NPS would allow the collection and stockpiling of material that washes onto roads during flood events for emergency use in repairing damage. This collection may occur in the active wash within 100 feet of the road centerline for the maintained paved and dirt roads, but only after a survey of the area certifies that no desert tortoise burrows would be harmed. Material accumulated on the active road surface may be reused or stockpiled without a survey. Stockpiling of such material may only occur at specified locations identified in the cooperative agreement with the County of San Bernardino (County).

Management of the Desert Tortoise

One of the goals of the General Management Plan is the delisting of the desert tortoise following recovery of the Mojave population. The NPS manages for multiple species and protection of habitats for all native species. To further recovery of the desert tortoise, the NPS proposes to manage grazing, burros (*Equus asinus*), hunting, and camping activities in a manner that will be compatible with the recovery of the species. The NPS will protect the desert tortoise and its habitat regardless of its location or habitat designation throughout the Preserve. The NPS would not need to create a new land use classification for these areas because they already receive the highest possible protection as park and wilderness lands.

Desert tortoises in the areas outside designated critical habitat would still be fully protected because of the wilderness designations and other protective measures the NPS proposes to put in effect. To ensure the long-term protection of the desert tortoise in the Mojave National Preserve, the NPS would begin or continue to implement the following measures:

Management policies already in effect:

- -Vehicles are permitted only on existing roads.
- -All vehicles must be street legal and licensed.
- -No offroad or wash driving is allowed anywhere in the Mojave National Preserve.
- -No competitive motorized events are permitted.
- -Organized events that do not involve timed races might be acceptable on existing roads, outside periods when desert tortoises are active, with appropriate restrictions and subject to other NPS statutes and regulations.
- -No existing or new landfills are allowed anywhere in park units under NPS regulations.
- -The NPS is currently closing and cleaning up existing unauthorized trash dumps.
- -The NPS enforces regulations prohibiting dumping and littering.
- -The NPS aggressively manages trash and litter to avoid subsidizing common ravens (*Corvus corax*).
- -Common raven-proof trash containers are being installed throughout the Mojave National Preserve.
- -No agricultural clearing or commercial vegetation harvest is permitted on National Park Service lands.
- -No surface disturbance is permitted on National Park Service lands, unless it is balanced with appropriate restoration or acquisition of replacement lands for mitigation.
- -The NPS imposes strict limits on research in the desert tortoise critical habitat that might adversely affect the desert tortoise.

-The NPS has removed approximately 3,000 burros from the Preserve since 1997.
-A management goal of zero feral burros would remain in effect and removals would continue until the goal is reached.
-The NPS enforces its regulations (36 CFR 2.4(a)(2)(ii)) prohibiting random target shooting.
-NPS regulations require dogs to be on a leash (or under physical or voice control of owner to ensure that they do not harass wildlife if used for hunting).
-No collecting of any natural or cultural resources, including the desert tortoise, is permitted under NPS regulations, unless done under a research collection permit.
-To prevent the spread of disease from captive desert tortoises, the NPS prohibits the release of captive desert tortoises in accordance with 36 CFR 2.1.
-The National Park Service would work with other federal and state agencies to develop a cooperative program where residents can drop off unwanted and injured desert tortoises and can adopt healthy, previously captive desert tortoises.

Proposed additional management actions:
-In areas where use by desert tortoises is high, during the active season, the NPS would undertake additional temporary signing and staffing of heavily used entrances on busy weekends to raise visitor awareness of its presence.
-Speed limits may be temporarily adjusted.
-The NPS would support and participate in an interagency regional study of predation by common ravens to determine the appropriate management actions.
-No new roads would be built in the critical habitat of the desert tortoise.
-Duplicate roads and those that provide access to range developments, active mines or other development sites would be closed and restored when no longer needed for that function.
-The NPS would implement temporary closure of certain dirt roads, as needed, within critical habitat to reduce vehicle access where human-caused mortality or stress of desert tortoises is identified.
-Congressional wilderness designation in 1994 resulted in the permanent closure of approximately 147 miles of unmaintained backcountry dirt roads in designated critical habitat. During development of the management plan for wilderness and backcountry over the next two years, the NPS would inventory and evaluate all remaining open dirt roads in desert tortoise critical habitat and determine duplicate or unneeded routes. The goal would be to permanently close up to an additional 100 miles of roads.
-The NPS would strive to eliminate unnecessary rights-of-way and easements and would require minimum maintenance to prevent increased vehicle traffic.
-Holders of rights-of-way and easements may be required to install fencing to preclude entry by desert tortoises through the critical habitat if traffic levels suggest a problem and fencing is identified as necessary to protect the desert tortoise.

-Maintenance activities on rights-of-way would be allowed only after the holder conducts an adequate survey of desert tortoise burrows along the route and complies with all stipulations from this biological opinion.
-The National Park Service would establish an active restoration program for disturbed areas after appropriate site-specific historical review and compliance.
-The NPS would make lands within critical habitat a high priority for acquisition.
-The NPS would develop extensive educational materials on the life history of, threats to, and recovery efforts for the desert tortoise for use in schools, museums, clubs, published media, site bulletins, and displays in the park information and visitor centers.
-The NPS would adopt minimum-impact fire suppression techniques in critical habitat, followed immediately by restoration of disturbed areas.
-The NPS would encourage and support research on the impacts of fire on the desert tortoise.
-The National Park Service would inventory and eliminate hazards to the desert tortoise from abandoned mining activities or facilities (*e.g.*, install devices to exclude desert tortoises from mine shafts).
-The National Park Service would modify existing water developments (mostly small game guzzlers) to prevent desert tortoises from gaining access or to ensure they are able to escape from them.

Proposed Cooperative Interagency Management Actions:
-The NPS would support the cooperative interagency monitoring effort for desert tortoise populations using protocols and methods adopted by the interagency Desert Managers Group. The NPS has hired a wildlife biologist to coordinate monitoring and research in the Mojave National Preserve.
-The NPS will inventory and monitor desert tortoise populations throughout the Preserve in coordination with the interagency, rangewide efforts.
-The NPS will work with the California Department of Fish and Game to limit hunting in the Mojave National Preserve to big game and upland game bird species during the normal hunting seasons. This action, combined with the existing policy on no target shooting, would eliminate the discharge of firearms when desert tortoises are active in the spring.
-The NPS will work with the County to find a suitable location outside the Mojave National Preserve to relocate the Baker landfill transfer station.
-The NPS will encourage and provide support for the relocation of the open sewage lagoons to eliminate odors at the Mojave National Preserve entrance and to reduce opportunities for common ravens to feed.

The NPS does not support the concept of installing new desert tortoise barrier fencing on paved roads in the Mojave National Preserve. However, the NPS would consider allowing barrier fencing along sections of the Kelso-Cima Road if installed by Union Pacific Railroad as part of another project. The fence would be placed out of visual site to not increase the visibility of desert tortoises walking along the fence. The fence would be left in place for a period of five years after construction and the NPS would undertake research to compare the fenced portion of this road with a similar unfenced portion to determine the advantages and disadvantages to the desert tortoise and other animals. The NPS will also take measures (entrance signs and information kiosks) to increase awareness of travelers of potential encounters with desert tortoises and other wildlife. Other measures have been identified that could be implemented seasonally to heighten awareness and slow traffic.

The NPS would work with the Service, the USGS, the California Department of Fish and Game, and the County to develop road maintenance standards that minimize impacts on desert tortoise. Berms and control of roadside vegetation are two issues for which standards need to be developed.

General Measures to Protect Desert Tortoises

If a development project is proposed on federal land within the Mojave National Preserve (*e.g.*, a right-of-way, mining, or range development) and would disturb or otherwise alter the native plant community or ground surface, the developer would be required to purchase equivalent habitat for the desert tortoise's conservation in accordance with the compensation formula established by the Desert Tortoise Management Oversight Group (Desert Tortoise Compensation Team 1991). Some activities might require monitoring during the project. The NPS would apply stipulations, as appropriate, for all activities permitted in areas where potential encounters with desert tortoises may occur. The NPS would continually evaluate ongoing research and communicate with the Service to modify these stipulations to reflect current recommendations regarding the protection of desert tortoises during research activities.

General Measures to Protect Desert Tortoises

As appropriate, measures to minimize impacts to the desert tortoise will be taken by the NPS or included, as stipulations, with special use permits issued by the NPS. These measures include the following:

1. Authorization of Biologists

   An authorized biologist is a person approved by the Service for moving desert tortoises out of a project area or from harm's way for a specific project. A qualified biologist is a person approved by the Service with appropriate education, training, and experience to conduct surveys, monitor project activities, provide worker education programs, and supervise or perform other implementing actions. The person may or may not be an authorized biologist. Review of the biologists' credentials for contracting purposes is at the discretion of the NPS.

2. Worker Training

All workers, including participating agency employees, construction and maintenance personnel, and others who implement authorized actions, shall be given special instruction on the protection of listed species, including occurrence, sensitivity, and activity patterns of the desert tortoise. Instruction shall also include legal protection and penalties for violation of federal and state laws.

3. Compliance

The project proponent shall designate an individual as field contact representative who shall be responsible for overseeing compliance and for coordination with the authorizing agency. Compliance shall include conducting species surveys, properly removing individuals of species from areas being affected, and ensuring that a sufficient number of qualified biologists are present during surface disturbance and that all conditions of the authorization are being met by the proponent, contractors, and workers. The field contact representative shall have the authority to halt activities that are in not in compliance with the authorization. After completion of the project, the NPS shall conduct a review to determine if the permittee complied with the conditions of the permit. Corrective actions shall be required of the proponent where conditions have not been met.

4. Compensation

A fee based on the amount of acreage disturbed shall be required of the permittee. The formula used to determine the amount of acreage to be acquired was developed by the Management Oversight Group for the Desert Tortoise (Desert Tortoise Compensation Team 1991) and considers factors such as the area where habitat was affected, the duration of the effect, and the nature of the disturbance.

5. Preconstruction Clearance Surveys

Preconstruction surveys shall be conducted to locate and remove desert tortoises prior to grading or actions which might result in harm to a desert tortoise or which remove habitat. The survey shall be conducted by an authorized biologist within 24 hours of the onset of the surface disturbance unless a fence to preclude entry by desert tortoises has been installed.

6. Surface Disturbance

All surface-disturbing activity shall be limited to the land area essential for the permitted project or activity. In determining these limits, consideration shall be given to topography, public health and safety, placement of facilities, and other limiting factors. Work area boundaries and special habitat features shall be appropriately marked to minimize disturbance. Where possible, previously disturbed areas shall be used as work sites and for storage of equipment, supplies, and excavated material. Pre-construction activity, such as removal of vegetation, shall occur in the presence of a qualified biologist. No overnight hazards to desert tortoises shall be created by this activity (*e.g.*, auger holes or any steep-sided depressions); hazards shall be eliminated each day prior to the work crew leaving the site. Large disturbed areas, such as open-pit mines and landfills, shall be enclosed with fencing to keep desert tortoises out of the work area. The fencing shall be removed when restoration of the site is completed. Temporary fencing shall be required around test sites where trenching or drill holes could trap animals or around other small, short-term projects where desert tortoises could move into the work area. Occasionally, seasonal restrictions and monitoring are required to alleviate the need for fencing. Special habitat features, particularly desert tortoise burrows, shall be flagged by the qualified biologist so that they may be avoided by equipment and during placement of poles and anchors.

7. Refuse Disposal

All trash and food items generated by construction and maintenance activities shall be promptly contained and regularly removed from the project site to reduce the attractiveness of the area to common ravens and other desert predators. Portable toilets shall be provided on-site, if appropriate.

8. Pets

Pets shall be restrained either by enclosure in a kennel or by chaining to a point within the desert tortoise-proof enclosure, if one has been constructed for the activity.

9. Common Ravens

Structures which may function as nesting or perching sites for common ravens are not authorized except as specifically stated in the appropriate NPS document. The permittee shall provide a description of all structures to be erected on the site. Some actions are required to reduce actual nesting on authorized structures, such as requiring the proponent to secure necessary permits to remove nests in a timely fashion.

10. Firearms

Use or possession of firearms by the permittee or his/her agents in the project area shall be prohibited.

11. Motorized Access

Motor vehicle access is limited to maintained roads and designated routes. Where access from a maintained road or designated route to a project's site is part of the approved development plan, the length and location of the route shall be designed to minimize impact on the habitat. The proponent shall be subject to the compensation fee for the amount of disturbed area and the route shall be designated "Limited Use" and not open to the public. The following measures also apply to motorized access:

a. Speed Limits

Vehicle speed within a project area, along right-of-way maintenance roads, and on routes designated for limited use shall not exceed 20 miles per hour. Speed limits shall be clearly marked by the permittee, and workers shall be made aware of these limits.

b. Desert Tortoises Under Vehicles

Vehicles parked in desert tortoise habitat shall be inspected immediately prior to being moved. If a desert tortoise is found beneath a vehicle, the authorized biologist shall be contacted to move the animal from harm's way or the vehicle shall not be moved until the desert tortoise leaves of its own accord. The authorized biologist shall be responsible for taking appropriate measures to ensure that any desert tortoise moved in this manner is not exposed to temperature extremes, which could be harmful to the animal.

12. Route Maintenance and Surface Restoration

The following measures shall be implemented during all route maintenance and surface restoration projects:

a. Heavy Equipment

Operators of heavy equipment (such as roadgraders) shall be accompanied by a qualified biologist when working in desert tortoise habitat during the desert tortoise's active period (March 1 to October 31). The qualified biologist shall walk in front of the equipment during its operation and shall function as the field contact representative and have the responsibility and authority to halt all project activity should danger to a desert tortoise arise. Work shall proceed only after hazards to the desert tortoise are removed, the desert tortoise is no longer at risk, or the desert tortoise has been moved from harm's way by an authorized biologist. During the desert tortoise's inactive period (November 1 to the end of February), an onsite monitor is not required, but the equipment operator shall be a qualified biologist. Otherwise, the operator shall be accompanied by a qualified biologist. The operator shall watch for desert tortoises while using the equipment and shall have the responsibility for preventing harm to desert tortoises, as described previously in this measure. Operators of light equipment used for trail maintenance and project leaders for surface reclamation actions shall watch for desert tortoises or burrows during all project activities. They shall have the responsibility for preventing harm to desert tortoises, as described previously in this measure. They shall be a qualified biologist.

b. Injury

Should any desert tortoise be injured or killed, all activities shall be halted and the authorized biologist immediately contacted. The biologist shall have the responsibility for determining whether the animal should be transported to a veterinarian for care, which is paid for by the permittee, if any is involved. If the animal recovers, the Service is to be contacted to determine the final disposition of the animal.

c. Report

The equipment operator or authorized biologist shall keep a tally of all desert tortoises seen, moved, injured, or killed during the project. Other required elements are rating the effectiveness of required protective measures, a breakdown of actual habitat disturbance, and suggestions for improving measures to protect the desert tortoise.

d. Ditches

The equipment operator or qualified biologist shall inspect ditches for desert tortoise burrows before moving or shoveling any soil. If a desert tortoise burrow is present, the ditch shall be left undisturbed if possible. If the equipment operator inspects ditches for desert tortoise burrows, he or she shall be adequately trained in the identification of desert tortoise sign by the authorized biologist prior to conducting inspections.

e. Burrows

If a burrow is occupied by a desert tortoise and avoidance of the burrow is not possible during road maintenance or reclamation activities, the authorized biologist shall make the final determination regarding the need to relocate the desert tortoise, either permanently or temporarily. Only an authorized biologist may excavate the burrow, following established protocols.

f. Grading

To avoid building up tall berms that may inhibit movement of desert tortoises, the operator should minimize lowering of the road bed while grading. Berms higher than 12 inches or a slope greater than 30 degrees shall be pulled back into the road bed.

g. Speed Limits

The equipment operator shall watch for desert tortoises on the road whenever driving, transporting or operating equipment. Driving speeds shall not exceed 20 miles per hour and operating speeds should not exceed 5 miles per hour to allow for adequate visibility.

The NPS has also proposed special protective measures for specific uses, which include:

13. Mineral Exploration and Development

In addition to the protective measures described above, the following special measures shall apply to small mining operations in which the surface disturbance or area from which desert tortoises are to be removed is less than ten acres:

a. Compliance

A qualified biologist shall be onsite during the initial mining activity.

b. Explosives

If use of explosives is authorized, the NPS biologist or environmental specialist shall verbally consult with the appropriate Service office to determine what measures shall be required to reduce the potential to kill or injure desert tortoises. These measures may include: seasonal restrictions on the use of explosives; temporary removal of desert tortoises from areas potentially at risk during detonation either directly from the explosion or by thrown materials; and covering of desert tortoise burrows to reduce impacts of flying materials. All handling and storage of desert tortoises for this purpose shall be conducted by an authorized biologist.

14. Special Use Permit and Events

A special use permit is needed for organized events involving 15 or more individuals or 7 or more vehicles. Appropriate measures to minimize the impact on the desert tortoise or other resource will be included.

15. Utility Pipelines and Underground Cables

The NPS will apply the following measures on construction and maintenance of all pipelines, fiber-optic lines, and other utilities requiring trenching:

a. Width

Construction rights-of-way shall be restricted to the narrowest possible width.

b. Exceptions

All project construction and maintenance shall be restricted to the authorized right-of-way. If unforeseen circumstances require expansion beyond the right-of-way, the potential expanded work areas shall be surveyed for desert tortoises.

c. Access

Vehicular travel shall be limited to the right-of-way. Access to the right-of-way shall be limited to public roads and designated routes.

d. Trenches

Open trenches shall be regularly inspected by the authorized biologist at a minimum of once per day and any desert tortoises that are encountered shall be safely removed. For small projects, escape ramps are sometimes required. The length of the trench left open at any given time shall not exceed that distance which will remain open for one week or less in duration. A final inspection of the open trench segment shall be made by the authorized biologist immediately prior to backfilling. Arrangements shall be made prior to the onset of maintenance or construction to ensure that desert tortoises can be removed from the trench without violating any requirement of the Occupational Safety and Health Administration.

e. Maintenance

Observations of desert tortoises or their sign during maintenance shall be conveyed to the field supervisor and a biological monitor. Employees shall be notified that they are not authorized to handle or otherwise move desert tortoises encountered on the project site.

f. Compliance

Sufficient authorized and qualified biologists shall be present during maintenance or construction activities to assist in the implementation of on-site protective measures for the desert tortoise and to monitor compliance. The appropriate number of biologists will depend upon the nature and extent of the work being conducted and shall be stated in the right-of-way grant for each particular action, after consultation with the specific resource area office authorizing the action.

g. Final Assessment

The authorizing agency shall ensure that maintenance or construction activities are confined to the authorized work areas by means of a post-project assessment. The assessment may be conducted by the authorized biologist. If maintenance or construction activities have extended beyond the flagged work areas, the NPS shall ensure that the project proponent restores these disturbed areas in an appropriate manner.

h. Restoration

The proponent shall be required to restore disturbed areas in a manner that would assist re-establishment of biological values within the disturbed rights-of-way. Methods of restoration shall include, but not be limited to: road closure, the reduction of erosion, respreading of the top two to six inches of soil, planting with appropriate native shrubs, and scattering any bladed vegetation and rocks, where appropriate, across the right-of-way.

16. Power Transmission Lines

The following protective measures shall be implemented during all construction and maintenance of transmission lines. Where memoranda of understanding or other agreements are appropriate, measures will be included within the agreement.

a. Surveys

When access along the utility corridor already exists, pre-construction surveys for transmission lines shall provide 100 percent coverage for any areas to be disturbed and within a 100-foot buffer around the areas of disturbance. When access along the utility corridor does not already exist, pre-construction surveys for transmission lines shall follow the standard protocol for linear projects.

b. Access

To the maximum extent possible, access for transmission line construction and maintenance shall occur from public roads and designated routes.

c. Disturbed Areas

To the maximum extent possible, transmission pylons and poles, equipment storage areas, and wire-pulling sites shall be sited in a manner that avoids desert tortoise burrows.

d. Restoration

Whenever possible, spur and access roads and other disturbed sites created during construction shall be recontoured and restored.

e. Common Ravens

All transmission lines shall be designed in a manner that would reduce the likelihood of nesting by common ravens. Each transmission line company shall remove any common raven nests that are found on its structures. Transmission line companies must obtain a permit from the Service's Division of Law Enforcement to destroy common ravens or their nests.

Management of Burros

The proposed management goal for the Mojave National Preserve is to remove all burros from inside the boundary and implement actions, to the extent practicable, to ensure that they do not reenter. The Bureau's former prescribed herd management level was 130 animals. A cooperative agreement between the NPS and the Bureau calls for burros to be managed at that level until adoption of this proposal. Because the existing population has far exceeded this interim target level, the NPS initiated removals in 1997 to reduce the population. Thirty days after the signing of the record of decision for the General Management Plan, the NPS would begin implementing the removal of the remainder of the Mojave National Preserve's burros.

Burros would be removed in a multi-phased approach similar to that used successfully in Death Valley National Park.

During phase one of the removal effort, up to two years would be allowed for the live capture and removal of as many burros as possible. The methods and procedures for capture, transport, and placement are the same as those used in the existing management program. They are summarized below and presented in detail in the NPS's action plan (NPS 1998). The captured burros would be placed through the Bureau's adoption program, animal protection groups, or direct or indirect placement programs of the NPS.

Four capture methods would be used or considered for the Preserve's burro program: 1) water trapping, 2) horseback wrangling, 3) helicopter-assisted roping and trapping, and 4) net gunning. A phased approach would be employed in implementing these methods. The first phase is the effort to be conducted by the NPS. Water trapping is considered the easiest and least expensive means of capture, with horseback wrangling and helicopter methods becoming increasingly more difficult and expensive. The more difficult capture methods, however, are also more effective at capturing elusive, remote, and solitary animals. As water trapping becomes less effective, horseback wrangling and helicopter methods will become the primary focus of capture operations. The number of burros that are removed with each method is subject to modification as the program progresses and various capture methods prove more or less effective than anticipated.

1. Water Trapping

Burros are habituated to drinking at certain cattle corrals and developed waters. During water trapping, the animals enter a corral through a one-way gate known as a "finger trap" or "trigger" to obtain water and cannot exit. Only existing corrals or previously developed water sources that have been previously heavily affected by livestock and feral burros are used. Temporary corrals would be set up around those developed water sources planned for trapping where no corral exists. Temporary corrals are made of six-rail livestock panels. No trapping is or would be conducted at springs, wetlands, riparian areas, or other sensitive environments. Traps are checked for animals every day during water trapping operations. Trapped animals are loaded on a trailer and hauled to a central holding corral, where they await shipment out of the Mojave National Preserve. Holding corrals, like the trapping corrals, are located on ground that is previously heavily disturbed by livestock use. Only existing corrals are used.

Water trapping has been highly successful at the Mojave National Preserve, resulting in the capture of 1,841 burros during three separate trapping seasons. Experience in other locations suggests that water trapping is most effective in the summer, when the animals are more thirsty and more willing to enter a trap to get a drink, and when fewer natural water sources are available. Based on the effectiveness of the water trapping program to date, however, the NPS is attempting to water trap burros on a year-round basis. If water trapping becomes ineffective in the spring, fall, or winter, trapping during these seasons would be halted. Additionally, as the number of burros is reduced, even warm-season water trapping may become less successful, because the burro herd will be reduced to only those animals that drink at natural sources.

2. Horseback Wrangling

When water trapping is not effective, other methods of capture will be required. One alternative is horseback wrangling, where riders capture burros by driving them into corrals or by roping the animals and leading them into corrals. Efforts would be made to use existing corrals or set up temporary corrals (using six-rail livestock panels) in previously disturbed areas. Like water trapping, burros would be moved to a central holding corral where they await removal from the Mojave National Preserve. Horseback wrangling may be used throughout the life of the program to capture animals that cannot be water trapped and are not concentrated enough to warrant the expense of helicopter capture.

3. Helicopter-Assisted Roping and Trapping

During helicopter-assisted trapping, a helicopter is used to locate burros and herd them into a funnel trap. Wranglers wait until the burros enter the mouth of the funnel trap and then close in behind the animals, herding them into the corral. During helicopter-assisted roping, a helicopter is used to herd the animals to a capture site where wranglers are waiting. The wranglers rope the animals and lead them to a corral. Like the other two methods, captured burros would be placed in a temporary holding corral where they would be cared for while awaiting removal from Mojave National Preserve. Helicopter-assisted roping and trapping would be employed to capture burros in those areas were water trapping and horseback wrangling are not feasible or effective, and where the concentration of burros that helicopter methods would prove cost effective. Costs per animal capture are expected to increase over the life of the program as burro numbers are reduced. In FY2000, the NPS initiated helicopter-assisted roundups in the Lava Beds and Granite Mountains, resulting in the capture of over 513 burros by this technique.

4. Net Gunning

During net gunning, a net is fired onto the animal from an overhead helicopter. Animal handlers (either already on the ground or in the helicopter) then move the burro to a designated holding corral where they are maintained until they are removed from Mojave National Preserve. Only the most remote and elusive burros would be captured through net gunning. Net gunning would be used sparingly and only in those situations where no other option exists for capture.

The Mojave National Preserve covers a large area and has few geographic boundaries that can inhibit burro migration within the park. Monitoring over the last three years by NPS staff suggest that burro herds are concentrated in the following general locations: Granite Mountains, Providence Mountains/Clipper Valley, Woods Hackberry Mountains, New York Mountains, Ivanpah Mountains, Cima Dome, Cinder Cones, and Clark Mountain. The combined area of these locations totals over one million acres. Predicting herd locations within these general geographic areas is problematic. Decisions on general capture areas would be based on monitoring observations taken approximately two weeks prior to capture operations. Decisions regarding specific trap and holding corral locations would be made immediately after the determination of the general capture locations. The specific number of livestock corrals in the Mojave National Preserve that could serve as potential traps or holding facilities is unknown, but may number in the hundreds. Potential holding facilities exist within a few miles of almost all capture locations.

Flexibility is a key feature of the removal methods used by the NPS. After the general capture areas are determined, the NPS contracts for use of a helicopter for limited periods of time. The helicopter then searches the Mojave National Preserve for concentrations of burros; when burros are found, the NPS then deploys wranglers, herds burros with the helicopter, or uses net guns. Simply stated, the NPS cannot precisely define the specific locations and specific times the removal of burros will occur.

Upon signing of the Record of Decision, the NPS would provide a maximum of six months during which animal protection groups may remove any remaining animals, at their expense, from areas of the Mojave National Preserve where live trapping or capture techniques have achieved the maximum cost effective results. This effort is the second phase of removal. If the group's proposal is agreeable with the NPS, an agreement would be negotiated and signed between the NPS and the interested group(s). The NPS would provide oversight, logistics support, and the use of some equipment and corrals. Most of the Mojave National Preserve's burros would likely be captured and removed through phases one and two. If an agreement with an animal protection group is not reached within six months of the signing of the Record of Decision, the NPS would immediately begin phase three. Phases one and two must result in adequate removals each year to reduce the populations substantially in the area being targeted. If phase one proves unsuccessful in the first year, the NPS would move to phases two and three as needed to achieve the desired results. One area of the Mojave National Preserve may remain in phase one, while other areas proceed to phases two and three as necessary.

In phase three, NPS staff or contractors would eliminate the remaining few animals in a humane manner. This action would occur only when desert tortoises are not active. By timing operations in this manner, juvenile desert tortoises may not be subject to increased predation by common ravens, which are likely to congregate near burro carcasses. Phase three would continue for an indefinite time. The NPS also maintains the option of implementing phase three if live captures do not succeed in reducing populations.

A Herd Management Area, under the jurisdiction of the Bureau, lies adjacent to Clark Mountain, with no natural or constructed barriers to prevent burros from entering this satellite unit of the Mojave National Preserve. The Bureau proposes to retain cattle grazing and burros surrounding the Clark Mountain area. Because of this situation, the NPS would work with the Bureau to minimize trespass animals from the Herd Management Area. To most effectively manage these animals and prevent or reduce their impacts, the NPS would fence the Clark Mountain unit of the Mojave National Preserve, following its boundary. Portions of the fence would be constructed in a manner that would allow for deer and bighorn sheep to pass, but which would block movement of burros and cattle. This action cannot be implemented until the existing cattle grazing permits within the Mojave National Preserve are retired. The NPS would also work cooperatively with the Bureau and the California Department of Fish and Game to conduct gathers and aerial surveys of burros.

Removal of Salt Cedar

The NPS would continue to identify and remove salt cedar (*Tamarix ramosissima*). Only authorized herbicides would be used in salt cedar control efforts. Such herbicides are not persistent or toxic to aquatic life and are used in accordance with accepted management practices and proper dosages. Any use of poisons or other chemical agents on federal lands within the Mojave National Preserve, including use by NPS staff or by permittees, requires review and permission under the NPS Integrated Pest Management program. Athel tamarisk trees (*T. aphylla*), such as those planted along the Union Pacific railroad corridor for protection of the tracks from blowing sand, do not spread easily and are not considered a threat. Retention of athel tamarisk trees at Kelso Depot and Zzyzx as part of the historic landscape would be evaluated during planning efforts for those sites.

Visitor Information Center Operation

Because the Preserve has many highway entrances and only two staffed information centers outside its boundary, many visitors might arrive without much opportunity to receive advanced information. To remedy this situation, the NPS would continually investigate and develop effective means of providing advanced information on the Preserve and the Mojave Desert. The overall objective of this proposal would be to try to provide advance information that would improve the quality of people's visit to the Preserve.

The Hole-in-the-Wall information center would continue to provide visitor information and serve seasonally as a base for interpretive programs such as ranger-led walks and talks. Eventual replacement of the existing information center is being evaluated in a separate development concept plan for Hole-in-the-Wall.

Interpretive Facilities

Kelso Depot would be rehabilitated for use as a museum and interpretive facility. The NPS may seek to acquire private lands in the immediate vicinity of the depot for use as parking lots. The NPS may also seek to develop partnerships to preserve the schoolhouse and general store. A water well and septic system would be installed within previously disturbed areas adjacent to the Kelso Depot. The NPS is also considering whether to develop interpretation opportunities centered around the historic iron ore loading bin, which is also located at the Depot, and Vulcan

Mine. The flood dike would be secured to protect the depot. The NPS intends to conduct separate consultations on the dike and Vulcan Mine activities. Other than possibly the dike and Vulcan Mine, these activities would occur in previously disturbed areas and would not affect desert tortoises or their habitat; consequently, they will not be discussed further in this biological opinion. The NPS will require the project area to be fenced during construction to keep desert tortoises from wandering into the site.

Soda Springs, which is also known as Zzyzx, has been used for a variety of purposes for hundreds of years. It has been used as an educational and research facility for the last 20 years. The existing facilities would serve as the focal point for visitors coming to Zzyzx for day use. The NPS would explore opportunities for expanded day use trails in the area and would expand the existing self-guided interpretive program and exhibits. These opportunities would be developed through the long-range interpretive plan and site specific planning. Occasional ranger-led programs may be provided. Planning, visitor use and interpretive programs in this area would be coordinated with California State University. Where possible, the ongoing research would be interpreted to the public.

The existing visitor information contact center at Hole-in-the-Wall offers little interpretive information and is only staffed seasonally. The NPS would develop a site-specific management plan for the Hole-in-the-Wall area to address visitor and administrative facilities. Soda Springs and Hole-in-the-Wall are located outside of desert tortoise habitat; consequently, activities in these areas would not affect desert tortoises. They will not be discussed again in this biological opinion.

The NPS intends to use signs unobtrusively and sparingly and in a manner that blends with the natural environment so that the undeveloped wild character and sense of exploration remains. The NPS would prepare a sign plan that would provide for directional signs to major points of interest, which are typically located on the major roads that carry most of the traffic. Secondary or backcountry roads would remain relatively free of directional signs. The intention would be to keep visitors from becoming lost. Emphasis would be placed in the sign plan for signs that could help protect the health and safety of visitors unfamiliar with the desert.

A minimal number of road or trailside interpretive wayside panels would be installed. Displays typically would be placed along paved or other heavily traveled roads to interpret important and interesting resources visible from each area. Safety and orientation panels would be installed at key trailheads, developed campgrounds, and other high visitor use areas, such as Kelso Dunes. Care would be taken to make and keep these displays as unobtrusive as possible and secondary to the landscape they were interpreting. Signs would be posted in parking areas asking visitors to check for desert tortoises under their vehicles before moving their vehicles.

Field Offices, Maintenance Facilities, Interagency Fire Center, and Employee Housing

The NPS has not developed specific plans for some of these future facilities. The renovation of existing facilities would occur in previously disturbed areas or outside of habitat that is suitable for the desert tortoise. Consequently, these facilities will not be discussed further in this biological opinion.

Access and Circulation

The Mojave National Preserve has a broad range of access options. A network of over 2,000 miles of roads is available for public access, ranging from unmaintained primitive jeep roads to paved highways. Hundreds of miles of old roads in wilderness, developed hiking trails, and cross-country hiking provide foot and horseback access to most areas of the Mojave National Preserve. In addition, the Union Pacific Railroad traverses the center of the Preserve through the Devil's Playground.

<u>Roads</u>
No major changes would be made to the existing roads. Some limited improvement of heavily used roads might be undertaken when funds permitted, such as the addition of crushed rock to the Kelso Dunes and Soda Springs access roads. Vehicle use would be limited to street legal vehicles. No off-road driving would be permitted. Driving in desert washes is not permitted unless they are shown as developed roads on park maps. These routes are usually easily identified on the ground, even after storms, due to the distinctive lack of vegetation from years of use as a route. To provide detailed guidance for managing the road system, a management plan would be prepared to evaluate the need for duplicate road sections, road surface conditions, and the appropriate level of maintenance.

<u>Paved Roads</u>
The County would continue to maintain the paved roads throughout the Mojave National Preserve under a cooperative agreement with the NPS. An inventory of these roads, totaling about 176 miles, would be included in the cooperative agreement. In accordance with NPS regulations at 36 CFR 4.2.1 and to assure the safety of visitors and protection of park resources, the speed limit on all paved roads may be reduced to 45 miles per hour in areas or during periods where such a reduction is warranted. Signing along these roads would be a joint responsibility, with the County installing and maintaining most regulatory signs and the NPS installing and maintaining interpretive and directional signs.

<u>Maintained Dirt Roads</u>
The County would continue to maintain the graded dirt Cedar Canyon, Black Canyon, Ivanpah, and Lanfair Valley roads (approximately 79 miles). The NPS would maintain graded dirt access roads to Zzyzx and Kelso Dunes and the Wild Horse Canyon Road (approximately 20 miles).

Backcountry Dirt Roads

High-clearance and four-wheel-drive roads would not be routinely maintained by the NPS or the County. However, emergency repairs or limited maintenance might be undertaken by the NPS or volunteer groups under cooperative agreements. Some private landowners that reside in the Mojave National Preserve or organized groups may do limited maintenance on certain roads such as dragging the road or using a small tractor. Where these roads cross federal land, the NPS would require a permit for such routine maintenance. This permit is necessary to assure that no desert tortoises are harmed by the activity and the maintenance is done in accordance with NPS standards. Backcountry users that encounter washed out roads during their visit may make emergency repairs using hand tools, if required for them to exit an area.

Mojave Road

The Mojave Road would remain open for street legal vehicles, mountain bikes, equestrians, and hikers. The NPS would consider granting business permits for commercial guided tours of the road to provide visitors without the appropriate vehicle an opportunity to experience this resource. Maintenance of the Mojave Road would be considered in a road management plan for the Preserve. Under that plan, general guidance would be given to allow the Mojave Road to develop its own character with minor maintenance until the plan was completed. Maintenance generally would be limited to repairs needed to allow continued passage by vehicles currently using the road. The NPS would seek partnerships with volunteer groups to help with maintenance of the road and other features in the road corridor. NPS rangers would patrol the road to offer emergency assistance and protect cultural and natural resources.

Backcountry and Wilderness Use

A management plan for backcountry and wilderness use will be prepared in the future. Until completion of the plan, all trails would be open for use by hikers and equestrians, except where management problems were identified and restrictions needed to be established.

Rights-of-way and Easements

An estimated 125 rights-of-way or easements exist within the Mojave National Preserve. Some of these are entirely within the boundary, while others enter the Mojave National Preserve and may terminate within or pass through. Some of the major rights-of-way or easements have been issued to AT&T for an underground communications cable, Southern California Edison for electric transmission lines, Southern California Gas Company for natural gas pipelines and a petroleum pumping station, Cal-Nev for an oil pipeline, Molycorp for a waste water pipeline, Pacific Bell for a communication site, U.S. Sprint for a telephone line, and Union Pacific Railroad.

Additional research and record checking over the next several years would be conducted to document all the existing rights-of-way and easements and develop an administration plan. The NPS would convert existing rights-of-way to NPS standards and regulations wherever possible.

If the right-of-way is no longer needed or its use is being converted to new technology, the NPS would seek to relocate the operation outside the Mojave National Preserve. Abandoned rights-of-way would be restored by the holders of the grant. Agreements would be sought where necessary to protect resources.

Railroads

The Union Pacific Railroad line traverses the center of the Mojave National Preserve for 91 miles from Nipton, through Cima and Kelso, and to the southern edge of Soda Lake. This railroad right-of-way is a 200-foot wide corridor that was granted by Congress in 1875. The railroad operates this line as a major regional freight corridor to southern California, servicing as many as 35 freight trains per day. Union Pacific also owns land in the Kelso Depot area and houses a small crew there in several mobile homes.

The line through the Preserve is currently a single set of tracks, with five sidings for passing located between Kelso and Cima. Union Pacific is currently pursuing permits to construct a second set of tracks parallel to the existing set, extending from Kelso Depot to Cima. This project would allow passenger train service from Los Angeles to Las Vegas, provided by Amtrak. Review of this double-tracking proposed is occurring under separate compliance. If passenger train service resumes, the NPS would coordinate with Amtrak on the feasibility of placing NPS information and interpreters on trains and allowing passengers to stop at Kelso Depot. The NPS would support the communities of Barstow, Nipton, and Primm in establishing passenger train stops at these locations. Where feasible and appropriate, the NPS would also support the concept of using rail as an alternative form of transportation for visitors entering the Preserve.

Burlington Northern and Santa Fe Railroad also operates a major regional railroad line that parallels the southern boundary of the Preserve in some locations. East of Goffs, the railroad line runs along the boundary of the Mojave National Preserve, with the tracks being outside of NPS lands. This railroad does not enter the Mojave National Preserve, but adjacent operations may affect park resources. The NPS would pursue cooperative agreements with both railroads to address issues such as spill response, emergency operations, permitting, maintenance of dikes that extend onto federal lands, use of pesticides and herbicides, and other relevant issues.

Roads

Most of the roads in the Mojave National Preserve were constructed without rights-of-way or easements being granted. The County contends that all established roads in the Mojave National Preserve are valid under Revised Statute 2477, which concerns rights-of-way established across public lands under the Mining Act of 1866. Although repealed by Congress in 1976 with enactment of the Federal Land Policy and Management Act, routes that existed prior to October 21, 1976 may qualify as RS-2477 rights-of-way. However, a right-of-way asserted under RS-2477 is not automatically assumed to be valid. Regardless of whether a party can successfully assert a valid claim to a right-of-way across NPS land, the NPS retains the authority to regulate use of an RS 2477 right-of-way.

Wildlife Guzzlers

Approximately 130 small game and 6 big game guzzlers were installed throughout the Mojave National Preserve by agencies and interest groups over the last 60 years. The artificial waters were installed to enhance or replace natural waters for wildlife use. The NPS would examine the use of and need for all big game and small game guzzlers. Guzzlers would be retained for native wildlife if they are found to be necessary to replace water lost due to actions taken by previous human activities. These developed water sites would be retained to allow native populations of plants and animals to return to or remain at a previously undisturbed population level. Simultaneously, with the retention of these developed water sites, the NPS would actively begin to restore natural water sources to be self-sustaining. When a water source became self-sustaining, the artificial facility would be removed.

The NPS has no jurisdiction on developed water sites on private land. Motorized access to guzzlers in wilderness would be considered extraordinary and would not be routinely allowed unless warranted by unusual circumstances. These instances would be considered on a case-by-case basis. The NPS would modify existing water developments (mostly small game guzzlers) to prevent desert tortoises from gaining access and to ensure they are able to escape from them.

Hunting

In accordance with NPS regulations at 36 CFR, the discharge of firearms (including target shooting or random plinking) is prohibited throughout the Mojave National Preserve, except for hunting of upland game birds and big game during the seasons designated for these species by the California Department of Fish and Game. The hunting season would extend from September 1 to January 31, except that the season for bighorn sheep (*Ovis canadensis*) would extend through the first Sunday in February. The use of hunting dogs would be allowed in accordance with State hunting regulations; to protect visitors and wildlife, hunting dogs must be in the owner's control at all times.

The NPS does not believe that Congress intended to allow the sport collection of amphibians and reptiles when it included hunting provisions for Mojave National Preserve in the California Desert Protection Act. This activity would not be allowed in Mojave National Preserve because it is in conflict with administration of the area to meet the preservation mandates of the NPS mission and NPS regulations found at 36 CFR Part 2.

Equestrian Use

All trails would be open for use by hikers and equestrians, except where management problems were identified and restrictions needed to be established. Horses may also travel cross-country. Groups and organized events would need to obtain a permit. Large groups may be restricted to existing roads.

Backcountry Use and Roadside Vehicle Camping

Roadside vehicle camping would continue to be allowed only in previously used areas along open routes of travel, outside of wilderness. Vehicles may not leave the road surface at any time or park on vegetation. Many of these existing campsites occur along dirt roads. The NPS would inventory previously used campsites and prepare a backcountry and wilderness management plan that may provide additional restrictions. Until the plan is completed, the Preserve would manage roadside camping with the following conditions:

-Roadside camping would be allowed in previously used sites outside the day use only area.

-Campsites must be more than 200 yards from any natural or constructed water source.

-Groups and organized events would need to obtain a permit.

-Vehicles must remain in previously disturbed areas. The creation of new campsites would not be allowed. Driving off roads would not be permitted.

-Campfires would be allowed in existing fire rings or in a fire pan. Visitors are not allowed to collect firewood in the Mojave National Preserve.

-Backcountry structures on public lands would remain available to the public on a first come basis. Backcountry campers may camp anywhere in the Mojave National Preserve outside of designated day use only areas but must erect their tent out of sight of paved roads.

Camping at High Use Areas

In locations that are consistently heavily used by individuals or groups, camping will be limited to designated campsites. Resource conditions and visitor use would be monitored to determine the need for designating sites such as Caruthers Canyon, Cima Dome, Cinder Cones, Clark Mountain, Granite Pass (Kelbaker Road), and Grotto Hills. Other locations could be identified as information on visitor use was gathered.

Camping

Camping along the Mojave Road would be subject to management decisions made for roadside camping. Large groups camping along the Mojave Road would be required to camp at designated areas and to obtain a special use permit. Areas that would be considered for large group use would be Grotto Hills, Willow Wash, Seventeen Mile Point, the southeastern edge of Soda Lake in the Cow Hole Mountains, and the area know as the Granites, which is southwest of Soda Lake.

Camping in Desert Tortoise Critical Habitat

The park literature on camping in the backcountry would be modified to include information about the desert tortoise and actions the public should take when camping in desert tortoise habitat. In sensitive areas designated as critical habitat for the desert tortoise, vehicle-based roadside camping would be confined to a limited number of designated campsites with metal fire rings or campsite markers to identify them for use. Previously used areas would be considered first for designation. The designation of campsites would come after an inventory of natural and cultural resource conditions and existing campsites to determine the best locations. Campsites would be considered closed unless designated.

Mineral Development

The Mojave National Preserve was established by Congress with the provision that mining activities may occur on valid existing claims under all applicable laws and regulations administered by the NPS. The Mining in the Parks Act of 1976 (Public Law 94-429) prescribes that all activities resulting from the exercise of valid existing rights on patented and unpatented mining claims within any unit of the national park system shall be subject to regulations developed and administered by the NPS. No specific mining is authorized by this general management plan. Each mining proposal is required to submit a detailed mining and reclamation plan and undergo separate environmental impact analysis; the NPS will conduct validity examinations on all new proposals for development. Consultation for listed species would occur at that time. During the evaluation of the mining proposal, a sensitive resource analysis based on an objective analysis of physical, biological, cultural and visitor use values relative to the project mining impacts would also be initiated. Congress closed the Mojave National Preserve to all new mining claim location and all other forms of appropriation and disposal.

Ranching Developments

Developments associated with ranching operations have been installed throughout the Mojave National Preserve over the last 100 or more years. Hundreds of miles of barbed wire fences and water pipelines and dozens of cattle guards, windmills, water tanks, troughs, corrals, earthen reservoirs, houses, barns, sheds and other structures support the ranching operations.

If a grazing permit is purchased by a third party and donated to the NPS for retirement, most ranching developments would be removed following an inventory and analysis of cultural resources. Other developments may be retained if necessary for wildlife or where needed for management of other resources (*i.e.*, burro removal or a NPS horse operation), park housing, or administrative use. An inventory of ranching developments will be prepared as part of the grazing management plan.

Cattle Grazing

In 1995, the NPS issued special use permits to ranchers to allow continuation of cattle grazing on the portions of eleven previous Bureau grazing allotments that are partially or wholly within the boundary of the Mojave National Preserve. The allotment boundaries, animal unit months (AUM), and the rules and restrictions (season of use, supplemental feeding, forage utilization levels) are currently the same as those that existed when the Bureau managed the area before the passage of the California Desert Protection Act in October 1994. Seven of the original allotments have boundaries that are on federal land managed partly by the NPS and partly by the Bureau.

Since 1995, four allotments (Crescent Peaks, Granite Mountains, Kessler Springs, and Lanfair Valley) have been permanently retired after the acquisition of the base property of the permittees. These allotments represented approximately 65 percent of the original grazing or 24,926 AUMs.

The NPS portions of the Clark Mountain and Valley Wells grazing allotments would be acquired via third party conservation groups and retired. Cattle grazing would be removed from the area and the boundary of the Clark Mountain unit would be fenced. These permits constitute about 20 percent of the entire allotments; the larger portions of the allotments are managed by the Bureau and lie mostly outside the Mojave National Preserve.

The NPS's overall management goal is to achieve the permanent retirement of grazing. The California Desert Protection Act directs the Secretary of the Interior to make the acquisition of base property from willing sellers a priority above all other acquisitions in the Mojave National Preserve. If ranchers notify the superintendent of their willingness to sell base property, the superintendent would immediately notify the Secretary of the Interior of the priority acquisition and request Land and Water Conservation Fund funding from Congress. The NPS would also work with conservation organizations to purchase grazing permits and fee property from willing sellers. Once a grazing permit was purchased and the new owners (*i.e.*, conservation organizations) requested retirement, it would be permanently retired. Livestock grazing would no longer be an authorized use in retired areas for any reason.

Maintenance of most of the ranching development (range improvement) facilities is the responsibility of the rancher who benefits from their use. Some fences, water tanks, pipelines and windmills are the responsibility of the NPS, the County, or California Department of Transportation (along Interstates 15 and 40). During development of the grazing management plan, specific detailed lists and maps of the locations, ownership and maintenance responsibility of all these developments would be prepared. Water is necessary for livestock grazing on NPS lands; these waters are controlled by the rancher to facilitate movement of livestock.

When grazing permits are retired, ranching developments might eventually be removed and site restoration undertaken, subject to compliance with environmental and cultural regulations, including a determination of national register eligibility and compliance with section 106 of the National Historic Preservation Act on all cultural features over 50 years old. Natural springs would be restored.

While acquisitions are being pursued and for permit holders that are unwilling to sell, grazing cattle on lands in the Mojave National Preserve would otherwise continue to be managed at levels no greater than those which existed as of October 31, 1994. Three of the grazing permits in the Mojave National Preserve have adjoining allotments that are managed by the Bureau.

Grazing would be managed over the short-term under existing Bureau allotment management plans and subject to applicable NPS regulations and policies, relevant biological opinions from the Service, and under the following conditions:

-Emphasis will be on the preservation and protection of resources and the reduction of impacts. Resource protection would be given priority over grazing activities. Grazing may be excluded from some areas if needed to protect sensitive species or habitat.

-Additional cattle grazing using an ephemeral preference above the perennial AUMs established for each permit would not be considered.

-Grazing would not be allowed anywhere that perennial plant utilization exceeds 30 percent. Grazing shall be curtailed to protect perennial plants during severe or prolonged drought by shutting off waters and moving cattle out of critical habitat.

-In critical habitat of the desert tortoise, grazing use would be restricted from March 15 to June 15 if adequate precipitation has not occurred to produce ephemeral plant production of 230 pounds per acre (air dry weight). This number may be adjusted if additional research suggests a need to do so. The restriction would be implemented by removing cattle from critical habitat.

-Water developments would be turned off in desert tortoise critical habitat when not in use or to move cattle off areas not having sufficient perennial or ephemeral forage. Modifications to water developments to discourage use by common ravens may be required.

-The NPS would evaluate the effectiveness of using predictive models developed by the USGS and other researchers. In cooperation with the Bureau, USGS, and park research communities, precipitation amounts and timing would be monitored in recommended locations to determine if ephemeral plant production can reasonably be expected to produce forage sufficient to allow cattle grazing. If not, cattle would be removed from desert tortoise critical habitat by March 15.

Supplemental feeding (using hay or other feed) would not be allowed in accordance with existing biological opinions for the desert tortoise. Use of feeding supplements (protein and/or salt) would be considered on a case-by-case basis.

-Ranching developments in wilderness would be reviewed for their historical significance and current need. If developments are determined necessary for current grazing permits, access would normally be allowed only via foot or horseback. Motorized access would be determined on a case-by-case basis using the minimal tool analysis as used for other actions that may occur in wilderness.

-Permittees would be required to maintain all ranching developments associated with their grazing permits, including corrals, fences, pipelines, windmills, cattle guards, and tanks, at their expense. Abandoned property must be removed from the Preserve by the permittee. If not removed within the timeframe identified, the NPS may charge the permittee for removal costs. No new ranching development would be permitted unless the NPS determined it to be beneficial to the flora and fauna and that it would not result in an increase in grazing over the levels as of October 31, 1994.

-Grazing permits would be reissued annually for one-year terms.

-The NPS would monitor range conditions and long-term plant community changes using locations and methodology currently being evaluated. Cattle may be removed from an area for an extended period if monitoring indicates that type conversion of the plant community may be occurring.

-The NPS would not increase AUMs when Catellus and State lands within the permit area are acquired. However, no fencing would be required to exclude existing authorized cattle from using the acquired parcels.

Any permit that is not retired would be managed pursuant to an NPS grazing management plan. This activity plan would tier from the overall management strategy presented herein and would address specific grazing management strategies, conditions, standards, resource protection criteria, range developments, monitoring, and other program needs. An environmental assessment would be prepared on this plan.

On allotments that are acquired, the following measures would be implemented:

Water developments on allotments with acquired permits would be assessed for removal and the area restored to natural conditions.

Ranching developments on allotments with retired permits would be removed unless determined to have historical or other value and do not otherwise affect native wildlife.

General Measures to Protect the Mohave Tui Chub

A population of the Mohave tui chub occurs at Soda Springs. The NPS would develop a cooperative agreement with the Department, Service, and California State University to identify management objectives and strategies, consistent with the recovery plan, for maintaining the Mohave tui chub population (such as cattail and other aquatic plant removal and dredging of the pond). The NPS would also pursue funding to provide for continued maintenance of the ponds and monitoring of the population.

STATUS OF THE SPECIES

Desert Tortoise

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

Desert tortoises are most active in California during the spring and early summer when annual plants are most common. Additional activity occurs during warmer fall months and occasionally after summer rain storms. Desert tortoises spend the remainder of the year in burrows, escaping the extreme conditions of the desert. Further information on the range, biology, and ecology of the desert tortoise can be found in Burge (1978), Burge and Bradley (1976), Hovik and Hardenbrook (1989), Luckenbach (1982), Weinstein *et al.* (1987), and Service (1994).

The Mojave population of the desert tortoise includes those animals living north and west of the Colorado River in the Mojave Desert of California, Nevada, Arizona, southwestern Utah, and in the Colorado Desert in California. On August 4, 1989, the Service published an emergency rule listing the Mojave population of the desert tortoise as endangered (54 *Federal Register* 32326). In its final rule, dated April 2, 1990, the Service determined the Mojave population of the desert tortoise to be threatened (55 *Federal Register* 12178). The Service designated critical habitat for the desert tortoise in portions of California, Nevada, Arizona, and Utah in a final rule, published February 8, 1994 (59 *Federal Register* 5820).

Critical habitat is designated by the Service to identify the key biological and physical needs of the species and key areas for recovery, and focuses conservation actions on those areas. Critical habitat is composed of specific geographic areas that contain the biological and physical attributes that are essential to the species' conservation within those areas, such as space, food, water, nutrition, cover, shelter, reproductive sites, and special habitats. These features are called the constituent elements of critical habitat. The specific constituent elements of desert tortoise critical habitat are: sufficient space to support viable populations within each of the six recovery units and to provide for movement, dispersal, and gene flow; sufficient quality and quantity of forage species and the proper soil conditions to provide for the growth of these species; suitable substrates for burrowing, nesting, and overwintering; burrows, caliche caves, and other shelter sites; sufficient vegetation for shelter from temperature extremes and predators; and habitat protected from disturbance and human-caused mortality (59 FR 5820).

The recovery plan for the desert tortoise is the basis and key strategy for recovery and delisting of the desert tortoise (Service 1994). The plan divides the range of the desert tortoise into six distinct population segments or recovery units and recommends establishment of 14 Desert Wildlife Management Areas throughout the recovery units. Within each Desert Wildlife Management Area, the recovery plan recommends implementation of reserve level protection of desert tortoise populations and habitat, while maintaining and protecting other sensitive species and ecosystem functions. The design of Desert Wildlife Management Areas should follow accepted concepts of reserve design. As part of the actions needed to accomplish recovery, land management within all Desert Wildlife Management Areas should restrict human activities that negatively affect desert tortoises (Service 1994).

The desert tortoise was listed in response to loss and degradation of habitat caused by numerous human activities including urbanization, agricultural development, military training, recreational use, mining, and livestock grazing. The loss of individual desert tortoises to increased predation by common ravens, collection by humans for pets or consumption, collisions with vehicles on paved and unpaved roads, and mortality resulting from diseases also contributed to the Service's listing of this species.

Mohave Tui Chub

The Mohave tui chub was listed as an endangered species in 1970 by the Service (35 *Federal Register* 16047). A recovery plan has been prepared for this species (Service 1988). The Mohave tui chub is a moderate to large sized subspecies of *Gila bicolor*. Adult Mohave tui chubs are typically 2 to 3.6 inches in length from the snout to the end of the vertebral column. The body is thick with a large head and short, rounded fins. A distinct hump sometimes develops behind the head in older fish. Mohave tui chubs are bright brassy-brown to dusky-olive dorsally, gold and finely speckled laterally and bluish-white to silver on the belly. The fins are olive to rich brown, the lower fins paling outward. Mohave tui chubs are morphologically adapted for feeding on plankton.

The original habitat of the Mohave tui chub appears to have been lacustrine, associated with deep pools and slough-like areas of the Mojave River (Snyder 1918). Although the Mohave tui chub may not be as capable of surviving flood flows as the arroyo chub (*Gila orcutti*), or as adapted to desert conditions as certain other desert fishes, it is adapted to the Mohave River's alkaline and hard water qualities. Water quality measurements of temperatures reaching 34 degrees Celsius at the surface, salinity of 11.15 parts-per-thousand and a pH between 9 and 10 were recorded in occupied habitat. The actual microhabitat conditions of the Mohave tui chub may be less extreme, as fish seek out water strata with more preferred conditions. Mohave tui chub larger than 3.2 inches SL are usually solitary and occur at depths greater than 2.8 inches

Spawning does not occur until the fish are at least one year old. Mohave tui chubs begin spawning in March or April when water warms to approximately 18 degrees Celsius. Spawning continues throughout the spring and can also occur in the fall. Like most tui chubs, the Mohave tui chub broadcasts eggs and milt over vegetation, where the eggs become attached after fertilization. Larger females (8.5 inches) have been observed to carry close to 50,000 eggs. Eggs are about 0.3 inches in diameter and hatch in 6 to 8 days. Prolarvae spend about 12 hours on the bottom and then swim to the surface. Fry form small schools in the shallow areas. Medium-sized fish (1.2 to 3.2 inches) school in areas 7.9 to 20 inches deep.

The Mohave tui chub is the only fish native to the Mojave River basin in California. The arroyo chub was introduced into the Mojave River system in the 1930s. This exotic chub successfully hybridized with the Mohave tui chub and by 1970, the latter fish taxon was believed to have been eliminated by this process of introgression. A small population of Mohave tui chubs, which were believed to be genetically pure, was found at MC Spring, which is a small pond (6 feet deep and 9 feet in diameter) at Soda Springs on the western bank of Soda Dry Lake (Service 1988).

Since its rediscovery, populations have been successfully introduced to constructed ponds at Soda Lake and Camp Cady, which is managed by the California Department of Fish and Game. They have also successfully planted at the Naval Air Weapons Station, China Lake; at this site, they inhabit channels which receive water from a natural spring and seepage from a wastewater treatment facility. The total estimated population at these three areas is between 10,000 and 20,000 fish (Mohave tui chub recovery team meeting, November 1996). A genetic study, completed in September 1997 on individuals that were introduced into a dredged pond (Lake Tuendae) at Soda Springs from the nearby refugia spring, found that the Mohave tui chub is a distinct subspecies (May *et al.* 1997).

ENVIRONMENTAL BASELINE

The Mojave Desert is a transition area between the hot Sonoran Desert and the cooler and higher Great Basin. This arid region of southeastern California and portions of Nevada, Arizona and Utah occupies more than 25,000 square miles.

It extends from the Sierra Nevada range along its northwestern boundary to the Colorado Plateau in the east; it abuts the San Gabriel and San Bernardino mountains in the southwest. Near the border of the Great Basin and Mojave Desert lies Death Valley, the lowest point in North America.

The Mojave Desert's climate is characterized by extreme variation in daily temperature and an average annual precipitation of less than 5 inches. Almost all the precipitation, particularly in its western areas arrives in winter; the eastern portions of the Mojave Desert also receive rain in the late summer. Freezing temperatures occur in winter, while summers are hot, dry and windy.

The Mojave Desert has a typical mountain-and-basin topography with sparse vegetation. Sand and gravel basins drain to central salt flats. Borax, potash, and salt mines are located in some of these basins. Silver, tungsten, gold and iron deposits are worked in many desert mountain ranges.

The Mojave National Preserve includes 1,589,165 acres of Federal lands located in the eastern Mojave Desert of California, primarily between Interstates 15 and 40. Approximately 86,708 acres of non-federal lands are also included within its boundaries. The major land uses that occur in the Mojave National Preserve include grazing, recreation (hiking, hunting, camping, equestrian use), mining, utility corridors, and transportation corridors. Approximately 100 private residences are located within the boundaries of the Mojave National Preserve.

Desert Tortoise

The wildlife and vegetative resources of the Mojave National Preserve include elements of the three major North American deserts: the Great Basin, the Mojave, and the Sonoran deserts. Vegetation consists primarily of species common to the Mojave Desert. The intermingling of the three desert environments has produced approximately 35 wildlife habitat types. The most prominent habitats in which desert tortoises may occur and some of the more common species in these communities include Joshua tree woodlands dominated by Joshua trees (*Yucca brevifolia* var. *jaegeriana*), shadscale scrub dominated by shadscale (*Atriplex confertifolia*), and creosote bush scrub dominated by creosote (*Larrea tridentata*) and white bursage (*Ambrosia dumosa*).

The Mojave National Preserve contains portions of two critical habitat units. The Ivanpah Critical Habitat Unit, which is in the northern portion of the Mojave National Preserve, includes Ivanpah Valley and Cima Dome. This area totals approximately 492,360 acres and is within the Eastern Mojave Recovery Unit and the southern end of the Northeastern Mojave Recovery Unit. The Clipper and Fenner Valleys are separated from desert tortoise habitat to the north by the Providence Mountains. This area contains 280,103 acres of the Piute-El Dorado Critical Habitat Unit, which is also within the Eastern Mojave Recovery Unit.

In 1999, monitoring of the long-term study plot at Goffs in the Fenner Valley indicated a substantial decline in the density of desert tortoises from approximately 450 per square mile to 88 per square mile (Berry *et al.* 2001). The cause of this decline has not been determined. At approximately the same time, numerous desert tortoises were found dead in the Ivanpah Valley. These mortalities followed an extremely dry year; consequently, drought has been implicated in the mortalities at Ivanpah, although other factors may also be involved.

The Service issued a biological opinion (1-8-98-F-17) to the NPS for individual activities that disturb areas of less than 2 acres of desert tortoise habitat. Since its issuance in June 19, 1998, the NPS has authorized or undertaken 8 actions under the auspices of this biological opinion. To date, 0.2 acres of desert tortoise habitat have been disturbed and another 3.2 acres authorized for disturbance. No desert tortoises have been killed as a result of these activities. The Service also consulted with the NPS on the removal of old copper and lead cable by AT&T (1-8-97-F-46); no desert tortoises were killed during implementation of this action.

The Service has also issued two biological opinions (1-8-94-F-17, 1-5-96-F-296R) for cattle grazing in desert tortoise habitat that apply to the Mojave National Preserve. The first biological opinion (1-8-94-F-17) evaluated the Bureau's grazing program and included terms and conditions to reduce the level of mortality that grazing could have on desert tortoises; the Service concluded that the grazing program was not likely to jeopardize the continued existence of the desert tortoise. In the second biological opinion (1-5-96-F-296R), we concluded that the Bureau's grazing program was not likely to adversely modify critical habitat, which had been designated since issuance of the first biological opinion. When the NPS assumed management of the Mojave National Preserve after passage of the California Desert Conservation Act, these biological opinions applied to grazing management on its lands.

Since 1995, four allotments (Crescent Peaks, Granite Mountains, Kessler Springs, and Lanfair Valley) have been permanently retired by the NPS after the donation of the permits by a third party that acquired them. These allotments represented approximately 65 percent of the original grazing or 24,926 AUMs.

The NPS proposes to acquire all grazing allotments from willing sellers and permanently retire the permits. At this time, the NPS anticipates being able to retire the remaining cattle allotments within desert tortoise habitat except for the Round Valley, Gold Valley, and Colton Hills allotments. The Colton Hills allotment is authorized for 2,877 AUMs within approximately 151,700 acres of the Piute-El Dorado Critical Habitat Unit. The Gold Valley allotment overlaps proximately 1,200 acres of this critical habitat unit; most of this allotment, which is authorized for 1,152 AUMs, is outside of desert tortoise habitat. Round Valley is authorized for 27 AUMs of which none is in critical habitat. The Valley View allotment occupies 268,900 acres within the Mojave National Preserve and is authorized for 8,069 AUMs. The Valley Wells permit contains 853 AUMs and covers 43,600 acres. These two allotments are located within the Ivanpah Critical Habitat Unit. The Clark Mountain allotment contains 371 AUMs and covers 17,500 acres.

Since the formation of the Mojave National Preserve, the NPS has acquired approximately 63,000 acres of critical habitat from the Catellus Corporation. As compensation for habitat disturbance associated with the cable project, AT&T is acquiring 210 acres of private lands for the NPS. The NPS has also removed approximately 3,000 burros and 147 miles of roads have been closed through wilderness designation.

Mohave Tui Chub

Mohave tui chubs formerly occurred in two constructed ponds at Soda Springs and at MC Spring. West Pond, the smaller of the two constructed ponds, does not drain adequately and cannot maintain Mohave tui chubs because of problems with its water quality. Currently, approximately 3,500 Mohave tui chubs inhabit Lake Tuendae and MC Spring at Soda Lake (NPS 2001). Lake Tuendae, which requires periodic maintenance to remove sand and aquatic vegetation, is by far the larger of the two remaining ponds at Soda Springs and supports most of the Mohave tui chubs. MC Springs also requires periodic removal of aquatic vegetation; because of the small size of the pond, this work is done by hand.

EFFECTS OF THE ACTION

The GMP provides overall guidance to the NPS with regard to its management activities within the Mojave National Preserve. Many activities will be able to proceed only after the development of specific plans. However, the GMP will also guide how the NPS implements numerous actions during its day-to-day management of the Mojave National Preserve.

In this biological opinion, we consider the effects of the various components of the GMP on two levels. Where sufficient information is available, we analyze the effects of the implementation of specific actions on listed species. Where sufficient information is not available, primarily because additional planning is required on the part of the NPS, our analysis considers the effects of the program on listed species.

Desert Tortoise

Several actions proposed by the NPS could result in injury or mortality to desert tortoises and loss or degradation of habitat. In the first part of this section of the biological opinion, we have described those potential effects on desert tortoises that may result from activities authorized by the NPS in a general manner. We then evaluated the specific programs which the NPS proposes to implement to attempt to determine the relative effect of those programs on the desert tortoise and its habitat. The NPS proposes to implement the same protective actions for the desert tortoise both within and outside critical habitats within the Mojave National Preserve. In addition to protecting desert tortoises that reside within critical habitat, this policy should help ensure the long-term persistence of animals outside of critical habitat.

We will not evaluate the effects of specific ground-disturbing activities because these actions will require separate consultation, pursuant to section 7(a)(2) of the Act. Most of the protective measures that the NPS has included in the GMP would be useful in reducing adverse effects to the desert tortoise. We will review these measures in more detail when we consult with the NPS on its specific projects.

Vehicle use along paved and unpaved roads could result in mortality of desert tortoises that are crossing these roads. Mortality will be greatest in the spring and fall, in areas where desert tortoises are most common. The NPS will attempt to reduce vehicle-associated mortality of desert tortoises during projects by establishing speed limits of not more than 20 miles per hour along rights-of-ways and other access routes. Workers will also be instructed to be aware that desert tortoises may be present on rights-of-ways and other access routes. In areas where use by desert tortoises is high, the NPS would undertake additional temporary signing and staffing of heavily used entrances on busy weekends during the species' active season to raise visitor awareness of its presence. Speed limits may be temporarily adjusted. The NPS would implement temporary closure of certain dirt roads, as needed, within critical habitat to reduce vehicle access where human-caused mortality or stress of desert tortoises is identified. The actual level of mortality that would occur will be influenced by many variables and is difficult to predict; the responsiveness of visitors to guidance from the NPS and the number of desert tortoises present during periods of heavy use are two of the primary factors that are difficult to predict.

Desert tortoises may seek shelter in the shade of vehicles and be crushed when those vehicles are subsequently moved. Workers will be informed that desert tortoises may hide under their vehicles and be instructed to search for them prior to moving the vehicles.

Increased human activity associated with tourists can result in improper disposal of food wastes and trash; these materials could attract predators of the desert tortoise, especially common ravens.

Pet dogs brought into the Mojave National Preserve by tourists could disturb, injure, or kill desert tortoises. NPS regulations require dogs to be on a leash; this level of control should reduce the opportunity for dogs to disturb, injure, or kill desert tortoises.

Tourists who bring firearms to the Mojave National Preserve could shoot desert tortoises. The NPS prohibits target shooting. These measures should reduce the likelihood that mortality of desert tortoises will occur as a result of shooting.

Unauthorized handling and other human physical contact could transmit disease to the desert tortoises. Measures employed by the NPS to educate the public and staff on the effects of handling desert tortoises should reduce the potential of spreading disease.

Fire Management

The current fire policy of suppressing all fires in the Mojave National Preserve is protective of desert tortoises because their habitat is generally not considered to be fire-adapted. Additionally, desert tortoises are not capable of escaping a fire, except by retreating to their burrows which they may be unable to reach in all circumstances. If heavy equipment, such as a bulldozer, is used to establish a fire break, desert tortoises could be killed and habitat degraded. However, the minimum impact suppression techniques to be used in all areas of the Mojave National Preserve should protect desert tortoises and their habitat in most cases. The type of minimum impact techniques would include walk-in fire attacks with small crews that would build fire lines. The use of mechanized equipment and vehicles would be limited in backcountry and wilderness areas. The NPS would use a minimum-impact fire suppression technique in critical habitat, followed immediately by restoration of disturbed areas. The training on appropriate strategy, tactics and precautions in desert tortoise habitat that the NPS would provide to all staff should further ensure the protection of the species.

Hazardous Materials

In general, the NPS proposal to survey hazardous material sites immediately and remediate them through use of licensed contractors will promote the recovery of the desert tortoises by removing materials that could poison or otherwise harm desert tortoises; the removal of these sites would also allow habitat to be restored.

Desert tortoises may use abandoned debris as shelter and could be affected during removal. Because the NPS would implement its general protective measures for the desert tortoise, few desert tortoises are likely to be killed or injured during these removal activities.

Inventorying, Monitoring, Research, and Permits

Inventory, monitoring, and research by NPS staff and outside researchers could affect desert tortoises and their habitat as researchers and others drive and otherwise travel throughout the Mojave National Preserve. Generally, research activities should not pose substantial risk to desert tortoises because they are, by nature, less intrusive than most construction or maintenance activities. The NPS will evaluate specific proposals to conduct such activities and determine whether further consultation, pursuant to section 7(a)(2) of the Act, is required at the time an activity is proposed.

Any research on desert tortoises must be conducted under the authority of a recovery permit, pursuant to section 10(a)(1)(A) of the Act. The Service will evaluate the merits of the research and conduct a separate analysis under section 7(a)(2) of the Act at the time such research is proposed.

Natural Resource Collections

The collection of natural resources should not pose substantial risk to desert tortoises or their habitat because collectors will be targeting specific resources for inclusion in museum collections and generally would remove only small amounts of materials. Collections for commercial purposes would not occur unless the permittee has entered into a cooperative research and development agreement with the NPS. The NPS will evaluate specific proposals to conduct such activities and determine whether further consultation, pursuant to section 7(a)(2) of the Act, is required at the time an activity is proposed.

Sand and Gravel for Road Maintenance

The removal of sand and gravel from roads after flash flood events is unlikely to kill or injure any desert tortoises; if the material is removed promptly, desert tortoises would be unlikely to have established burrows in this newly deposited material. The NPS would conduct surveys to ensure that no desert tortoise burrows would be disturbed if it proposes to authorize the collection of materials in active washes within 100 feet of the road centerline of maintained paved and dirt roads. This measure, combined with the fact that the density of desert tortoises is usually lower near paved roads, should ensure that few individuals would be killed by this activity.

Desert tortoises that burrow into stockpiles of excess materials collected from roads could be crushed when the stockpiles are later used for road maintenance or otherwise removed. Desert tortoises that burrow into abandoned stockpiles could also be crushed if the stockpiles collapse.

We cannot predict the potential extent of this level of mortality because it would depend on the location of the stockpile, the density of desert tortoises in the area, and the manner in which the stockpile is built and removed.

Management of Desert Tortoises

The NPS is currently implementing numerous measures to conserve the desert tortoise and its habitat. These measures are described in the Description of the Proposed Action portion of this biological opinion. Several of these measures have been or will be discussed under other topics in this section. Among the measures currently being implemented that will not be discussed elsewhere, permitting vehicles only on existing roads, prohibiting landfills, and prohibiting agricultural clearing or commercial vegetation harvest on NPS lands are particularly important in conserving the desert tortoise because they eliminate sources of mortality of individuals and habitat degradation that would impede the recovery of the species.

The NPS also proposes other measures to conserve desert tortoises, such as supporting and participating in an interagency regional study of predation by common ravens to determine the appropriate management actions, prohibiting the construction of new roads in critical habitat of the desert tortoise, closing and restoring duplicate roads and those that provide access to range developments, active mines or other development sites when they are no longer needed, restoring disturbed areas, and acquiring lands within critical habitat. These efforts would provide additional information necessary to manage desert tortoises, reduce habitat loss and mortality, and return disturbed habitat to a useable condition, respectively.

The NPS proposes to work with the Service, the USGS, the California Department of Fish and Game, and the County to develop standards for the maintenance of roads and their berms and control of roadside vegetation that would minimize impacts on desert tortoise. Desert tortoises can be killed during maintenance activities when roads are graded and vegetation is controlled, either through direct crushing by vehicles or exposure to herbicides. Roadside berms can trap desert tortoises within the road bed where they are subsequently exposed to lethal temperatures, predators, and vehicles; smaller desert tortoises are particularly vulnerable to these sources of mortality. Of these potential effects, berms that are too high or steep are likely responsible for most mortality associated with road work. Detecting the number of desert tortoises that are affected by berms is not possible because of the extent of the roads and the fact that the remains of most individuals that die within road beds do not persist long enough to be detected.

The NPS also proposes to inventory abandoned mining facilities and eliminate hazards (open pits and shafts) to the desert tortoise that these facilities can present. For example, desert tortoises can be excluded from mine shafts through the installation of fences. This activity would also reduce mortality of individuals.

The elimination of small game hunting may reduce the availability of carcasses upon which common ravens can feed. The reduction in this source of food could reduce the attractiveness of the Mojave National Preserve to common ravens and thereby reduce the level of mortality that this species inflicts upon desert tortoises in the region.

The NPS will require project proponents who disturb federal land with desert tortoise habitat to purchase habitat for the desert tortoise's conservation in accordance with the compensation formula established by the Desert Tortoise Management Oversight Group (Desert Tortoise Compensation Team 1991). The recovery plan cites acquisition of private lands within recovery areas as an important measure to conserve desert tortoises (Service 1994). The acquisition of desert tortoise habitat brings land under NPS administration where it becomes subject to federal regulations. Acquired lands also are eligible for inclusion in habitat enhancement and management plans which could further improve their wildlife values. Therefore, the acquisition and management of compensation lands which support desert tortoises would benefit this species.

Burros

Water trapping of burros would likely not affect desert tortoises because only existing structures would be used or new structures would be placed only in previously disturbed areas. Additionally, the capture is passive; burros move into the corrals at their own speed.

The capture of burros through horseback wrangling, helicopter-assisted roping and trapping, and net gunning could result in trampling of desert tortoises and some degradation of habitat because the burros would be attempting to escape and would likely not be as aware of desert tortoises or their burrows. We cannot predict how many desert tortoises would be killed or injured by these activities because of the nature in which they are conducted. Specifically, the NPS searches out and attempts to remove burros in a single operation; this method is necessary because burros move across fairly substantial areas of the Mojave National Preserve. However, the number of desert tortoises killed as a result of these activities is likely to be low because most burros will have been removed by water trapping before these methods are employed. Additionally, the removal of burros by these means would occur throughout the Mojave National Preserve and would not be limited to habitat of the desert tortoise.

The shooting of burros could affect the desert tortoise if the carcasses attract common ravens and contribute to increased reproduction of common ravens, which would lead to a greater population of predators in the region. The NPS proposes to shoot burros when desert tortoises are inactive to avoid attracting common ravens to the area. This measure would not be effective in preventing the general subsidizing of common ravens. The level to which the reproduction of common ravens would increase and the effect of this increase on desert tortoises cannot be predicted, in part at least, because we do not know what the duration of the project will be, how many burros will be shot, or whether common ravens will be attracted to carcasses in great numbers.

The NPS would also allow outside groups to try to capture burros. Because we do not have any information on how these captures would occur, we cannot analyze the effects of such actions at this time.

To date, the NPS has removed approximately 3,000 burros from the Mojave National Preserve. Because burros can trample desert tortoises and their burrows, consume suitable forage for desert tortoises, and disturb habitat, the removal of burros from the Mojave National Preserve provides a substantial benefit to the desert tortoise and its habitat.

Removal of Salt Cedar

Most removal of salt cedar is likely to occur outside of habitat of the desert tortoise. The springs and waterways where tamarisk control is necessary occur in mountain canyons. For this reason and because of the NPS's proposed methods (described earlier in this document) to avoid impacts to desert tortoises when conducting activities in the Mojave National Preserve, desert tortoises are unlikely to be killed or injured or to have their habitat disturbed by this activity.

Interpretive Facilities

Providing information to the public, whether through roadside signs or exhibits or at interpretive facilities, about desert tortoises, their status, and the precautions which visitors should follow when encountering desert tortoises is likely to benefit the recovery of the species. People who are informed about the desert tortoise are less likely to behave inappropriately when around animals or within their habitat.

The renovation of the Kelso Depot is unlikely to affect desert tortoises or their habitat because this activity will be conducted within a previously disturbed area. Additionally, the NPS has proposed to install a fence around the work area; the fence should prevent most desert tortoises from wandering into the site during the renovation.

Some potential also exists that desert tortoises could enter the visitor areas of the Kelso Depot and be killed or injured inadvertently by tourists. We cannot predict the likelihood of desert tortoises entering this area; however, we do not anticipate that desert tortoises would be encountered within the developed areas of the Kelso Depot in large numbers.

The renovation of the Kelso Depot and development of a visitor facility at Hole-in-the-Wall will result in a higher visitor concentration in the center of the Mojave National Preserve. The growth in visitation will increase the potential for desert tortoises to be killed or injured along the Mojave National Preserve's roads. The NPS will develop awareness exhibits at the Kelso Depot and Hole-in-the-Wall to attempt to inform visitors of the need to be aware of desert tortoises when traveling in the Mojave National Preserve.

The installation of signs and roadside exhibits could result in the killing of desert tortoises, disturbance of their burrows, and loss of habitat, depending upon their placement. The signs and exhibits are also likely to promote a minor amount of disturbance at the site because tourists will stop to read them and subsequently walk through the surrounding areas. These disturbances are generally likely to be minor and localized; the NPS would consider whether the future placement of signs and exhibits at specific locations would affect the desert tortoise and consult, pursuant to section 7(a)(2) of the Act, if necessary.

Access and Circulation

The impacts of roads on desert tortoises are well documented. Desert tortoises are frequently killed on or collected adjacent to freeways, paved highways and roads, and dirt roads, resulting in depletion of the adjacent populations. The number of desert tortoises is depleted up to a mile or more on either side of roads when the average daily traffic is greater than 180 vehicles (Nicholson 1978a, 1978b). The numbers of juvenile desert tortoises on permanent study plots in California were significantly lower adjacent to dirt and paved roads (Berry and Turner 1984). Significant differences in desert tortoise densities were also documented adjacent to Highway 58 in San Bernardino County (Boarman *et al.* 1992); based on abundance of desert tortoise sign, a similar situation occurs along Highway 395. Even dirt roads with relatively low vehicle use can contribute to depressions in local desert tortoise densities (Berry *et al.* 1986).

The Mojave National Preserve contains approximately 2,180 miles of roads. The County maintains an estimated 255 miles of road in the Mojave National Preserve. Traffic has increased on local paved and maintained roads over the past years, probably at least partially in response to the change in the status of the area. Additionally, travelers use Kelbaker, Ivanpah, and Cima roads to drive from the southern desert through the Mojave National Preserve to Interstate 15 to Las Vegas and for return trips.

The NPS notes that speed limits on all paved roads may be reduced to 45 miles per hour in areas or during periods where such a reduction is warranted. A reduction to this speed is not likely to substantially reduce the mortality of desert tortoises on roads because animals would remain difficult to see and avoid at these speeds. Smaller desert tortoises would be particularly difficult to see; the detection of any desert tortoise would be difficult on roads with numerous dips and rises.

As the NPS notes, increasing the awareness of visitors may help reduce mortality associated with roads. This measure is most likely to be effective with visitors; it will likely be far less effective with people who are merely traveling through the Mojave National Preserve.

Absent any additional measures, desert tortoises will continue to be killed on paved roads within the Mojave National Preserve. We cannot determine the number of individuals that will be killed because of the variety of factors involved. For example, many of the actions that the NPS has implemented or plans to implement will benefit the desert tortoise and could result in increased numbers of animals in the Mojave National Preserve; however, other factors, such as those related to disease and the existing reduction in abundance of desert tortoises adjacent to roads, may reduce the overall abundance of the desert tortoise and, consequently, level of mortality associated with roads.

Maintenance of both paved and dirt roads can degrade habitat and kill desert tortoises. Desert tortoises occasionally burrow into the berms along the sides of dirt roads; these burrows and any animals within them can be destroyed during road work. The channels cut through the berms to remove flood waters from road surfaces degrade habitat and can kill desert tortoises. Road maintenance also spreads non-native plants; non-native plants can degrade habitat of the desert tortoise by reducing the abundance of native species upon which the desert tortoise forages. The fairly recent infestation of Sahara mustard (*Brassica tournefortii*) along Copper City Road north of Barstow may have been accelerated by road maintenance.

Under the provisions of the GMP, the NPS will continue to maintain approximately 20 miles of roads within the Mojave National Preserve; these include the access roads to Zzyzx and Kelso Dunes and the Wild Horse Canyon Road. Desert tortoises are uncommon, if present at all, along the road from Interstate 15 to Soda Springs. During road maintenance, the NPS has proposed to either have a biologist present or ensure the equipment operator is trained to recognize desert tortoises (depending on the season), avoid burrows where possible or move desert tortoises from harm's way when burrows cannot be avoided, avoid the establishment of high and steep berms, and operate equipment at reduced speeds when traveling to a site or working. Additionally, the NPS does not propose to cut channels from the road to remove storm waters. For these reasons and because of the relatively minor amount of road maintenance proposed by the NPS, few desert tortoises are likely to be injured or killed during this activity.

The County maintains most of the roads through the Mojave National Preserve. Currently, it is limiting its activities with regard to road maintenance to minor repairs, such as filling potholes. The NPS will consult with the Service in the future during the development of a cooperative agreement with the County regarding more extensive road maintenance.

Camping, Backcountry and Wilderness Use, Backcountry Use and Roadside Vehicle Camping, Camping at High Use Areas, and Camping in Desert Tortoise Critical Habitat

The NPS proposes to restrict large groups to camping at designated areas and to require these groups to obtain a special use permit. These measures would reduce the impact of this activity on the desert tortoise and its habitat because these visitors will be provided with information on desert tortoises as part of the permitting process and will be directed to areas that are already disturbed to some degree by human use.

Backcountry and wilderness use is not likely to affect desert tortoises or their habitat in a substantial manner, primarily because the level of use is likely to be low. The NPS will prepare a management plan for this type of use in the future; potential impacts to the desert tortoise from implementation of the plan will be evaluated at that time.

The NPS will continue to allow roadside vehicle camping only in previously used areas along open routes of travel, outside of wilderness; when camping in such areas, vehicles are not permitted to leave the road surface at any time or park on vegetation. The requirement for groups and organized events to obtain a permit should assist in reducing adverse effects because the NPS would provide the permittees with information on the desert tortoise. The NPS will prepare a management plan for this type of use in the future; potential impacts to the desert tortoise from implementation of the plan will be evaluated at that time.

The NPS proposes to limit camping to designated campsites in locations that are consistently heavily used by individuals or groups. This measure should also reduce the level of effect to desert tortoises; by using only previously disturbed sites, additional habitat is not likely to be disturbed. If the NPS decides that additional sites would be needed, based on an analysis of visitor use, further consultation may be required.

Overall, camping should not have substantial adverse effects on desert tortoises or their habitat because heavier use would be directed to sites that are previously disturbed and more dispersed use, such as backcountry camping, is likely to occur at a fairly low level. Additionally, a portion of the camping that would occur in the Mojave National Preserve will be outside of desert tortoise habitat.

Rights-of-way and Easements

The NPS proposes to eliminate unnecessary rights-of-way and easements and require minimum maintenance to prevent increased vehicle traffic. The NPS may also require holders of rights-of-way and easements to install fencing to preclude entry by desert tortoises through critical habitat if observations of traffic levels suggest fencing could resolve the problem. Holders of rights-of-way and easements would be required to conduct an adequate survey of desert tortoise burrows along the route prior to performing any maintenance activities; they would also be required to comply with all stipulations from this biological opinion when conducting maintenance. These measures should reduce the level of mortality of desert tortoises and disturbance of their habitat. Some desert tortoises would continue to be affected by activities along rights-of-way and easements; the level of mortality and amount of habitat disturbance cannot be determined with the information available to us at this time.

Railroads

Under the provisions of the GMP, the effects of railroads on desert tortoises would be unchanged. The rail lines and berms currently are responsible for some degree of habitat fragmentation, although bridges over washes provide some corridors for movement of desert tortoises. Desert tortoises have been found on railroad tracks elsewhere in the California desert;

once they have entered the area between the rail lines, desert tortoises are vulnerable to predation, exposure to extreme temperatures, and damage from trains. We are unaware of any specific mortalities of desert tortoises resulting from the presence of railroads in this region of the desert.

Wildlife Guzzlers

Desert tortoises are known to have been trapped and drowned within some water developments. Small game guzzlers with steep and slippery entry ways are responsible for most deaths. The modification of existing water developments by the NPS to prevent desert tortoises from gaining access or to ensure they are able to escape from them would reduce this source of mortality.

Hunting

Hunting would occur only from September through January or early February. This timing avoids the spring activity period of the desert tortoise; however, hunting would occur during the its fall activity period. A portion of the hunting will occur outside of desert tortoise habitat because bighorn sheep tend to occupy higher elevations in the desert. For these reasons, authorized hunting is unlikely to substantially affect the desert tortoise.

Equestrian Use

Desert tortoises and their burrows could be trampled by horses and pack animals. Smaller desert tortoises and burrows are more likely to be affected because horses and pack animals would likely try to avoid stepping on larger desert tortoises or into their burrows. The use of horses and pack animals is unlikely to occur at levels where they compete with desert tortoises for food or disturb substantial amounts of habitat.

Large groups of horses and pack animals, concentrated in specific areas, may cause more habitat disturbance and have some greater potential to trample desert tortoises than smaller groups. The NPS requires large groups to apply for permits; at the time of these applications, the NPS will need to consider whether the activity is likely to adversely affect the desert tortoise; these decisions would likely be influenced by the time of the year and the areas for which permits are desired.

Mineral Development

The GMP does not authorize any specific mining activity. Consequently, we cannot evaluate the potential effects of future proposals to mine within habitat of the desert tortoise. However, because Congress closed the Mojave National Preserve to all new mining claim location and all other forms of appropriation and disposal, the potential for future mining may be somewhat limited.

Ranching Developments

Most existing ranching developments are not likely to affect desert tortoises. However, in at least one case, small desert tortoises were unable to escape from a badly installed cattle guard. Windmills could provide nesting sites for common ravens. Water sources for cattle may also subsidize common ravens.

Because the NPS proposes to remove most ranching developments upon retirement of an allotment, the level of their effect upon desert tortoises over time will decrease. The removal of the ranching developments could affect desert tortoises if heavy equipment or ground disturbance is involved; the NPS would evaluate the potential for such effects to occur and consult with the Service on future actions, if necessary. Additionally, during its inventory of ranching developments, the NPS should be able to identify those ranching developments, such as badly designed cattle guards, that have the potential to adversely affect desert tortoises and eliminate the hazards.

New ranching developments would not be permitted unless the NPS determined they would be beneficial to wildlife and not result in an increase in grazing over the levels as of October 31, 1994. These provisions should ensure that new developments do not affect the desert tortoise.

Maintenance of ranching developments by the permittees could adversely affect desert tortoises, particularly if heavy equipment is used and ground disturbance is involved. The NPS would evaluate the potential for such effects to occur and consult with the Service on future actions, if necessary.

Cattle Grazing

Livestock grazing affects desert tortoises and their habitat in numerous ways. Trampling by livestock can injure or kill desert tortoises, either above ground or while they are in their burrows. Livestock grazing can also change plant communities by eliminating native perennial grasses, and native annual forbs and replacing them with woody shrubs and an understory of non-native weeds; the new plant communities contain less forage for desert tortoises (Frenkel 1970, Humphry 1958, 1987). By reducing the diversity and abundance of native annual plants, livestock grazing can affect the nutritional intake of desert tortoises; reduced nutritional intake may lead to slower growth and reduced production of eggs. Because desert tortoises are more vulnerable to predation when they are smaller, reducing their rate of growth may eventually result in fewer individuals reaching breeding age. Oftedal (2001) found that native forage has less nutritional value for desert tortoises during drought years; this factor furthers exacerbates the direct effects of drought and grazing. Desert tortoises in grazed areas spend more time foraging than those in non-grazed areas (USGS 2001); this effect may cause desert tortoises in grazed areas to spend more time exposed to predators and other environmental threats. Desert habitats that have been invaded by Mediterranean grass (*Schismus* spp.), bromegrass (*Bromus* spp.), and Sahara mustard are extremely prone to wildfire; wildfires can kill desert tortoises, as discussed previously in this biological opinion, and cause type conversion from landscapes dominated by shrubs to those dominated by non-native annual grasses and forbs. For these reasons, management of forage and invasive plant species on grazed lands is considered essential to the long-term recovery of the desert tortoise.

At this time, the NPS has either retired or plans to retire all cattle allotments within desert tortoise habitat except for the Valley View, Gold Valley, and Colton Hills allotments. The removal of grazing benefits desert tortoises in several ways. Cattle can introduce or spread non-native plants, trample desert tortoises and their nests and burrows, and disturb cryptogamic crusts. Cattle can alter the structure of perennial vegetation and make it less able to provide cover sites for desert tortoises; at times, cattle may reduce the local availability of forage for desert tortoises. Range improvements, cattle manure, and dead livestock also attract and subsidize common ravens. These impacts are eliminated or reduced with the removal of cattle from areas of desert tortoise habitat.

To manage the remaining allotments, the NPS proposes to prohibit grazing when utilization of perennial plants exceeds 30 percent and to remove cattle from critical habitat to protect perennial plants during severe or prolonged drought. The biological opinion under which the NPS is currently operating requires that utilization be measured on key species within key areas. (See term and condition 2 on page 20, biological opinion 1-8-94-F-17.) Measuring utilization on all perennial species, as proposed by the NPS, may underestimate the actual level of grazing if cattle are selectively foraging on certain species. Consequently, the NPS may not be able to detect at least some changes in habitat condition using this method; the lesser degree of sensitivity could result in greater impact to desert tortoise habitat as a result of grazing.

The NPS has also proposed to remove cattle from critical habitat from March 15 to June 15, if ephemeral plant production does not reach 230 pounds per acre (air dry weight). The NPS would not authorize grazing of ephemeral forage when use exceeds the perennial standards. This measure would also be protective of desert tortoises by ensuring that suitable habitat conditions are being maintained for the desert tortoise in terms of both perennial and annual vegetation.

The protective measures that the NPS has proposed to implement on the remaining allotments should generally ensure that cattle grazing does not result in substantial declines of desert tortoises. Specifically, maintaining cattle grazing at the low levels of utilization proposed by the NPS should ensure that vegetation structure is not changed in a manner that precludes its use by desert tortoises and plant communities are not substantially altered over the next several years. Prohibiting the granting of ephemeral preferences should also assist desert tortoises in making use of available forage in those years when it is available. Years of over-average rainfall and abundant forage may allow young desert tortoises to grow more rapidly and all desert tortoises to improve the overall health status; if desert tortoises do take advantage of these years in such a manner, the prohibition of ephemeral preferences may be particularly important to desert tortoises.

Cattle grazing has likely affected, either directly or indirectly, all desert tortoise habitat within the Mojave National Preserve. Consequently, plant communities have been altered to some degree, some areas have been highly disturbed by ranching developments, and non-native plant species have been introduced; many of these impacts were realized in past years when cattle grazing occurred at higher levels historically than it does today. Despite these changes to the environment of the desert tortoise, this region of the Mojave Desert has supported some of the greatest densities of desert tortoises until recently.

Given the measures the NPS proposes to use to manage ongoing grazing and the relatively minor amount of livestock use that is projected to occur over the next several years, few desert tortoises are likely to be directly killed or injured by grazing activities. In some localized areas, cattle may remove enough forage to reduce its availability to limited numbers of desert tortoises; however, the level of grazing is likely sufficiently low that most desert tortoises should not be substantially affected.

Summary

In summary, the overall status of the desert tortoise should improve as a result of implementation of the GMP; however, future actions will require consultation to ensure adequate site-specific analysis. The effects of ongoing vehicle use, the NPS's road maintenance activities, removal of burros, camping, grazing, and equestrian use are not likely to appreciably reduce the ability of the desert tortoise to survive and recover because the number of individual desert tortoises that are likely to be killed or injured is expected to generally be low. Additionally, these activities are not expected to result in substantial impacts to critical habitat of the desert tortoise because they will primarily occur in areas that have been used for these purposes for many years.

Mohave Tui Chub

The GMP does not contain any specific management actions related to the Mohave tui chub that are likely to adversely affect this species. Future activities, such as the development of a cooperative agreement with the California State University and dredging of Lake Tuendae, will require consultation, pursuant to section 7(a)(2) of the Act.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7(a)(2) of the Act. Most of the Mojave National Preserve consists of Federal lands; consequently, consultation, pursuant to section 7(a)(2) of the Act, will be required for most future activities. We are unaware of any future activities in the action area that are reasonably certain to occur which do not involve the NPS.

CONCLUSION

After reviewing the current status of the desert tortoise and the Mohave tui chub, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of these species or adversely modify critical habitat of the desert tortoise.

We have reached this conclusion for the following reasons:

For the Mohave tui chub, the GMP does not identify any specific actions that are likely to adversely affect this species. Future consultations will be needed for any specific action that the NPS permits, funds, or undertakes that may affect this species.

For the desert tortoise, most of the actions that the NPS has proposed would improve the condition of habitat within the Mojave National Preserve and reduce the level of mortality of desert tortoises; consequently, implementation of the GMP would benefit the survival and recovery of this species. Additionally, many of the actions described in the GMP require future approvals by the NPS. Future consultations will be needed for many of these specific actions that the NPS permits, funds, or undertakes.

INCIDENTAL TAKE STATEMENT

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

The measures described below are non-discretionary and must be undertaken by the NPS or made binding conditions of any authorization provided to permittees. The NPS has a continuing duty to regulate the activity covered by this incidental take statement. If the NPS fails to assume and implement the terms and conditions of the incidental take statement or to make them enforceable terms of permit or grant documents, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, the NPS must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR §402.14(I)(3)].

The GMP describes numerous programs under which the NPS will need to make specific decisions with regard to future actions. Although we have evaluated the general nature of the effects of these actions, both negative and positive, on listed species, we cannot assess the potential effects of the specific actions because data on the locations, timing, nature, and other aspects of the actions are not known at this time. Consequently, we cannot provide an exemption from the prohibitions against take, as described in section 9 of the Act, for the incidental take that may result from many of the actions or programs proposed by the NPS.

Given this limitation, this biological opinion provides an exemption from the prohibitions against take for the incidental take of desert tortoises that may result from any camping, vehicle use, equestrian use, grazing (but not including new range developments), hunting, burro management, road maintenance, and restoration of the Kelso Depot authorized or implemented by the NPS within the Mojave National Preserve.

These activities are likely to disturb a small amount of habitat of the desert tortoise. Most of the actions that will not require further consultation will occur in disturbed areas (*e.g.*, renovation of the Kelso Depot, use of existing corrals for the removal of burros) or will not, by their nature, cause removal of habitat (*e.g.*, removal of burros, hiking, camping in previously disturbed areas). Because of the measures that the NPS proposed as part of its action to minimize the mortality of desert tortoises, including education of visitors, we anticipate that camping, equestrian use, grazing, hunting, burro management, road maintenance, and restoration of the Kelso Depot are likely to result in few mortalities of or injuries to desert tortoises. We expect that most mortality of desert tortoises in the Mojave National Preserve would occur as a result of vehicle use; mortality is likely to be higher on paved roads than on unpaved roads. We cannot anticipate the precise numbers of desert tortoises that may be killed or injured because of the large size of the action area, the patchy distribution of desert tortoises within the Mojave National Preserve, and the unpredictability of when activities involving camping, vehicle use, equestrian use, grazing, hunting, road maintenance, and burro management will cause injury of or mortality to desert tortoises.

To ensure that the measures proposed by the NPS are effective and are being properly implemented, the NPS shall contact the Service immediately if a desert tortoise is killed or injured. At that time, the Service and the NPS shall review the circumstances surrounding the incident to determine whether additional protective measures are required. Activities related to camping, vehicle use, equestrian use, grazing, hunting, road maintenance, burro management, and renovation of the Kelso Depot may continue pending the outcome of the review, provided that the NPS's proposed protective measures and any appropriate terms and conditions of this biological opinion have been and continue to be fully implemented.

We do not anticipate that the proposed action will result in take of any Mohave tui chubs.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of the desert tortoise:

1. The NPS shall re-issue annual permits for livestock grazing only if the permittee is in full compliance with the terms and conditions of the previous biological opinion on grazing, as modified by the NPS's proposed action.

2. The NPS shall determine the level of mortality of desert tortoises that is occurring on its paved roads and implement measures to reduce this mortality.

3. The NPS shall ensure that only qualified personnel are allowed to handle desert tortoises, conduct clearance surveys, and monitor for compliance with the protective measures proposed by the NPS and the terms and conditions of this biological opinion.

4. The NPS shall attempt to prevent mortality of desert tortoises during road maintenance operations.

5. The NPS shall avoid and minimize take of desert tortoises during removal of burros.

6. The NPS shall determine the level of desert tortoise mortality associated with wildlife guzzlers and take measures to minimize this mortality

The Service's evaluation of the effects of the proposed action includes consideration of the measures developed by the NPS and repeated in the Description of the Proposed Action portion of this biological opinion, to minimize the adverse effects of camping, equestrian use, grazing, hunting, road maintenance, burro management, and renovation of the Kelso Depot on the desert tortoise. We also considered the management of grazing that occurs under the Service's previous biological opinions, as modified by NPS proposals described in this biological opinion. Any subsequent changes in the minimization measures proposed by the NPS or in the conditions under which cattle grazing currently occurs may constitute a modification of the proposed action and may warrant re-initiation of formal consultation, as specified at 50 CFR 402.16. These reasonable and prudent measures are intended to clarify or supplement the protective measures that were proposed by the NPS as part of the proposed action.

TERMS AND CONDITIONS

To be exempt from the prohibitions of section 9 of the Act, the NPS must comply with or ensure that any permittee complies with the following terms and conditions, which implement the reasonable and prudent measures described above and outline reporting and monitoring requirements. These terms and conditions are non-discretionary.

An authorized biologist is a biologist who can demonstrate to the Service that he or she has substantial field experience and training to handle and relocate desert tortoises, reconstruct burrows, and relocate eggs; an authorized biologist can also demonstrate that he or she possesses the skills described for an approved biologist. An approved biologist is an individual who can demonstrate, through training and field experience, that he or she can detect the presence of desert tortoises through observations of animals, sign, scat, and burrows. An approved biologist shall also have the ability and skill to monitor projects for compliance as described in the protective measures of the GMP and the terms and conditions of this biological opinion.

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

   a. The NPS shall ensure that evaluations of habitat that is grazed by livestock are presented to the Service at least 90 days prior to the date re-issuance of a permit is needed. The NPS shall re-issue the permit only after written notification from the Service that it has reviewed and concurs with the conclusions of the evaluations.

   b. If the measures contained in the previously issued biological opinion (1-8-94-F-17, attached), as modified by the proposed action in this biological opinion, have not been fully implemented, the NPS shall bring the allotment into legal compliance within one month. Alternatively, the NPS shall suspend the permit and remove grazing from the affected area until the allotment is in compliance.

   c. If habitat conditions fall below the standards as proposed by the NPS, the NPS shall remove grazing from the affected areas until the range conditions have improved sufficiently to meet the proposed standards.

   d. The NPS shall continue to implement the terms and conditions of biological opinion 1-8-94-F-17 except where the minimization measures contained in the GMP or the terms and conditions of this biological opinion are more protective of the desert tortoise. As an example, utilization levels shall be measured on key perennial species within key areas.

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

   a. The NPS shall maintain records of where all desert tortoises, whether dead or alive, are sighted on or along paved roads within the Mojave National Preserve.

   b. If more than two adult desert tortoises are killed in any four week within a five-mile stretch of paved roads, the NPS shall implement measures to reduce mortalities. These measures can include, but are not limited to:

1. reduced speed limits;

2. enforcement of speed limits through ticketing;

3. additional signing; and

4. fencing to prevent desert tortoises from entering roads.

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

a. Only biologists authorized by the Service under the auspices of this biological opinion shall handle desert tortoises.

b. All handling of desert tortoises and their eggs, relocation of desert tortoises, and excavation of burrows shall be conducted by an authorized biologist in accordance with recommended protocol (Desert Tortoise Council 1999).

c. Only biologists approved or authorized by the Service under the auspices of this biological opinion shall conduct pre-project clearance surveys for the desert tortoise or monitor project activities for compliance with the proposed protective measures.

d. The NPS shall submit the names(s) and credentials of the proposed biologist(s) to the Service for review and approval at least 30 days prior to the onset of activities. No activities shall begin until a biologist is approved by the Service.

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

a. An authorized biologist shall examine any areas to be disturbed for road maintenance for desert tortoises and their burrows immediately prior to ground disturbance. All desert tortoise burrows and pallets outside of, but near, stockpiles of materials removed from roads shall be flagged prior to the onset of ground-disturbance so that they may be avoided during work activities. At the conclusion of work activities, all flagging shall be removed.

b. Concentrations of invasive weeds resulting from road maintenance shall be contained and controlled to prevent their expansion and introduction into surrounding habitats.

c. The NPS shall develop a management plan for road maintenance within three years. This management plan shall describe the types of activities that are likely to be included as road maintenance, the measures to be undertaken during maintenance activities to minimize mortality of desert tortoises, and the methods that will be used to avoid the establishment of high and steep berms. These aspects of road maintenance, at a minimum, should be components of the cooperative agreement that the NPS plans to develop with the County of San Bernardino; we recommend that you coordinate with the Service during the development of the cooperative agreement.

5. The following term and condition implements reasonable and prudent measure 5:

When burros are being removed from within desert tortoise habitat, the NPS shall have authorized or approved biologists present, as appropriate, to ensure desert tortoises are moved from harm's way or avoided, if necessary. These protective measures for the desert tortoise shall be implemented when the removal of burros is likely to result in concentrated activity by horses, burros, or workers or ground disturbance.

6. The following term and condition implements reasonable and prudent measure 6:

   a. Within 2 years of issuance of this biological opinion, the NPS shall inventory all guzzlers located within desert tortoise habitat and assess their potential to trap desert tortoises. The assessment of the potential to trap desert tortoises shall be based on the design of the guzzler and the abundance of desert tortoises within the area of the guzzler.

   b. Within 3 years of the issuance of this biological opinion, the NPS shall retrofit all guzzlers that have been identified as having the potential to trap desert tortoises.

   c. The NPS shall retrofit all other guzzlers within desert tortoise habitat within 5 years of the issuance of this biological opinion.

REPORTING REQUIREMENTS

By January 31 of each year this biological opinion is in effect, the NPS shall provide a report to the Service that provides details on each desert tortoise that is found dead or injured. The information shall include the location of each mortality, the circumstances of the incident, and any actions undertaken to prevent similar instances from occurring in the future. The annual report shall also describe activities which the NPS implemented (*e.g.*, the amount of road maintained) within habitat of the desert tortoise. The annual reports shall also evaluate the range conditions that are specified in the previously issued biological opinions for grazing in the Mojave National Preserve.

Anything looks like it died w/in the reporting year
Reports to Barstow Office

DISPOSITION OF DEAD OR INJURED DESERT TORTOISES

Upon locating an individual of a dead or injured desert tortoise, the NPS shall make initial notification to the Service within three working days of its finding. The notification must be made in writing to the Service's Division of Law Enforcement in Torrance (370 Amapola Avenue, Suite 114, Torrance, California 90501; (310) 328-1516) and by telephone and writing to the Ventura Fish and Wildlife Office (2493 Portola Road, Suite B, Ventura, California 93003; (805) 644-1766) and the Barstow office (222 East Main Street, Suite 202, Barstow, California 92311 (760) 255-8890). The report shall include the date and time of the finding or incident (if known), location of the carcass, a photograph, cause of death (if known), and other pertinent information.

Make notation if no camera

Animals injured through activities under NPS jurisdiction shall be transported to a qualified veterinarian for treatment at the expense of NPS. If an injured desert tortoise recovers, the Service shall be contacted regarding its final disposition. Care must be taken in handling injured desert tortoises to ensure effective treatment and care, and in handling dead specimens to preserve biological material in the best possible state. We encourage you to contact the Biological Resources Division of the USGS to determine whether it desires dead desert tortoises. The NPS shall advise us of any arrangements it makes with the Biological Resources Division. Any desert tortoises which are not provided to the Biological Resources Division shall be disposed of appropriately.

CONSERVATION RECOMMENDATIONS

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

1. The NPS should install desert tortoise fencing along the paved roads where desert tortoises are determined to be abundant, based on the data collected as described in term and condition 2a of this biological opinion. Large culverts should also be installed to allow desert tortoises to move across the fenced roads. The NPS should contact researchers with the Biological Resources Division for recommendations on the design of fences and culverts.

2. The NPS should prepare a research proposal to evaluate the population densities of desert tortoises adjacent to roads with and without fences. We recommend that the research evaluate the problems and benefits of fencing roads to minimize mortality of desert tortoises on both the desert tortoise and other desert wildlife. We recommend that you coordinate with us, the Biological Resources Division, and the California Department of

Fish and Game when developing the proposal and that the research be completed within 5 years.

3. The NPS should develop a fire management plan that specifically addresses standard procedures for response and an expedited emergency consultation process.

4. The NPS should maintain the fence at the Colton Hills exclosure in good condition and continue to collect data to provide a long-term record of habitat changes within and outside the exclosure. Data should be collected in a manner that will allow for rigorous comparison of habitat conditions between the areas within and outside the exclosure.

We request notification of the implementation of any conservation recommendations so we are informed of actions that minimize or avoid adverse effects to or benefit listed species or their habitats. We would appreciate information on the amounts of private lands acquired within the Mojave National Preserve, on any cattle allotments that are retired, and on the number of burros removed and the locations from which they were removed.

REINITIATION NOTICE

This concludes formal consultation on the GMP for the Mojave National Preserve. As provided in 50 CFR 402.16, reinitiation 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 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 not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

If you have any questions regarding this authorization, please contact Tim Thomas of my staff at (760) 255-8890.

Attachment

LITERATURE CITED

Berry, K., T. Goodlett, and K. Anderson. 2001. Recent declines in desert tortoise population in Eastern California: The Fenner and Chemehuevi Valleys. In: Abstracts of Desert Tortoise Council 26th annual meeting and symposium March 16-19, 2001.

Berry, K., L. Nicholson, S. Juarez, and A. Woodman. 1986. Changes in desert tortoise population at four study sites in California. Proceedings of the 1986 Symposium, Desert Tortoise Council. pp. 60-80.

Berry. K., and F. Turner. 1984. Notes on the behavior and habitat preferences of juvenile desert tortoises (*Gopherus agassizii*). Proceedings of the 1984 Symposium, Desert Tortoise Council. pp. 111-130.

Boarman, W., M. Sazaki, K. Berry, G. Goodlet, B. Jennings, and A. Woodman. 1992. Measuring effectiveness of a tortoise-proof fence and culverts: Status report from the first field season. Proceedings of the 1992 Symposium, Desert Tortoise Council.

Burge, B.L. 1978. Physical characteristics and patterns of utilization of cover sites by *Gopherus agassizii* in southern Nevada. Proceedings of the 1978 Symposium, Desert Tortoise Council. pp. 80-111.

Burge, B.L., and W.G. Bradley. 1976. Population density, structure and feeding habits of the desert tortoise, *Gopherus agassizii*, in a low desert study area in southern Nevada. Proceedings of the 1976 Symposium, Desert Tortoise Council. pp. 51-74.

Desert Tortoise Compensation Team. 1991. Compensation for the Desert Tortoise. A Report Prepared for the Desert Tortoise Management Oversight Group. The Management Oversight Group is composed of the State Directors of the Bureau of Land Management, the Field Supervisors of the Fish and Wildlife Service, and the directors of the State game and fish departments in California, Utah, Arizona, and Nevada.

Desert Tortoise Council. 1999. Guidelines for Handling Desert Tortoises During Construction Projects. Edward L. LaRue, Jr., editor. San Bernardino, California.

Frenkel, R.E. 1970. Ruderal vegetation along some California roadsides. University of California Publications in Geography. 20:1-163. Berkeley and Los Angeles, California.

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

Humphrey, R.R. 1958. The desert grassland: A history of vegetational change and an analysis of causes. Botanical Review 24:193-252.

Humphrey, R.R. 1987. 90 years and 535 miles: vegetation changes along the Mexican border. University of New Mexico Press, Albuquerque.

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

May, B., J. Rodzen, and J. Agrest. 1997. Genetic purity and subspecific status of the Mohave tui chub. W68711-97-LT-70025.USN. San Bruno, California.

National Park Service. 1998. Action plan for the removal of feral burros. Unpublished document. Mojave National Preserve. Barstow, California.

National Park Service. 2001. Biological assessment for dredging of Lake Tuendae, Soda Lake, San Bernardino California. Mojave National Preserve. Barstow, California.

Nicholson, L. 1978a. The effects of roads on tortoise populations. Bureau of Land Management, Riverside, California. Contract No. CALIFORNIA-060-CT8-000024.

Nicholson, L. 1978b. The effects of roads on desert tortoise populations. Proceedings of the 1978 Symposium, Desert Tortoise Council. pp. 127-129.

Oftedal, O. 2001. Low rainfall affects the nutritive quality as well as the total quantity of food available to the desert tortoise. In abstracts of the 26th annual meeting and symposium of the Desert Tortoise Council, March 16-19, 2001, Tucson, Arizona.

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

Snyder, J.O. 1918. The fishes of Mohave River, California. Proceedings of the U.S. Natural History Museum 54:297-299.

Turner, R.R. 1982. Mohave desertscrub. In: D.E. Brown (editor), Biotic communities of the American Southwest - United States and Mexico. Desert Plants 4(1-4):157-168.

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

U.S. Bureau of Land Management and California Department of Fish and Game. 1992. California statewide desert tortoise management policy. Sacramento, California.

U.S. Geological Survey. 2001. Diet and foraging ecology of the desert tortoise in relation to cattle grazing in the Mojave Desert. U.S. Geological Survey, Western Ecological Center web site. www.werc.usgs.gov/cc/diet.html

U.S. Fish and Wildlife Service. 1988. Revised Recovery Plan for the Mohave tui chub (*Gila bicolor mohavensis*). Portland, Oregon.

U.S. Fish and Wildlife Service. 1994. Desert Tortoise (Mojave Population) Recovery Plan. Portland, Oregon.

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

Appendix C:

BIOLOGICAL OPINION FOR ACTIVITIES IN THE CALIFORNIA DESERT CONSERVATION AREA

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Carlsbad Fish and Wildlife Office
2177 Salk Avenue, Suite 250
Carlsbad, California 92008

In Reply Refer To:
FWS-KRN/SBD/INY/LA/IMP/RIV-17B0532-17F1029

September 1, 2017
Sent by Email

Memorandum

To: District Manager, California Desert District, Bureau of Land Management, Moreno Valley, California

From: for Field Supervisor, Carlsbad Fish and Wildlife Office, U.S. Fish and Wildlife Service, Carlsbad, California

Subject: Biological Opinion for Activities in the California Desert Conservation Area

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion regarding the effects on the federally listed desert tortoise (Mojave population DPS) (*Gopherus agassizii*) and its critical habitat, in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq*.), of existing and future actions that are likely to occur within the boundaries of the California Desert Conservation Area.

This biological opinion is based on information in our files and discussions with your staff during the course of consultation. A record of this consultation can be made available at the Carlsbad Fish and Wildlife Office.

CONSULTATION HISTORY

Staff from the Bureau of Land Management (Bureau) and Service discussed the basic concepts of this consultation on February 2, 2016, and met several times thereafter to resolve specific issues. Based on these discussions and our general knowledge of the activities occurring within the boundaries of the California Desert Conservation Area, we provided a draft biological opinion to the Bureau on April 26, 2017. The Bureau provided the Service with comments on the draft biological opinion on May 26, 2017. This final biological opinion incorporates the Bureau's comments on the draft biological opinion.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

Scope of the Consultation

The Bureau and Service agreed that this consultation would address only the desert tortoise and its critical habitat. The desert tortoise and its critical habitat are the subjects of most consultations in the California Desert Conservation Area. The Bureau will consult with the Service on a case-by-case basis for any future activity that may affect other listed species or critical habitat.

The Bureau and Service agreed to consult formally on most activities that the Bureau undertakes or authorizes within the boundaries of the California Desert Conservation Area. This biological opinion pertains but is not limited to the construction, operation, maintenance, and decommissioning of the activities listed in the following table, and any management action that may occur within any of the program areas listed below, under the direction of the California Desert Conservation Area Plan, as amended, including the conservation and management actions for the Desert Renewable Energy Conservation Plan (Bureau 2016).

Wildlife, Vegetation, and Natural Resources
Guzzlers
Habitat restoration
Wild horses and burros
Invasive species management
Scientific studies
Fuels, fire, and prescribed burns
Range improvements
Recreation
Route closure and restoration of closed routes
Fences, signs, information and interpretive kiosks, directional signage, traffic counters
Organized tour events, special recreation permits, dual sport events, foot races, Bureau-sponsored or cosponsored outreach events, marathons, enduros, long-distance tours, races, shooting ranges, shooting of any rifle, shotgun or handgun consistent with the appropriate county's and/or California Department of Fish and Wildlife's shooting/hunting zone map
Staging areas
Non-motorized bicycle and hiking trails
Non-motorized trail development, maintenance and upgrades
Operations
Construction and maintenance of the Bureau's facilities, bathrooms, warehouses, office buildings, or maintenance facilities
Road repair and maintenance, paving, Arizona crossings, soil stabilizer, culverts
Lands
Apiaries
Land tenure (i.e., sales and exchanges)
Transmission and distribution lines
Substations, switchyards
Communication towers
Geotechnical surveys
Meteorological towers
Pipelines
Water storage tanks
Unexploded ordinance cleanups
Trash cleanups
Remediation of hazardous material sites

Mining
Locatable minerals (e.g., metallic, nonmetallic, and certain other minerals)
Leasable minerals (e.g., oil, gas, sodium, potash, phosphate, and coal)
Saleable minerals (e.g., sand and gravel)
Abandoned mining lands

Through this consultation, the Bureau and Service are implementing a process to expedite the review of certain future activities that the Bureau will implement or authorize under the guidance of the land use plan amendment for the California Desert Conservation Area (Bureau 2016). As part of the land use plan amendment, the Bureau adopted numerous conservation and management actions, which it defines as the "specific set of avoidance, minimization, and compensation measures, and allowable and non-allowable actions for siting, design, pre-construction, construction, maintenance, implementation, operation, and decommissioning activities on (Bureau) land." The Bureau will apply these conservation and management actions to all future activities. The land use plan amendment (Bureau 2016) contains a complete list of the conservation and management actions.

This biological opinion describes the process by which the Service and Bureau will consult on future activities and analyzes whether implementation of these activities is likely to jeopardize the continued existence of the desert tortoise or result in the destruction or adverse modification of its critical habitat. The Service and Bureau did not alter any of the conservation and management actions described in the land use plan amendment. However, the Bureau clarified that the conservation and management actions regarding transmission lines (TRANS-BIO-1 and LUPA-BIO-6) will also apply to distribution lines. All subsequent citations of conservation and management actions in this biological opinion are from the land use plan amendment (Bureau 2016).

This biological opinion will also replace most existing programmatic consultations that the Bureau and the Service are currently implementing. Some existing programmatic consultations, such as those with utilities, will remain in effect until the Service and Bureau replace them using the provisions of the new land use plan amendment as described in the Administration of the Consultation section. The existing programmatic consultations for off-highway vehicle management areas, livestock grazing, and route designation will remain in effect. This consultation will not include route designation, grazing, designation of new utility corridors, the development of renewable energy facilities, or major transportation corridors. See Appendix A for a list of these previous biological opinions.

Administration of the Consultation

The implementing regulations require that each Federal agency "review its actions at the earliest possible time to determine whether any action may affect listed species or critical habitat" [50 Code of Federal Regulations (CFR) 402.14(a)]. The Wildlife Biologist from the appropriate Bureau Field Office and California Desert District Office will review all discretionary actions that the Bureau proposes to implement or permit within the action area. If the Bureau determines that a future activity within the California Desert Conservation Area may affect the desert tortoise or its critical habitat, it will follow the procedures outlined in this section. (In this biological opinion, we intend "critical habitat" to refer to critical habitat of the desert tortoise, unless the reference is to the general regulatory provisions that apply to critical habitat.)

During the development of this biological opinion, Bureau and Service staff agreed that early informal consultation will remain a key component of the coordination between our agencies as either the Bureau or proponents propose activities. This coordination will include the discussion of survey protocols, the sharing of the results of surveys, and the discussion of the appropriate conservation and management actions, as described in the Bureau's (2016) land use plan amendment. The Bureau and Service recognize that informal consultation is an optional process; in some situations (e.g., small activities that are similar to those that we have previously reviewed), informal consultation may be unnecessary.

The Bureau will maintain a record of all its activities that undergo this evaluation. For all activities, the Bureau will include in its record:

1. The title of the action;

2. A description of the proposed action;

3. Location;

4. Size; and

5. The conservation and management actions and other protective measures, if any, for the desert tortoise and its critical habitat.

To assist in record keeping and in communicating between our agencies, the Bureau and Service will use the activity form that is appended to this biological opinion to document activities (Appendix B). These records will be maintained at the California Desert District Office.

The Bureau will notify the Service of every action that may affect the desert tortoise or its critical habitat by providing the activity form, via electronic mail, to the Palm Springs Fish and Wildlife Office (PSFWO).

For projects that affect 10 acres of habitat or less, or that do not involve ongoing impacts to desert tortoises that are associated with transportation, the Service will have 30 days to respond via electronic mail if we have any concerns with use of the programmatic consultation. The Bureau may assume that the Service has no concerns if it does not respond by the close of the 30-day period; as a courtesy, the Service will attempt to notify the Bureau of its decision as soon as possible. If the Service has concerns, it will describe these concerns to the Bureau and recommend a means of resolving the issues. Staff from the Bureau and Service may discuss issues informally during this time to resolve the issue; if they reach resolution, staff will summarize the revisions on the activity form as appropriate and the Service will submit it to the Bureau.

For projects that affect more than 10 acres or that will involve ongoing impacts to desert tortoises that are associated with transportation, the Service will respond within 30 days by signing and returning the activity form via electronic mail. The Bureau will not authorize the project until it receives this notification from the Service. The Service will indicate on the form whether it has any concerns with use of the programmatic consultation and agrees with the conservation and management actions the Bureau selected. The Service may also propose additional conservation and management actions or other protective measures, if necessary. Staff from the Bureau and Service may discuss issues informally during this time; if such discussions result in revisions to the protective measures, staff will revise the activity form as appropriate and the Service will sign and submit it to the Bureau.

The Bureau or Service may opt out of using this consultation for a specific activity. If either agency determines that the use of this biological opinion may not be appropriate for a specific activity, it will notify the other agency as soon as possible to allow for changes in planning schedules.

In past consultations with the Bureau, the Service has authorized biologists to implement protective measures and handle desert tortoises on a project-by-project basis. Upon completion of this consultation, the Bureau will not request such authorization on a project-by-project basis. Upon date of signature, any person approved by the Service to undertake the duties of an authorized biologist for Bureau actions may also perform those duties on future actions within the Bureau's lands if those actions are within the scope of this biological opinion. If the Bureau determines that an authorized biologist is not performing his or her duties in a satisfactory manner, it will notify the Service at the earliest possible time it makes this determination.

The Service and Bureau acknowledge that activities may be proposed in the future that we have not considered in this biological opinion. The Bureau and Service will determine whether this biological opinion sufficiently considered the effects of such activities on the desert tortoise and its critical habitat. If so, use of this biological opinion would be appropriate; otherwise, re-initiation of formal consultation or initiation of a separate consultation may be appropriate.

If staff from the Service and Bureau cannot agree on a course of action after discussions on this or other issues, any disagreement will be elevated to the next appropriate supervisory level within the PSFWO for the area within which the project lies and the Bureau's appropriate field office for resolution. If further elevation is required, these individuals will contact the next level of supervisors within their agencies. Although the elevation of issues is likely to be an infrequent occurrence, the Bureau and Service consider this procedure to be a useful tool to maintain efficient processes and a healthy working relationship between our agencies.

The California Desert District Office will provide the Service with an annual report of the activities that it conducted or permitted under the auspices of this consultation. The annual report will include the information from the activity forms (Appendix B). The annual report will be provided to the Service by February 28 of each year this biological opinion is in effect.

This biological opinion will remain in effect until the Bureau or Service determines that it is no longer meeting either agency's needs. If such a circumstance arises, the agency reaching this conclusion will notify the other agency at the earliest possible time. If any of the thresholds for re-initiation of formal consultation are met (see Re-initiation Notice section of this biological opinion), the Bureau and Service will work together and revisit the consultation. If the Bureau and Service determine that this biological opinion requires changes that do not rise to the level of re-initiation, they will work together to amend the procedures contained herein.

Staff and managers from the PSFWO and the Bureau will meet annually to review how this consultation is functioning and to discuss any potentially important events in the upcoming year. If the Service and Bureau agree that such a meeting is unnecessary in any given year, the meeting may be cancelled.

Extent of Future Development

To ensure that its activities are not likely to jeopardize the continued existence of the desert tortoise, the Bureau has proposed to re-initiate formal consultation if 15 large desert tortoises are killed in a calendar year as a result of the activities considered in this biological opinion. The Bureau will transport any injured desert tortoise to a qualified veterinarian. If the desert tortoise recovers from its injuries but cannot be returned to the wild, we will consider this individual to have been killed. We will not consider rehabilitated desert tortoises that are returned to the wild as having been killed. During translocation, some desert tortoises may be found to be in such poor condition that they need to be euthanized; we will not consider these individuals as having been killed as a result of the activity.

The Bureau and Service will reassess, and alter if appropriate, the re-initiation threshold every 5 years using the results of the Service's range-wide sampling program and the number of large tortoises killed in the previous 5 years. For example, if the density of desert tortoises decreases, we will reduce the re-initiation threshold accordingly.

The Bureau and Service have not established re-initiation thresholds for critical habitat or habitat in general. The Bureau's disturbance cap system within areas of critical environmental concern and National Conservation Lands already limits the loss of critical habitat because critical habitat is located within these protected areas. The Bureau and Service have not established a cap system for habitat loss outside of protected areas because these areas support few desert tortoises and are not necessary for the conservation of the species.

Monitoring and Adaptive Management

The Bureau will implement a monitoring program to assess the effects of the proposed activities. The program will include activity-level monitoring for compliance with its project-specific approvals and monitoring of the effects of the land use plan. Both activity- and plan-level monitoring include provisions for effectiveness monitoring and adaptive management; the goal of these provisions is to ensure that monitoring is "an iterative process designed to continually improve the understanding of managed systems and inform their management over time" (Bureau 2015a). The land use plan amendment for the Desert Renewable Energy Conservation Plan (Bureau 2016, section III.2) includes detailed discussions of the monitoring programs.

ANALYTICAL FRAMEWORK FOR THE SECTION 7(A)(2) 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 determine the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the species; and (4) the Cumulative Effects, which evaluate the effects of future, non-Federal activities in the action area on the species.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of the current status of the species, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the 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 result in the destruction or adverse modification of critical habitat of listed species. "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. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features (50 CFR 402.02).

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

For purposes of the adverse modification determination, the effects of the proposed Federal action on the critical habitat of the desert tortoise are evaluated in the context of the range-wide condition of the critical habitat, taking into account any cumulative effects, to determine if the critical habitat range-wide would remain functional (or would retain the current ability for the physical and biological features to be functionally established in areas of currently unsuitable but capable habitat) to serve its intended recovery role for the desert tortoise.

The analysis in this biological opinion places an emphasis on using the intended range-wide recovery function of critical habitat for the desert tortoise and the role of the action area relative to that intended function as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the adverse modification determination.

METHODOLOGY

In most consultations, the Service and Bureau are aware of detailed information regarding the proposed action. For example, we know the project's specific location and its precise type; we often have a general idea of the timing of development. Because of surveys that the applicant or Bureau have conducted, we can frequently estimate the numbers of individuals of desert tortoise that the proposed action may affect. We will also know the precise measures that the Bureau will require the applicant to undertake to mitigate the effects of the proposed action on the desert tortoise and its critical habitat.

In this formal consultation, the Bureau and Service are considering the effects on the desert tortoise and its critical habitat of activities that the Bureau may undertake pursuant to the land use plan amendment signed on September 14, 2016. However, we do not know the specific types, timing, or locations of activities that the Bureau or its applicants may propose within the California Desert Conservation Area or the specific number of desert tortoises or amount of habitat (including critical habitat) that each activity may affect.

Given these uncertainties, the Bureau and Service established specific sideboards for the number of desert tortoises that may be killed during activities as a threshold for the re-initiation of formal consultation. Because the Bureau adopted disturbance caps with regard to habitat in areas that are important for the conservation of the desert tortoise as part of its land use plan amendment, we did not establish acreage thresholds with regard to habitat. We will evaluate the general effects of activities on the desert tortoise and its critical habitat, assess how the conservation and management actions are likely to mitigate these effects, and determine if the residual effects are likely to jeopardize the continued existence of the desert tortoise or destroy or adversely modify its critical habitat.

First, we will provide information on the range-wide status of the desert tortoise and its critical habitat; we will follow that discussion with information on the status of the desert tortoise and its critical habitat within the action area. We will conduct our analysis of the effects of the Bureau's activities on the desert tortoise and its critical habitat, provide our conclusions with regard to whether the proposed action is likely to jeopardize the continued existence of the species or result in the destruction or adverse modification of critical habitat. If appropriate, an incidental take statement will follow the conclusion.

The Bureau used 25 years as a planning horizon for its analysis during the development of the land use plan amendment. The activities that may follow the land use plan amendment will usually proceed for longer or shorter periods of time. We will consider how the expected duration of the activity will affect desert tortoises and their critical habitat when we conduct the activity-specific review, as described in the above Administration of the Consultation section of this biological opinion.

Biological analyses are frequently not readily quantifiable. For example, we usually cannot state that the degradation of a certain local area as the result of an activity will result in the likelihood that species is 25 percent less likely to survive and recover. Therefore, we address the likely magnitude of the effects of activities considered in this biological opinion by using the terms "considerable," "appreciable," and "negligible." In its final rule regarding the definition of destruction or adverse modification of critical habitat (81 Federal Register 7214), the Service defined ''considerably'' to mean "worthy of consideration'' and described it as a way of "stating that we can recognize or grasp the quality, significance, magnitude, or worth of the reduction in the value of critical habitat." In that rule, we defined the term ''appreciably diminish'' to mean "that the relevant question is whether the reduction has some relevance because we can recognize or grasp its quality, significance, magnitude, or worth in a way that negatively affects the value of the critical habitat as a whole for the conservation of a listed species." Although both of the definitions refer to critical habitat, we can use these adjectives to qualify the scale of any impact. To continue further down this scale, we will use the term "negligible" to indicate when activities would result in effects that are too small to meaningfully measure, detect, or evaluate. Through use of these qualifying adjectives, we will describe the relative effect of various activities on the desert tortoise and its critical habitat.

STATUS OF THE DESERT TORTOISE AND ITS CRITICAL HABITAT

Status of the Desert Tortoise

The Service listed the desert tortoise as threatened in 1990 [55 Federal Register (FR) 12178]. 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, and habitat invasion by non-native invasive plant species.

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

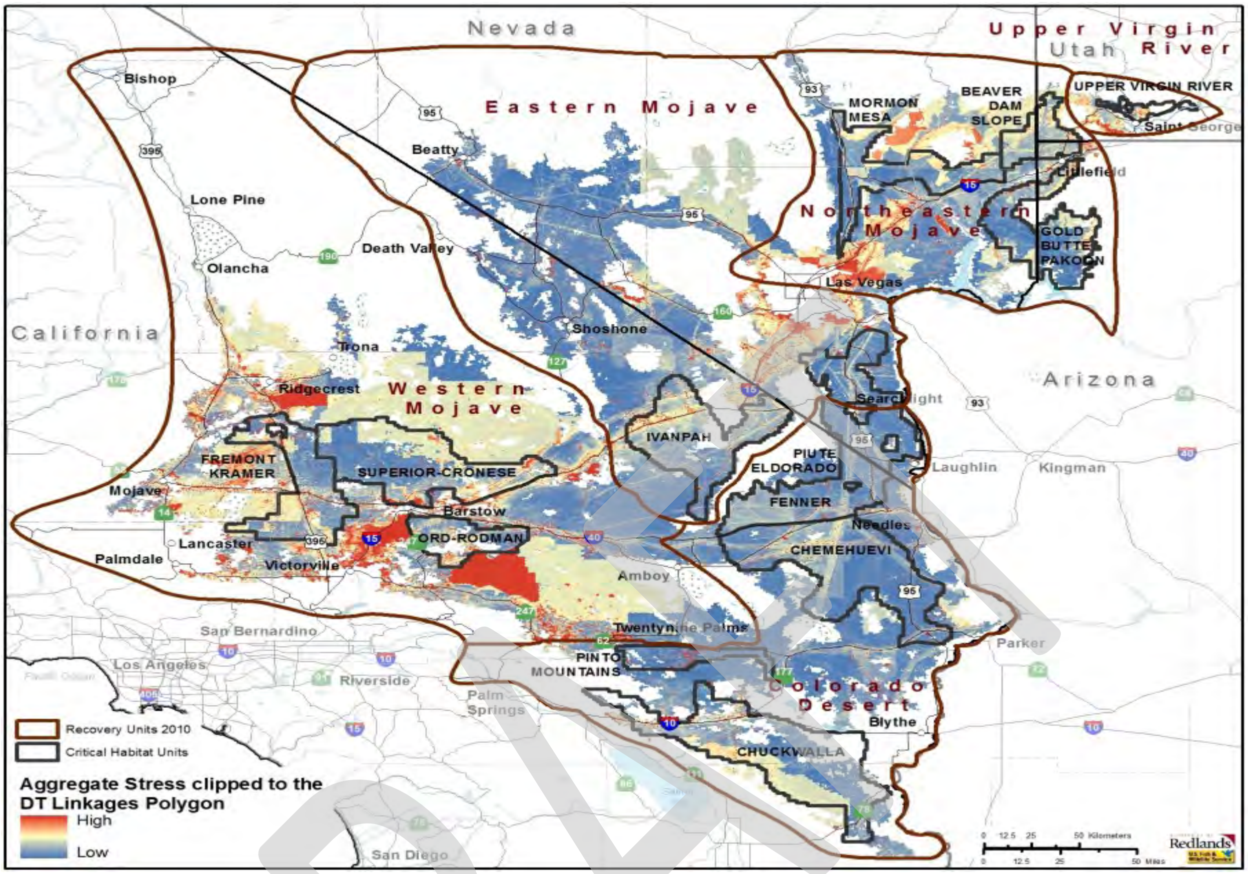
In recognition of the absence of specific and recent information on the location of habitable areas of the Mojave Desert, especially at the outer edges of this area, Nussear *et al*. (2009) developed a quantitative, spatial habitat model for the desert tortoise north and west of the Colorado River. The model incorporates environmental variables such as precipitation, geology, vegetation, and slope and is based on 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.

To understand better the relationship of threats to populations of desert tortoises and the most effective manner to implement recovery actions, the Desert Tortoise Recovery Office developed a spatial decision support system that models the interrelationships of threats to desert tortoises and how those threats affect population change. The spatial decision support system describes the numerous threats that desert tortoises face, explains how these threats interact to affect individual animals and habitat, and how these effects in turn bring about changes in populations. For example, we have long known that the construction of a transmission line can result in the death of desert tortoises and loss of habitat. We have also known that common ravens, known predators of desert tortoises, use 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. The spatial decision support system allows us to map threats across the range of the desert tortoise and model the intensity of stresses that these multiple and combined threats place on desert tortoise populations.

The following map depicts the 12 critical habitat units of the desert tortoise, linkages between conservation areas for the desert tortoise and the aggregate stress that multiple, synergistic threats place on desert tortoise populations, as modeled by the spatial decision support system. Conservation areas include designated critical habitat and other lands managed for the long-term conservation of the desert tortoise (e.g., the Desert Tortoise Natural Area, Joshua Tree National Park, and the Desert National Wildlife Refuge).

Recovery Plan

The Service (1994, 2011) has issued an initial recovery plan and a revised recovery plan for the desert tortoise. The 1994 recovery plan recommended that a scientifically credible monitoring plan be developed to determine that the population exhibit a statistically significant upward trend or remain stationary for at least 25 years and that enough habitat would be protected within a recovery unit or the habitat and populations be managed intensively enough to ensure long-term viability. Because both minimum population densities and minimum population numbers need to be considered to ensure recovery, the Service further recommended that reserves be at least 1,000 square miles. Smaller reserves that provide high-quality, secure habitat for 10,000 to 20,000 adult desert tortoises should provide comfortable persistence probabilities for the species well into the future when populations are well above minimum viable density (e.g., 30 or more adults per square mile) and lambdas can be maintained (see page C54 of Service 1994). Conversely, populations with densities below approximately 10 adults per square mile (3.9 per square kilometer) are in danger of extinction (see page 32 of Service 1994).



"Adult" desert tortoise connotes reproductive maturity. The Bureau's conservation and management actions use 160 millimeters as the threshold for "adult" desert tortoises; however, not all desert tortoises that are 160 millimeters in length are reproductive. The Bureau based this size on the Service's 2010 pre-project survey protocol for the desert tortoise. The Service based its 2010 survey protocol on the methodology used in range-wide sampling but erred in citing 160 millimeters as the size below which surveyors' ability to detect desert tortoises decreases. In range-wide sampling, the Service uses 180 millimeters as its cut-off length for counting desert tortoises, at least in part because the Styrofoam models used for training are 180 millimeters in length. The Service intends to revise the survey protocol and will use 180 millimeters in the revised version. We have evaluated how the Bureau's use of 160 millimeters would affect desert tortoises. Specifically, Turner *et al*. (1987, which contains a life table that the Service generally uses to predict the number of desert tortoises that may occur in an area) found that individuals larger than 160 millimeters comprise approximately 15.4 percent of all desert tortoises; desert tortoises larger than 180 millimeters comprise 13.2 percent of all individuals. From that perspective, on average, we would expect that using 160 millimeters as the size threshold would make the Bureau's conservation and management action slightly more conservative for on-the-ground decisions. However, for the purposes of this biological opinion, we have used the term "adult" to indicate reproductive status and "large" to indicate animals larger than 180 millimeters in order to conform to the Service's protocols for range-wide sampling and pre-project surveys.

The revised recovery plan for the desert tortoise (Service 2011) 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 (λ) for desert tortoises are increasing (i.e., $\lambda > 1$) 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. The previous map in this biological opinion illustrates that, across the range, desert tortoises in areas under the highest level of conservation and management remain subject to numerous threats, stresses, and mortality sources.

Five-Year Review

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

In the 5-year review, the Service discusses the status of the desert tortoise as a single distinct population segment and provides information on the Federal Register notices that resulted in its listing and the designation of critical habitat. The Service also describes the desert tortoise's ecology, life history, spatial distribution, abundance, habitats, and the threats that led to its listing (i.e., the 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.

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

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 desert wildlife management areas 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 43,920 acres of habitat of the desert tortoise. We also predicted that the project areas supported up to 3,721 desert tortoises; we concluded that most of these individuals were small desert tortoises, that most large individuals would likely be translocated from project sites, and that most mortalities would be small desert tortoises that were not detected during clearance surveys. To date, 583 desert tortoises have been observed during construction of projects; most of these individuals were translocated from work areas, although some desert tortoises have been killed (see Appendix D). The mitigation required by the Bureau and California Energy Commission, the agencies permitting 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 the 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 (e.g., areas of critical environmental concern, National Conservation Lands, etc.) from 6,118,135 to 8,689,669 acres (Bureau 2015a); 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.

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 for the use of additional training lands at Fort Irwin. As part of this proposed action, the Department of the Army removed approximately 650 desert tortoises from 18,197 acres of the southern area of Fort Irwin, which had been off-limits to training. The Department of 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.

The Service also issued a biological opinion to the Marine Corps that considered the effects of the expansion of the Marine Corps Air Ground Combat Center at Twentynine Palms (Service 2017). We concluded that the Marine Corps' 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 Management Area. As part of this proposed action, the Marine Corps removed 929 desert tortoises from the expansion area (Hoffmann 2017).

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. Although 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 the expected benefits of the measures have yet been realized, at least in part 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. The vast majority of threats to the desert tortoise or its habitat are associated with human land uses." Oftedal's work (2002 in Service 2010) suggests that invasive weeds may adversely affect the physiological health of desert tortoises. 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.

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

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 would "reasonably be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR 402.02). Although the Service does not explicitly address these metrics in the 5-year review, we have used the information in that document and more recent information to summarize the status of the desert tortoise with respect to its reproduction, numbers, and distribution.

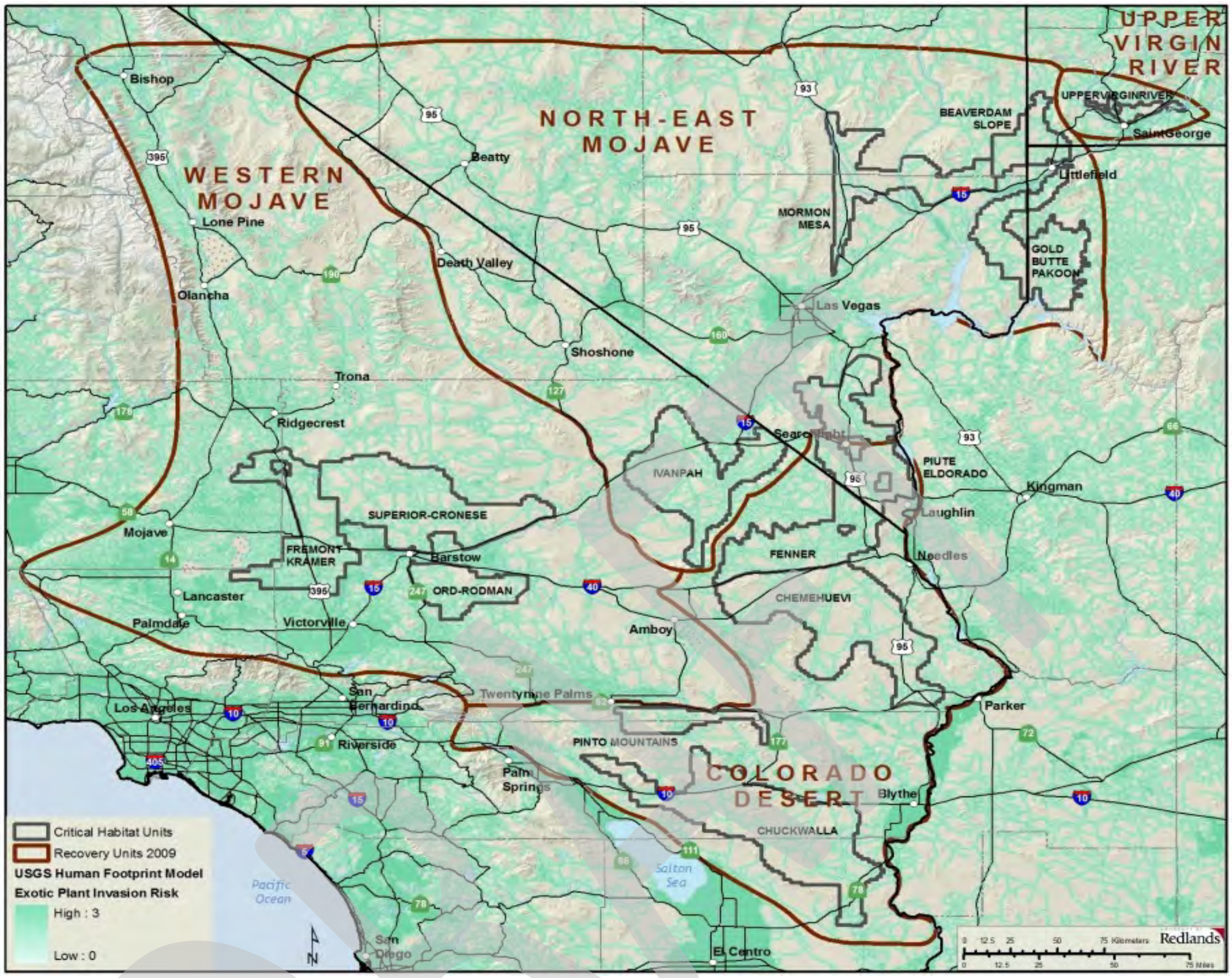
Reproduction

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 2002 in Service 2010), 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 trials, 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 following map depicts the potential for these species to invade habitat of the desert tortoise. The reproductive capacity of the desert tortoise may be compromised to some degree by the abundance and distribution of invasive weeds across its range; the continued increase in human access across the desert likely continues to facilitate the spread of weeds and further affect the reproductive capacity of the species.

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 sample 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., 1 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 population densities from the local study plots cannot be extrapolated to provide an estimate of the number of desert tortoises on a range-wide basis, historical densities in some parts of the desert exceeded 100 adults in a square mile (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. The Desert Tortoise Recovery Office (Service 2015a) used annual density estimates obtained from this sampling effort to evaluate range-wide trends in the density of desert tortoises over time. (All references to the density of desert tortoises are averages. Some areas support higher densities and some lower; desert tortoises are not distributed 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; the following table depicts the estimated numbers of desert tortoises within conservation areas in each recovery unit and the rates of population change. 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. Densities in the Joshua Tree and Piute Valley conservation areas within the Colorado Desert Recovery Unit seem to be increasing, although densities in the recovery unit as a whole continue to decline.

Recovery Units	2004	2014	Change	Percentage of Change
Western Mojave	35,777	17,644	-18,133	-51
Colorado Desert	67,087	42,770	-24,317	-36
Northeastern Mojave	4,920	18,220	+13,300	+270
Eastern Mojave	16,165	5,292	-10,873	-67
Upper Virgin River	2,397	1,760	-637	-27
Total	126,346	85,686	-40,660	-32

In the previous summary of the results of range-wide sampling (Service 2014), we extrapolated the densities obtained within conservation areas (e.g., desert wildlife management area, Desert Tortoise Research Natural Area, Joshua Tree National Park) to all modeled habitat of the desert tortoise. This extrapolation may have exaggerated the number of desert tortoises because we applied the values for areas where densities are generally highest (i.e., the conservation areas) to areas where desert tortoises exist in very low densities (e.g., the Antelope Valley). We are also aware of a few areas where the density of desert tortoises outside of conservation areas is higher than inside.

To further examine the status of desert tortoise populations over time, we compared the densities of desert tortoises in the Western Mojave Recovery Unit between 2004 and 2014 (see Service 2015a). In 2004, desert tortoise conservation areas surveyed in the Western Mojave Recovery Unit supported an average density of approximately 5.7 adults per square kilometer (14.8 per square mile). In contrast, surveys in the same areas in 2014 indicated that densities had decreased to 2.8 adults per square kilometer (7.3 per square mile). This decline in densities is consistent with decreases in density of populations in all recovery units over the same time period, with the exception of the Northeastern Mojave Recovery Unit. In fact, historical survey data from numerous plots in the Western Mojave Recovery Unit during the late 1970s and early 1980s suggest that adult desert tortoise densities ranged from 50 to 150 per square mile (Tracy *et al*. 2004).

To further assess the status of the desert tortoise, the Desert Tortoise Recovery Office (Service 2015) used multi-year trends from the best-fitting model describing loge-transformed density of adult animals per square kilometer. In 2014, 3 of the 5 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 (2014) evaluated changes in size distribution of desert tortoises since 2001. In the Western Mojave and Colorado Desert recovery units, the relative number of juveniles to adults indicates that juvenile numbers are declining faster than adults. In the Eastern Mojave, the number of juvenile desert tortoises is also declining, but not as rapidly as the number of adults. In the Upper Virgin River Recovery Unit, trends in juvenile numbers are similar to those of adults; in the Northeastern Mojave Recovery Unit, the number of juveniles is increasing, but not as rapidly as are adult numbers in that recovery unit. Juvenile numbers, like adult densities, are responding in a directional way, with increasing, stable, or decreasing trends, depending on the recovery unit where they are found.

In this context, we consider "juvenile" desert tortoises to be animals smaller than 180 millimeters in length. The Service does not include juveniles detected during range-wide sampling in density estimations because they are more difficult to detect and surveyors frequently do not observe them during sampling. However, this systematic range-wide sampling provides us with an opportunity to compare the proportion of juveniles to adults observed between years.

Distribution

Prior to 1994, desert tortoises were extirpated from large areas within their distributional limits by urban and agricultural development (e.g., the cities of Barstow and Lancaster, California; Las Vegas, Nevada; and St. George, Utah; etc.; agricultural areas south of Edwards Air Force Base and east of Barstow), military training (e.g., Fort Irwin, Leach Lake Gunnery Range), and off-road vehicle use (e.g., portions of off-road management areas managed by the Bureau and unauthorized use in areas such as east of California City, California).

Since 1994, urban development around Las Vegas has likely been the largest contributor to habitat loss throughout the range. Desert tortoises have been essentially removed from the 18,197-acre southern expansion area at Fort Irwin (Service 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 desert tortoise conservation areas, such as desert wildlife management areas, although such projects have occurred in areas that the Service considers important linkages between conservation areas (e.g., Silver State South Project in Nevada).

The following table 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.

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

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. Since 2010, we again conclude that the species' distribution has not changed substantially in terms of the overall extent of its range, although desert tortoises have been removed from several thousand acres because of solar development and military activities.

Status of Critical Habitat of the Desert Tortoise

The Service designated critical habitat for the desert tortoise in portions of California, Nevada, Arizona, and Utah in a final rule published February 8, 1994 (59 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. 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 desert tortoise critical habitat are: sufficient space to support viable populations within each of the six recovery units and to provide for movement, dispersal, and gene flow; sufficient quality and quantity of forage species and the proper soil conditions to provide for the growth of these species; suitable substrates for burrowing, nesting, and overwintering; burrows, caliche caves, and other shelter sites; sufficient vegetation for shelter from temperature extremes and predators; and habitat protected from disturbance and human-caused mortality.

Critical habitat of the desert tortoise would not be able to fulfill its conservation role without each of the physical and biological features being functional. As examples, critical habitat would not function properly if a sufficient amount of forage species were present but human-caused mortality was excessive; an area with sufficient space to support viable populations within each of the six recovery units and to provide for movement, dispersal, and gene flow would not function properly without adequate forage species.

The final rule for designation of critical habitat did not explicitly ascribe specific conservation roles or functions to the various critical habitat units. Rather, it refers to the strategy of establishing recovery units and 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 5820, see page 5823). Specifically, we designated the critical habitat units to follow the direction provided by the draft recovery plan (Service 1993) 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 would compromise the ability of critical habitat as a whole to serve its intended function and conservation role.

Despite the fact that desert tortoises do not necessarily need to move between critical habitat units to complete their life histories, both the original and revised recovery plans discuss the importance of these critical habitat units and connectivity between them for the recovery of the species. Although it determined that linkages between critical habitat units did not meet the definition of critical habitat, the Service (1994) recommended the identification of buffer zones and linkages for smaller desert tortoise conservation areas to aid in overall recovery efforts; however, land management agencies have generally not established such areas.

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

Within each critical habitat unit, both natural and anthropogenic factors affect the function of the 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 salty; 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 the following table, the acreage for modeled habitat is for the area in which the probability that desert tortoises are present is greater than 0.5. The acreages of modeled habitat do not include loss of habitat due to human-caused impacts. The difference between gross acreage and modeled habitat is 653,214 acres; that is, approximately 10 percent of the gross acreage of the designated critical habitat is not considered modeled habitat. All units are 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
Totals	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

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

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

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

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

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

Urban and agricultural development, concentrated use by off-road vehicles, 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 the function of this physical and biological feature has been compromised. To date, the largest single loss of critical habitat is the use of 18,197 acres of additional training land in the southern portion of Fort Irwin.

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

In some cases, major roads likely disrupt the movement, dispersal, and gene flow of desert tortoises. 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 so widespread through critical habitat, this threat has diminished the value of critical habitat for conservation of the desert tortoise throughout its range, to some degree. See the Status of the Desert Tortoise section of this biological opinion for a map that depicts the routes by which invasive weeds have access to critical habitat; the routes shown on the map are a subset of the actual number of routes that cross critical habitat of the desert tortoise.

Suitable substrates for burrowing, nesting, and overwintering.

Surface disturbance, motor vehicles traveling off route, use of off-highway vehicles management areas, off-highway vehicles 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 most of the critical habitat units.

Burrows, caliche caves, and other shelter sites.

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

<u>Sufficient vegetation for shelter from temperature extremes and predators</u>.

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, the following table provides an indication of the scale of the fires.

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

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

<u>Habitat protected from disturbance and human-caused mortality</u>.

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). 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 these planning efforts, the Bureau has proposed the withdrawal of some areas of critical habitat from mineral entry (79 FR 51190; the withdrawal of 10,094.03 acres of public lands within the Superior-Cronese Critical Habitat Unit). Because of actions on the part of various agencies, many miles of highways and other paved roads have been fenced to prevent desert tortoises from wandering into traffic and being killed. The Service and other agencies of the Desert Managers Group in California are implementing a plan to remove common ravens that prey on desert tortoises and to undertake other actions that would reduce subsidies (i.e., food, water, sites for nesting, roosting, and perching, etc.) that facilitate their abundance in the California Desert (Service 2008). The Bureau’s (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.

Despite the implementation of these actions, disturbance and human-caused mortality continue to occur in many areas of critical habitat (which overlap the Bureau's areas of critical environmental concern for the most part and are the management units for which most data are collected) to the extent that the value of critical habitat for the conservation of the desert tortoise is, to some degree, diminished. 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 carcasses on roads are quickly removed by scavengers or destroyed by other vehicles, we expect that far more desert tortoises are killed on roads 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.

Finally, the Bureau will not allow the development of renewable energy facilities on public lands within the boundaries of areas of critical environmental concern and National Conservation Lands (which largely correspond to the boundaries of critical habitat). Counties have not specifically restricted the development of renewable energy facilities on private lands within the boundaries of areas of critical environmental concern and National Conservation Lands. 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. On the landscape level, atmospheric pollution is increasing the level of nitrogen in desert substrates; the increased nitrogen exacerbates the spread of invasive plants, which outcompete the native plants necessary for desert tortoises to survive. As invasive plants increase in abundance, the threat of large wildfires increases; wildfires have the potential to convert the shrubland-native annual plant communities upon which desert tortoises depend to a community with fewer shrubs and more invasive plants. In such a community, shelter and forage would be more difficult for desert tortoises to find.

Invasive plants have already compromised the value of critical habitat for the conservation of the desert tortoise to some degree with regard to the second physical and biological feature (i.e., sufficient quality and quantity of forage species and the proper soil conditions to provide for the growth of these species). These effects likely extend to the entirety of critical habitat; given the numerous routes by which invasive plants can access critical habitat and the large spatial extent that is subject to nitrogen from atmospheric pollution.

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

Although the remaining physical and biological features have been affected to some degree by human activities, 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.

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. Livestock have been removed from numerous other allotments through various means throughout the range of the desert tortoise. The retirement of allotments assists in the recovery of the species by eliminating disturbance to the physical and biological features of critical habitat by cattle and range improvements.

ENVIRONMENTAL BASELINE FOR THE DESERT TORTOISE AND ITS CRITICAL HABITAT

Action Area

The implementing regulations for section 7(a)(2) of the Endangered Species Act describe the action area to be all areas affected directly or indirectly by the Federal action and not merely the immediate area affected by the proposed project (50 CFR 402.02). The action area for this biological opinion comprises approximately 10 million acres of lands managed by the Bureau in the California Desert Conservation Area. For some activities, the Bureau's authorizations will lead to effects to desert tortoises and critical habitat on non-federal lands. The action area for this biological opinion also encompasses activities on non-federal lands that are dependent upon the Bureau's authorizations. The action area for the Bureau's proposed action occurs entirely within the California Desert Conservation Area.

Previous Consultations within the Action Area

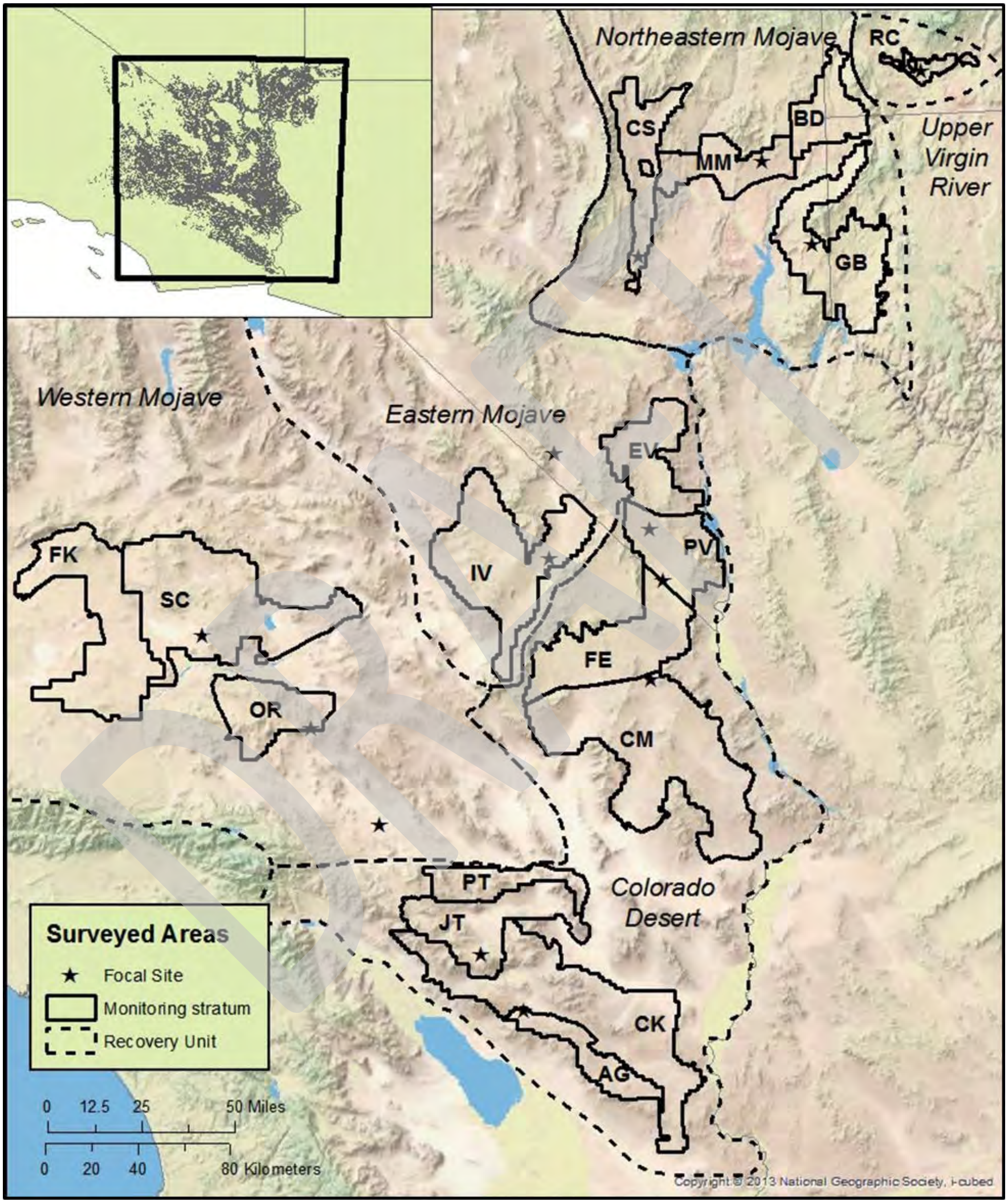
The Bureau and Service have consulted on several land use plan amendments to the California Desert Conservation Area Plan with regard to the desert tortoise and its critical habitat (Service 2005, 2006, etc.). In these biological opinions, the Service concluded that the Bureau's proposed amendments were not likely to jeopardize the continued existence of the desert tortoise or result in the destruction or adverse modification of its critical habitat.

The Bureau and Service have previously consulted on the effects of the land use plan amendment for the Desert Renewable Energy Conservation Plan (Service 2016) on the desert tortoise and its critical habitat. The Service concluded that the land use plan amendment for the Desert Renewable Energy Conservation Plan and was not likely to jeopardize the desert tortoise or result in the destruction or adverse modification its critical habitat.

Status of the Desert Tortoise in the Action Area

In the following paragraphs, we have provided a brief summary of the status of the desert tortoise in each recovery unit. Range-wide sampling allows us to estimate the number of desert tortoises the sampled areas of the conservation areas in each recovery unit. We cannot estimate the total number of desert tortoises because we do not conduct range-wide sampling outside of conservation areas. Generally, we expect that desert tortoises occur at lower densities outside of conservation areas, although we are aware of a few instances of higher densities. Overall, the number of desert tortoises has declined within the action area since 2004.

The following map is from the most recent analysis of range-wide sampling (Service 2015b); we summarized the data in the table from the same source. The map depicts the long-term monitoring strata corresponding to conservation areas for the desert tortoise in each recovery unit. Table 10 (in Service 2015b) provides estimates of adult densities in California's desert tortoise conservation areas in 2014 and the change in abundance within conservation areas in each recovery unit between 2004 and 2014 based on multi-year trends from the best-fitting model describing $\log_e$-transformed density/square kilometer. Because the model is log-linear, standard errors are multiples of the density estimates. The multiplier for the desert tortoise conservation area estimates was 0.3268. Estimates for the recovery units may differ from simple sums of abundance for conservation areas because are based on the ANCOVA parameter estimates and are affected by missing years of data. The totals for the Colorado Desert and Eastern Mojave Recovery Units include the abundances in conservation areas outside of California.



Northeastern Mojave
RC
CS
BD
MM
Upper Virgin River
GB
Western Mojave
Eastern Mojave
EV
FK
SC
IV
PV
FE
OR
CM
PT
Colorado Desert
JT
Surveyed Areas
Focal Site
Monitoring stratum
Recovery Unit
CK
AG
0 12.5 25 50 Miles
0 20 40 80 Kilometers
Copyright:© 2013 National Geographic Society, i-cubed

Recovery Unit TCA	Surveyed area (km^2)	2014 Density (SE)	2004 Abundance (SE)	2014 Abundance (SE)	Δ Abundance (SE)
Western Mojave	6294	2.8 (1.0)	35777 (9703)	17644 (4785)	-18133 (4918)
FK	2347	2.6 (0.3)	12251 (4004)	6196 (2025)	-6055 (1979)
OR	852	3.6 (0.4)	7036 (2299)	3064 (1001)	-3972 (1298)
SC	3094	2.4 (0.3)	19216 (6280)	7398 (2418)	-11818 (3862)
Colorado Desert	11663	3.7 (1.3)	67087 (23312)	42770 (14862)	-24317 (8450)
AG	713	7.2 (0.8)	7327 (2395)	5146 (1682)	-2181 (713)
CK	2818	3.3 (0.4)	14869 (4859)	9304 (3041)	-5565 (1819)
CM	3763	2.8 (0.3)	29660 (9693)	10469 (3421)	-19191 (6272)
FE	1782	4.8 (0.5)	18067 (5905)	8517 (2784)	-9550 (3121)
JT	1152	3.7 (0.4)	2418 (790)	4319 (1412)	1901 (621)
PT	508	2.4 (0.3)	3126 (1022)	1241 (406)	-1885 (616)
Eastern Mojave	3446	1.5 (0.6)	16165 (4515)	5292 (1478)	-10873 (2949)
IV	2447	2.3 (0.2)	12693 (4148)	5578 (1823)	-7115 (2325)

TCA	Desert tortoise conservation area	AG	Chocolate Mountains
km	Kilometer	CK	Chuckwalla
Δ	Change	CM	Chemeheuvi
SE	Standard error	FE	Fenner
FK	Fremont-Kramer	JT	Joshua Tree
OR	Ord-Rodman	PT	Pinto Mountains
SC	Superior-Cronese	IV	Ivanpah

Western Mojave Recovery Unit

Based on information from range-wide sampling, we estimate that desert tortoises in the conservation areas in the Western Mojave Recovery Unit decreased in abundance by 51 percent from 2004 to 2014. We expect the trend throughout the rest of recovery unit was similar. Because of other surveys conducted outside of conservation areas, we are aware of areas of very low abundance (west of State Route 14, Keith *et al*. 2005) and of relatively higher abundance (southern slope of Cady Mountains, URS 2010).

Colorado Desert Recovery Unit

From 2004 to 2014, we estimate that the number of desert tortoises in conservation areas in the Colorado Desert Recovery Unit decreased by 36 percent. We expect the trend throughout the rest of recovery unit was similar. Not as many surveys have been conducted here as in the Western Mojave Recovery Unit. However, as a result of surveys conducted in association with renewable energy projects, we are aware that the area surrounding the eastern portion of Interstate 10 supports low abundance of desert tortoises. See Appendix D for more information on desert tortoises found at these solar projects.

Eastern Mojave Recovery Unit

From 2004 to 2014, we estimate that the number of desert tortoises in conservation areas in the Eastern Mojave Recovery Unit decreased by 67 percent. We expect the trend throughout the rest of recovery unit was similar. Not as many surveys have been conducted here as in the Western Mojave

Recovery Unit. However, as a result of surveys conducted in association with renewable energy projects, we are aware that the Ivanpah Valley west of Interstate 15 supports a substantial number of desert tortoises. See Appendix D for more information on desert tortoises found in this area. Desert tortoises occur in lower abundance in California to the north of the Ivanpah Valley.

Status of Critical Habitat in the Action Area

The conditions of the physical and biological features of critical habitat within the action area are generally similar to those we described in the Status of Critical Habitat section of this biological opinion. Therefore, we will not repeat that discussion here. The critical habitat units on the Western Mojave Recovery Unit generally are more disturbed by human activities than those farther to the east.

The Service's previous biological opinions on the California Desert Conservation Area provide a general description of human activities within critical habitat of the desert tortoise on public lands in California. We hereby incorporate them by reference. Please refer to Appendix A for a list of these biological opinions.

Since the time of the previous land use plan amendments addressed in those biological opinions, the Bureau (2016) has adopted the Desert Renewable Energy Conservation Plan. This land use plan amendment increased the protection afforded to critical habitat of the desert tortoise by including most critical habitat on public lands within either areas of critical environmental concern or National Conservation Lands. The Bureau also adopted numerous conservation and management actions that it will implement or require project proponents to implement during the course of activities in these areas. Overall, the Bureau's management direction is protective of critical habitat while allowing for various types of multiple use.

EFFECTS OF THE ACTION ON THE DESERT TORTOISE AND ITS CRITICAL HABITAT

Effects of the Action on the Desert Tortoise

The activities covered by this consultation may affect desert tortoises in several ways. Desert tortoises would be captured, handled, and moved from harm's way or translocated; they may also be killed by heavy equipment and vehicles. Common ravens may obtain subsidies from activities, increase in abundance, and prey more heavily on desert tortoises. Activities may result in the loss, degradation, and fragmentation of habitat.

First, we will analyze how these various aspects of the proposed action may affect desert tortoises in a qualitative manner. In the Conclusions section, we will integrate this general analysis and the re-initiation thresholds we developed with the Bureau with the best available information with regard to the reproduction, number, and distribution of desert tortoises in the action area to determine whether the proposed action is likely to jeopardize the continued existence of the species.

Capture and Translocation of Desert Tortoises

Desert tortoises are likely to be found within the boundaries of some proposed projects; however, the Bureau will not authorize projects that would require translocation of 35 or more large desert tortoises

(CONS-BIO-IFS-1). These conservation and management actions do not apply to transmission activities. For projects with less than 35 large desert tortoises, the Bureau will require that the project proponent move these desert tortoises to safe habitat, using the Service's translocation protocol; alternatively, the proponent may redesign the proposed action to avoid areas that have more desert tortoises.

The alternatives to translocating desert tortoises from project sites are to leave them in place to be killed or to remove them from the wild. Because of their long generation times and reproduction ecology, protecting individual desert tortoises (particularly reproductive adults) is important for the recovery of the species; removing them from the wild does not serve conservation purposes. Translocating desert tortoises using appropriate techniques, such as described in the Service's protocol, can be done successfully; we will discuss translocation in more detail later in this section. Consequently, the Service views translocation as a reasonable protective measure when the activity is sited appropriately.

The first step in the translocation of desert tortoises involves their capture. In some cases, the authorized biologists may find the animals above ground or near the mouth of their burrow. The Bureau will require that authorized biologists conduct activity-specific biological monitoring during pre-construction, construction, and decommissioning to ensure that avoidance and minimization measures are appropriately implemented and are effective (LUPA-BIO-2). In such cases, authorized biologists can easily pick up the desert tortoise and transfer it to a container for transport. If desert tortoises are deeper in their burrows, the authorized biologists would excavate the burrow; we expect that excavating desert tortoises from deep in their burrows is likely more stressful for them than being captured on the surface of the ground.

The capture and holding of desert tortoises can subject them to stress; stressed desert tortoises occasionally void their bladders. Desert tortoises store water in their bladders; this water is important to desert tortoises, particularly during times of low rainfall, in maintaining their life functions. Consequently, desert tortoises that void their bladders are at an increased risk of dying after their release. Averill-Murray (2002) found that desert tortoises that urinated during handling had lower survival rates than those that did not. Because the Bureau will require project proponents to follow the Service's translocation protocol, the authorized biologist will hydrate desert tortoises prior to their release and otherwise employ the methods described in the protocol to reduce the likelihood that they are killed or injured during translocation.

We acknowledge that, in every phase of implementation of a proposed activity, including during translocation, desert tortoises are at risk of being killed or injured when workers (including authorized biologists and biological monitors) drive outside of areas that have been fenced and cleared of desert tortoises. Small desert tortoises are at greater risk than larger animals because they are more difficult to see. This will generally be the case for every activity, and we will not repeat this throughout the biological opinion. We are aware of desert tortoises that have been crushed by the vehicles of biologists working on translocations; both resident and translocated animals are vulnerable.

Boarman (2002), in a review of literature on threats to the desert tortoise, stated that the adverse effects of translocation include increased risk of mortality, spread of disease, and reduced reproductive success. The tendency for translocated desert tortoises to spend more time above ground, moving through their environment, than animals within their home ranges exacerbates at least some of these threats. Recent research, using comparisons among resident desert tortoises (animals within their home ranges with translocated individuals nearby) and control desert tortoises (animals within their home ranges with no translocated individuals nearby), has provided substantial information on this issue. We will evaluate the potential effects of translocation on desert tortoises in the following paragraphs.

Field *et al*. (2007), Nussear (2004), and Nussear *et al*. (2012) have found that translocated animals seem to reduce movement distances following their first post-translocation hibernation to a level that is not significantly different from resident populations. As time increases from the date of translocation, most desert tortoises change their movement patterns from dispersed, random patterns to more constrained patterns, which indicate an adoption of a new home range (Nussear 2004).

In general, desert tortoises moved shorter distances (especially within their home ranges) exhibit more limited movement patterns after translocation. Desert tortoises that spend less time above ground are less vulnerable to predation and environmental extremes. Regardless of the distance desert tortoises would be moved, we expect that translocated animals would spend more time moving, at least during the first year, which means they would be more vulnerable to predators, adverse interactions with other desert tortoises, and weather conditions than resident animals. For example, in spring 2013, biologists translocated 108 large and 49 small desert tortoises from approximately 2,000 acres of the KRoad Moapa Solar Project on the Moapa River Indian Reservation northeast of Las Vegas; they also monitored 18 large desert tortoises as controls or residents. Extremely high temperatures during the summer may have killed two or more large translocated desert tortoises. Predators likely killed eight small translocated desert tortoises. No resident or control desert tortoises died during monitoring (Burroughs 2013). During the first year of increased movement, desert tortoises would also be more likely to engage in fence-pacing behavior, which can lead to hyperthermia and death.

Depending on the specific goal of translocating desert tortoises, translocating animals either short or long distances is likely to have differing effects. Hinderle *et al*. (2015) found that desert tortoises translocated less than 2 kilometers are likely to attempt to return to the point of capture. If those returning animals cannot regain access to the habitat from which they were removed, they are likely to wander more extensively or pace fence lines; both of these activities increase the likelihood that the desert tortoises may be attacked by predators or die from exposure to extreme temperatures. Therefore, when desert tortoises will not be able to regain access to their point of capture, translocating them to suitable habitat more than 2 kilometers away is likely to prevent them from returning. Conversely, the short-distance movement of desert tortoises would be an appropriate strategy to employ if disturbance at the project area is temporary and animals are able to return to suitable habitat at the point of capture after work is completed.

As we previously discussed, we expect that translocated desert tortoises would spend more time moving around. Because translocated desert tortoises spend more time moving, individuals that are moved during the summer months outside of their active season (i.e., from June to August) could be overexposed to heat and die from hyperthermia. Cook *et al*. 1978 (in Nussear *et al*. 2012) stated summer releases have previously been reported to be potentially lethal to translocated desert tortoises, often with high mortality within days of release. The Bureau will require project proponents to follow the Service's most recent translocation protocol (DFA-BIO-IFS-3). The Service recommends in its current guidance that translocation not occur in the summer; therefore, desert tortoises will not be exposed to this threat. Absent new information that indicates translocation in the summer does not pose a threat to desert tortoises, the Service is unlikely to alter this protocol.

As with other translocations (Nussear 2004; Field *et al*. 2007), we anticipate that predation is likely to be the primary source of post-translocation mortality. The level of winter rainfall may dictate the amount of predation observed in desert tortoises (Drake *et al*. 2010; Esque *et al*. 2010). Drake *et al*. (2010) documented a statistically significant relationship between decreased precipitation and increased predation of translocated desert tortoises at Fort Irwin. We are aware of two instances where monitoring of large numbers of control and resident desert tortoises accompanied the translocation of desert tortoises (Fort Irwin and Ivanpah Solar Electric Generating System). At Fort Irwin, Esque *et al*. (2010) found that "translocation did not affect the probability of predation: translocated, resident, and control tortoises all had similar levels of predation." At the Ivanpah Solar Electric Generating System, Scherer *et al*. (2016) "found no statistical difference in estimates of four-year (cumulative) survival probability" among translocated, resident, and control desert tortoises in each size class. Predation by canids is the greatest source of mortality among translocated, resident, and control animals at several projects.

Drought conditions seem to affect translocated and resident desert tortoises similarly. Field *et al*. (2007) noted that studies from various sites "suggest that all (desert) tortoises at the (Large-scale Translocation Site) site, regardless of translocated or resident status, likely were negatively impacted by drought conditions at the site in 1997." Field *et al*. (2007) noted that most of the translocated desert tortoises "quickly became adept at life in the wild," despite the harsh conditions. Consequently, we have concluded that the amount of rainfall preceding translocation is not likely to decrease the survival rate of desert tortoises that would be moved from within the area of a proposed renewable energy facility.

Nussear *et al*. (2012) investigated the effects of translocation on reproduction in 120 desert tortoises. They found that, in the first year since translocation, the mean reproductive effort for translocated desert tortoises was slightly less than that of residents. Nussear *et al*. (2012) noted that the translocated animals may have benefited from being fed while in the pre-translocation holding facility; the food provided in the facility may have increased their production of eggs in the first year after translocation. In the second and third years after translocation, the mean number of eggs was not different between resident and translocated desert tortoises. (That is, absent the food the desert tortoises received in the holding facility, the first year's reproduction may have been lower; the lack of difference in egg production between resident and translocated animals in subsequent years indicates that translocation did not have a long-term effect on reproductive output.)

Walde and Boarman (2013) reported on a microsatellite analysis of 72 hatchlings found in the area to which desert tortoises had been translocated from Fort Irwin. They found that, 4 years after translocation, most (if not all) of the hatchlings had been fathered by resident male desert tortoises, even though translocated males were well represented in the population. We do not know the reason for this difference; additional research into this situation is warranted. We do not view this lack of representation of the translocated males as being appreciably negative, at least in the short term, because minimal differentiation among subpopulations of desert tortoises occurs even at low levels of gene flow such as less than one migrant per year or even one migrant every few decades (see Latch *et al*. 2011). We expect that translocated males will ultimately begin siring offspring within the population during their lifespan.

Translocating desert tortoises may also adversely affect resident desert tortoises within the action area due to local increases in density. Increased densities may result in increased incidence of aggressive interactions between individuals, increased competition for available resources, increased incidence of predation that may not have occurred in the absence of translocation, and increased spread of upper respiratory tract disease or other diseases.

We anticipate that density-dependent effects on resident populations are likely to be minor because the Bureau will require translocations to occur according to the Service's protocol, which establishes the maximum recipient and translocated density for each recovery unit. Additionally, during the translocation work at Fort Irwin, researchers tested over 200 desert tortoises for differences in the levels of corticosterone, which is a hormone commonly associated with stress responses in reptiles; Drake *et al*. (2012) "did not observe a measurable physiological stress response [as measured by (corticosterone)] within the first two years after translocation." The researchers found no difference in stress hormone levels among resident, control, and translocated desert tortoises. For these reasons, we conclude that the addition of translocated desert tortoises to the recipient areas would not result in detrimental effects to translocated or resident animals.

The Service based its guidance for the upper limit of the number of desert tortoises translocated into an area on the density of large animals. The Service generally recommends that the number of small desert tortoises released into a translocation area not exceed the number of released large individuals. Healthy populations have a large number of desert tortoises smaller than 180 millimeters (Turner *et al*. 1987). Additionally, natural mortality rates of smaller desert tortoises are greater than those of larger tortoises and we expect that small desert tortoises use resources differently than do large ones (Wilson *et al*. 1999). Finally, we expect that juveniles (small animals) and adults (large animals) interact much less frequently than do adults. Due to differences in habitat use, caused by both physical and physiological differences in large and small desert tortoises, we expect overlapping of ranges while the small desert tortoises are growing and dispersing. For these reasons, we do not expect translocating small desert tortoises according to our guidance is likely to result in density-dependent adverse effects.

Upper respiratory tract disease and other pathogens are spread by direct contact between desert tortoises. Consequently, increasing the density of desert tortoises in the recipient areas has the potential to exacerbate the spread of diseases because, presumably, animals that occur in higher densities would have more opportunity to contact one another. Several circumstances are likely to reduce the magnitude of the threat of disease prevalence being exacerbated by translocation. First, the Bureau will require project proponents to use experienced biologists and approved handling techniques that are unlikely to result in substantially elevated stress levels in translocated animals; animals are less likely to succumb to disease when they are not stressed. Second, desert tortoises on project sites are currently part of a continuous population with the resident populations of the adjacent recipient sites and are likely to share similar pathogens and immunities. Third, Drake *et al*. (2012) indicated that translocation does not seem to increase stress in desert tortoises. Fourth, density-dependent stress is unlikely to occur for the reasons discussed previously in this section. Finally, biologists who have been trained by the Service (or other specialist) will perform health assessments using Service-approved protocols and will not translocate any desert tortoise showing severe clinical signs of disease.

During translocations to date, we have detected few desert tortoises that were unsuitable for translocation. For projects authorized under the land use plan amendment, the Service and Bureau will determine their final disposition depending on the site-specific conditions. They may be placed in an agency-approved quarantine facility or used for research; extremely ill individuals may be euthanized.

Based on this information, we anticipate that post-translocation survival rates will not significantly differ from that of animals that have not been translocated. We expect that translocated desert tortoises would be at greatest risk during the time they are spending more time above ground than resident animals. We cannot precisely predict the level of post-translocation mortality because regional factors that we cannot control or predict (e.g., drought, predation related to a decreased prey base during drought, etc.) would likely exert the strongest influence on the rate of mortality and affect translocated and resident desert tortoises similarly. Translocation is an effective means of minimizing adverse effects on desert tortoises during project implementation when occupied habitat cannot be avoided.

Construction of Non-Linear Facilities

With few exceptions, including differences in the amount of ground disturbance associated with different types of activities, the construction of non-linear facilities would affect desert tortoises in a similar manner. Therefore, we will address the general effects of construction in this section.

Some activities may result in the exclusion of desert tortoises from work areas temporarily (e.g., repair of underground pipelines). Other activities, such as mines and communication sites, would result in the long term exclusion of desert tortoises from such areas. In the past, areas for most activities resulted in the disturbance of less than 20 acres.

The Bureau will require project proponents to install fencing to preclude desert tortoises from entering work areas prior to removing all individuals that they can locate on the project site. During construction of the perimeter fencing and during other ground-disturbing activities that are outside of the fenced facility (i.e., access roads), the authorized biologists will perform pre-activity clearance surveys and move desert tortoises out of harm's way if they re-enter work areas.

Some potential always exists that surveyors may miss desert tortoises during clearance surveys and construction monitoring. We cannot predict how many desert tortoises that clearance surveys and construction monitoring would miss. However, we anticipate the number is likely to be small because the Bureau would authorize projects only when the anticipated number of desert tortoises is 35 or fewer and the proponents will use qualified biologists authorized by the Service for the clearance surveys. Weather conditions can also affect the number of animals detected during surveys; warm weather after average or above-average rainfall would lead to more activity in desert tortoises, which would facilitate their detection.

In some cases, desert tortoises that have been fenced out of their home ranges make repeated efforts to return and follow fence lines for long periods. Desert tortoises would die when exposed to harsh conditions (i.e., cold or hot temperatures) while pacing fences. We expect that desert tortoises whose home ranges have been affected by projects would be most likely to pace fences.

The installation of fencing may also reduce the home range size of some individuals that inhabit areas immediately adjacent to the fence alignments or that overlap the project footprint. This reduction could result in future injury or mortality of these individuals as they expand their home range into adjacent areas where unknown threats may occur or where adverse social or competitive interactions may occur with neighboring desert tortoises. Larger projects are likely to destroy the territories of more desert tortoises; however, given the Bureau's management direction to site activities in habitat that does not support large numbers of desert tortoises (DFA-BIO-IFS-3), we do not expect that individual activities are likely to destroy numerous territories.

Desert tortoises often construct their nests at the entrance to their burrows (Ennen *et al*. 2012). The Bureau will require applicants to follow the Service's guidelines for clearance surveys; these guidelines call for the excavation of all desert tortoise burrows within construction footprints prior to the onset of ground disturbance. Consequently, the biologists may detect at least some of the nests and eggs. Overall, we anticipate that detection of eggs is unlikely because the buried nests are difficult to find. Because hatchlings can take shelter in burrows of all sizes and are difficult to see due to their cryptic nature and their small size, surveyors are less likely to detect them than they are larger desert tortoises. Consequently, we expect that most of the hatchlings and eggs are likely to remain in the work areas during construction. Construction is likely to kill these desert tortoises. Because construction activities are likely to occur year round, they are likely to affect both hatchlings and eggs. (Eggs and small desert tortoises, even those that are larger than hatchlings, are always more difficult to detect than larger animals and therefore more likely to be killed during every type of activity; we will not repeat this fact for every activity.)

Numerous variables complicate our estimations of the number of desert tortoises on a project site. For example, we usually do not know the precise number of desert tortoises onsite, the size of those individuals, whether eggs will be present at the time of construction, the time of year that construction occurs, and the weather before or during construction. Regardless of these factors, we expect that few large desert tortoises are likely to be killed or injured during construction because the Bureau will require the proponents to site activities in areas with lower densities and to implement measures that have proven effective in the past in reducing mortality and injury. Small desert tortoises are likely to be killed or injured in greater numbers because they are more difficult to find. However, because activities would occur in areas of lower density, we do not expect large numbers of small desert tortoises to be killed or injured. The loss of small desert tortoises is also not as deleterious to the population as the loss of reproductive animals, because they require up to 20 years to reach sexual maturity, have low reproductive rates during a long period of reproductive potential, and individuals experience relatively high mortality early in life (Service 2011).

Construction of Linear Facilities

Linear facilities have different effects on desert tortoises relative to construction on large blocks of habitat. Construction of linear facilities (e.g., access roads, water pipelines, transmission lines, and installation of fences along access roads) often takes place outside of the permanent perimeter fencing. Consequently, the primary adverse effect associated with the construction of linear features is not the loss of habitat; it is the greater potential to kill desert tortoises with vehicles and other equipment. Additionally, if trenches or holes are left uncovered, desert tortoises could become entrapped and die of exposure or be killed by predators.

During construction of linear components, the proponent would move desert tortoises out of harm's way into adjacent habitat. These animals would remain within their territories because they would be moved short distances and the minor habitat disturbance would not remove their territories. Generally, the construction of linear facilities would not affect numerous desert tortoises because the Bureau will require the proponents to site activities in areas with lower densities and linear facilities comprise small portions of the projects. However, depending on the local density of desert tortoises and the length of the linear component, the use of access roads during construction may result in the death or injury of numerous individuals because vehicles frequently use these roads, which are usually not fenced.

The Bureau may require the proponent to fence a linear feature during construction. For example, if desert tortoises are particularly active at the time of construction (e.g., if work occurred during a spring with abundant wild flowers), temporary fencing could prevent numerous deaths and injuries.

The Bureau will require project proponents to monitor activities, check under vehicles before moving them, and not exceed a speed limit of 15 miles per hour when working outside of desert tortoise exclusion fencing (LUPA-BIO-IFS-5, -6, -7, -8, and -9). These conservation and management actions should reduce the number of desert tortoises that are killed or injured outside of fences.

Overall, we expect that the construction of linear facilities is likely to injure or kill relatively few desert tortoises. We cannot quantify the number of desert tortoises that these activities may affect because we do not know how many animals will enter linear work areas during construction. Also, we expect that monitors would be able to detect and protect most desert tortoises.

Operations and Maintenance of Non-Linear Facilities

We are aware of occasions where desert tortoises have been able to enter fenced facilities, such as a pump station for a gas pipeline; they entered through gaps under the fencing or open gates. Floods can damage fences to the point where desert tortoises may be able to enter the facilities. Once inside the fencing, desert tortoises would be at risk of being killed or injured by operations or maintenance. The Bureau would ensure that project proponents maintain fences to prevent entry by desert tortoises (LUPA-BIO-IFS-4).

Over the life of the project, proponents are likely to conduct ground-disturbing maintenance activities outside of fenced areas. These activities have the potential to injure or kill desert tortoises primarily by vehicle strikes, as workers travel to and from work sites outside of fenced areas; a limited possibility exists that desert tortoises could be injured or killed by equipment or workers moving around a work site.

Maintenance activities associated with repair of desert tortoise exclusion fencing would likely kill or injure few, if any, desert tortoises for the following reasons. First, fence repairs are likely to result in minimal ground disturbance in localized areas. Second, at least a portion of the work area would be on disturbed areas within the fenced project site. Third, the permanent perimeter roads, located outside the perimeter fencing, would allow access to most repair locations with minimal off-road travel. Finally, the proponent would implement protective measures to reduce the potential for injury or mortality of desert tortoises.

We expect that the operations and maintenance of non-linear facilities is likely to injure or kill relatively few desert tortoises because the majority of these activities will occur within areas that have been cleared of desert tortoises and have been fenced to prevent their entry. We cannot quantify the number of desert tortoises that these activities may affect because we do not know how many animals workers will encounter during operations and maintenance. Also, we expect that authorized biologists would be able to detect and protect most desert tortoises.

Operations and Maintenance of Linear Facilities

The primary adverse effect associated with the operations and maintenance of linear facilities is likely to be the greater potential to kill or injure desert tortoises with vehicles and other equipment while traveling along the access route. The level of risk depends on the local density of desert tortoises, length of the linear facility, time of the year, and amount of use of the facility.

If a desert tortoise is encountered on a linear facility, depending on the nature of the activity, an authorized biologist, biological monitor, or worker may move the desert tortoise out of harm's way into adjacent habitat. These animals would remain within their territories because they would be moved short distances out of harm's way and would not be removed from their territories. Alternatively, the Bureau may direct that desert tortoises be allowed to move out of harm's way on their own accord.

The Bureau will require project proponents to monitor activities, check under vehicles before moving them, and not exceed a speed limit of 15 miles per hour when working outside of desert tortoise exclusion fencing (LUPA-BIO-IFS-5, -6, -7, and -8). These conservation and management actions should reduce the number of desert tortoises that are killed or injured outside of project fences.

Overall, we expect that the operations and maintenance of linear facilities are likely to injure or kill relatively few desert tortoises. However, activities along linear facilities pose a greater risk to desert tortoises than those associated with non-linear facilities; the risk would be greatest in high density areas and during the active seasons. We cannot quantify the number of desert tortoises that these activities may affect because we do not know how many animals will enter linear facilities during operations and maintenance activities.

Decommissioning

Work associated with decommissioning of facilities within perimeter fences is unlikely to injure or kill desert tortoises because desert tortoises would not be present. The effects of work outside of the exclusion fence would be similar to those associated with construction and described previously in this biological opinion; the effect of work along linear facilities has greater potential to kill or injure desert tortoises and disturb habitat for the reasons discussed during the previous discussion of linear facilities.

The Bureau will require project proponents to restore areas disturbed by project activities to the pre-disturbance plant community (LUPA-BIO-8). Restoration activities that occur outside of fenced areas have the potential to kill or injure desert tortoises, particularly after the plant community has begun to recover and individuals begin to return to the area.

Common Ravens, Coyotes, and Other Predators

Construction and operation of linear and non-linear facilities 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.

The Bureau will require project proponents to implement measures to reduce subsidies that activities may provide to predators (LUPA-BIO-6). These measures would vary on a project-specific basis but would include control of attractants (food, water, and shelter), monitoring and reporting programs, and implementing adaptive management techniques such as devices to discourage the predators from using project-related structures.

The Bureau will require project proponents to participate in the regional management and monitoring program for common ravens (LUPA-BIO-6). The Service developed this program in coordination with the Desert Managers Group, which is a consortium of land management agencies and other stakeholders in California, and the Renewable Energy Action Team, which is composed of the Service, Bureau, California Energy Commission, and the California Department of Fish and Wildlife. To date, management actions undertaken as part of this program include surveys to determine where common ravens are most abundant and removal of birds that are known to be preying on desert tortoises. Because common ravens are intelligent and learn behaviors from one another, the removal of individuals that are killing desert tortoises has both direct and indirect benefits.

We cannot reasonably predict the amount of predation on desert tortoises that construction, operations, and maintenance are likely to add to baseline levels within the action area. Generally, best management practices are effective in eliminating some, but not all, use of the project sites by predators. Contributions to the management program for common ravens would assist in recovery actions for the desert tortoise throughout the desert and, in that manner, further assist in reducing the effects of these predators.

Recreation

The Bureau issues activity-specific authorizations for various types of recreational activities, such as organized tour events, special recreation permits, dual sport events, foot races, marathons, enduros, long-distance tours, and races. It also engages in other activities related to recreation including but not limited to the closure and restoration of routes; shooting ranges; installation of interpretive kiosks; directional signage; and the management of staging areas, and bicycle and hiking trails. The effects on the desert tortoise of building and maintaining recreational facilities and restoring disturbed areas are similar to those associated with other construction and restoration activities; therefore, we will not discuss those effects again here. The Service analyzed the effects of recreational activities that occur within the Bureau’s Johnson Valley, Stoddard Valley, El Mirage, and Spangler Hills off-highway vehicle management areas in previous biological opinions. Because those biological opinions will remain in effect after issuance of this biological opinion, we will not discuss those activities here. Additionally, because the Service and Bureau have previously consulted on casual use within the California Desert Conservation Area, we will not address casual use in this biological opinion. Consequently, we have limited the analysis in this section of the biological opinion to the potential effects of the specific recreation activities that the Bureau will undertake or authorize.

The activities usually involve the Bureau’s authorization of groups of people using open routes for organized vehicular tour events, dual sport events, foot races, marathons, enduros, and races. Because these events occur on open routes, the primary risk to desert tortoises is crushing by vehicles, either while the vehicles are in motion or if a desert tortoise has taken shelter under parked vehicle; as in most situations, smaller desert tortoises will be at greater risk because they are more difficult to see and avoid. Events that occur in spring and fall would pose the greatest threat, although some desert tortoises may be active on some days throughout the year.

Desert tortoises would also be vulnerable when tours stage or stop for breaks or camp for the evening. Animals make take shelter under vehicles and be crushed when the vehicle is later moved. Smaller animals may be trampled by foot traffic.

The Bureau may also authorize bicycle tours and group hikers. These activities may also crush desert tortoises with smaller animals being the most vulnerable.

The Bureau has adopted several conservation and management actions that will likely reduce the potential that authorized events will kill desert tortoises. For example, NLCS-REC-1 states that issuance of commercial and competitive special recreation permits is a discretionary action and that the Bureau can issue them "on a case by case basis, for activities that do not diminish the values of the National Conservation Lands unit and would be prohibited if the proposed activities would adversely impact the nationally significant ecological, cultural or scientific values for which the area was designated." SRMA-REC-2 states that, where special recreation management areas overlap with National Conservation Lands and areas of critical environmental concern, the Bureau will "manage in accordance with the Special Unit Management Plans for the (special recreation management areas/extensive recreation management areas) and the applicable ecological and cultural conservation unit…." If a conflict exists between management of the National Conservation Lands or areas of critical environmental concern and the management of the special recreation management area or extensive recreation management area, the Bureau "will apply the most restrictive management (i.e., management that best supports resource conservation and limits impacts to the values for which the conservation unit was designated)."

With this management direction and the ability of the Bureau and Service to adopt additional activity-specific protective measures during the review of events, we expect that such recreation is likely to kill few desert tortoises.

Loss and Degradation of Habitat

The loss and degradation of habitat affect desert tortoises on both regional and local scales. We consider the loss of habitat to be the complete removal of all habitat value from a parcel of land. For example, construction of a building in creosote bush scrub removes all potential for desert tortoises to reside within the area occupied by the building. We consider degradation of habitat to occur when activities alter the structure of the substrate or annual and perennial plant communities but do not completely remove it. For example, degradation of habitat would occur if a project proponent excavates a pit to conduct geotechnical testing and then refills it. Desert tortoises may still cross the refilled pit and forage there; in the long term, perennial plants may re-establish themselves and the substrate may become suitable for burrowing.

We expect that most disturbances with conservation areas will be relatively small because of the conservation and management action that will limit the number of desert tortoises that may be disturbed (CONS-BIO-IFS-1). Additionally, the Bureau will require the proponents of activities to implement additional restoration of habitat if they exceed the disturbance cap in areas of critical environmental concern and National Conservation Lands (CONS-BIO-IFS-3). These components of the land use plan amendment are likely to ensure that the loss and degradation of habitat within conservation areas is limited to the extent that regional impacts are minimal.

The construction, operation, maintenance, and decommissioning of transmission lines within conservation areas would disturb more habitat because of the length of the lines. Over time, desert tortoises would continue to use areas within the transmission line corridors to forage, burrow, nest, and traverse. In general, the loss of habitat would be small (e.g., the footprints of pylons for electrical transmission lines, pumping stations for oil and gas lines).

Activities outside of conservation areas may be relatively larger than those inside of such areas because the conservation and management actions discussed previously in this section would not apply. Larger activities would likely impede the ability of desert tortoises to move freely throughout the landscape. However, because the Bureau has included almost all of the areas that the Service considers important for the recovery of the desert tortoise within areas of critical environmental concern and National Conservation Lands, the potential loss and degradation of habitat outside of conservation areas would not compromise the survival and recovery of the species.

Effects of the Action on Critical Habitat

Most of the critical habitat in the action area lies in National Conservation Lands, areas of critical environmental concern, and wilderness. Only 0.44 percent of the Chuckwalla Critical Habitat Unit and 0.05 percent of the Fremont-Kramer Critical Habitat Unit lie outside of these conservation areas. The disturbance caps will apply within National Conservation Lands and areas of critical environmental concern; disturbance caps will not apply in wilderness, but we expect little, if any, ground disturbance will occur in areas with this land use allocation.

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

The various activities that the Bureau would authorize or implement could lead to long- or short- term disturbance of habitat. These activities have the potential to reduce the amount of space available to support viable populations; they may also impede, to some degree, the movement, dispersal and gene flow of desert tortoises.

The primary biological resources goals of the land use plan amendment are landscape and habitat connectivity, ecosystem and ecological function, and species conservation. The Bureau will require project proponents to implement conservation and management actions to the maximum extent practicable. For activities covered by this programmatic consultation, the Bureau will require implementation of conservation and management actions within “tortoise conservation areas”; critical habitat of the desert tortoise is included within these tortoise conservation areas. Our analysis focuses only on critical habitat.

Specifically, LUPA-BIO-13 requires, to the maximum extent practicable, that activities avoid occupied habitat of species such as the desert tortoise; it also restricts construction activity to existing roads, routes, and utility corridors to minimize the number and length and size of new roads, routes, disturbance, laydown, and borrow areas. LUPA-BIO-IFS-2 requires, to the maximum extent practicable, avoidance of construction of new roads in critical habitat, that new roads within critical habitat be unpaved with a maximum speed limit of 25 miles per hour, and the incorporation of wildlife underpasses for roads requiring installation of long-term exclusion fencing. LUPA-BIO-IFS-3 requires all culverts for access roads or other barriers be designed to allow unrestricted access by desert tortoises and be large enough so that they do not use culverts as shelter sites.

Finally, the Bureau has established disturbance caps, as described in CONS-BIO-IFS-3 and previously discussed in this biological opinion, of 0.5 percent within all critical habitat of the desert tortoise in the action area. The Bureau's use of these caps will ensure that the amount of ground disturbance resulting from various actions in any given area will not have a larger, cumulative effect on this physical and biological feature. For these reasons, the Bureau's authorization and implementation of activities under this biological opinion will not have a measurable effect on the amount of space available to support viable populations within each of the recovery units and to provide for movement, dispersal, and gene flow.

The following table correlates the types of activities we discussed in the effects of the action on the desert tortoise section of this biological opinion with the potential impacts to this physical and biological feature.

Type of activity	**Potential Impact on Sufficient Space to Support Viable Populations within Each of the Six Recovery Units and to Provide for Movement, Dispersal, and Gene Flow**
Translocation	This activity involves vehicular use on previously disturbed areas and walking in desert tortoise habitat. None of these activities will reduce the amount of space or disrupt movement, dispersal or gene flow.
Construction of linear facilities	This activity involves short-term disturbance of long but narrow strips of habitat. Linear facilities may involve the loss of the small amount of habitat over long distances, but will not impede movement, dispersal, or gene flow.
Construction of non-linear facilities	This activity involves long-term disturbance of habitat. The conservation and management actions described in this section would ensure that the loss of habitat does not appreciably reduce the space needed to support viable populations or connectivity with regard to movement, dispersal, or gene flow.
Operations and maintenance of linear facilities	This activity involves short-term disturbance of generally small areas of habitat and will not reduce the space needed to support viable populations or disrupt movement, dispersal or gene flow.
Operations and maintenance of non-linear facilities	This activity involves short-term disturbance of generally small areas of habitat and will not reduce the space needed to support viable populations or disrupt movement, dispersal or gene flow.

Decommissioning	This activity involves restoration of vegetation and is likely to increase the amount of space available to support viable populations and decrease impediments to movement, dispersal, and gene flow.
Common ravens, coyotes, and other predators	The attraction of predators to activities and measures implemented to mitigate this effect will not reduce the space needed to support viable populations or disrupt movement, dispersal or gene flow.
Recreation	This activity would result in disturbance or loss of small amounts of habitat to install kiosks, signs, and other recreation features. Most activities would occur on open routes of travel. For these reasons and implementation of the conservation and management actions, recreation will not reduce the space needed to support viable populations or disrupt 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; Sufficient Vegetation for Shelter from Temperature Extremes and Predators

The second through fifth physical and biological features represent the plant species desert tortoises require for food and shelter, the substrates that are necessary for these plants to grow and for desert tortoises to construct burrows, and the burrows and other shelter sites they use. These features are the components of the environment necessary to meet desert tortoise's need for food and shelter. Because the condition of substrates, annual forage species, and perennial shrubs are so interrelated, we have combined our analysis of the effects of the proposed action on these physical and biological features.

The various activities that the Bureau would authorize or implement could lead to disturbance of the second through fifth physical and biological features. These activities have the potential to reduce the quality and quantity of forage species and proper soil conditions; suitable substrates for burrowing, nesting, and overwintering; burrows, caliche caves, and other shelter sites; and sufficient vegetation for shelter from temperature extremes and predators.

For example, the use of heavy equipment can disrupt soil conditions that lead to an increased abundance of non-native and invasive plant species. These species can outcompete native species and thereby reduce the abundance and diversity of the native species upon which desert tortoises depend. Oftedal's work (2002 in Service 2010) demonstrates that invasive species may adversely affect the physiological health of desert tortoises because they do not contain the same types and levels of nutrients of native plants; desert tortoises that are undergoing nutritional stress may be more susceptible to diseases, drought, and predation. Therefore, a proliferation of nonnative invasive species would impair the conservation function of the second physical and biological feature (i.e., sufficient quality and quantity of forage species). The use of heavy equipment can also crush burrows, caliche caves, other shelter sites, and perennial vegetation under which desert tortoises shelter.

Type of activity	Potential Impacts on 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
Translocation	This activity involves vehicular use on previously disturbed areas and walking in desert tortoise habitat. Because these physical and biological features are generally not present in disturbed areas, vehicle use will not affect them. Walking through habitat is likely to affect these physical and biological features (e.g., crushing of some annual plants, minor compaction of a small amount of substrate) but not to an appreciable degree.
Construction of linear facilities	This activity involves short-term disturbance of long but narrow strips of habitat. Linear facilities may involve the loss of small amounts of these physical and biological features over long distances (e.g., removal of burrows, loss of soil structure, etc.); this loss will not have an appreciable effect on the ability of these physical and biological features to support the conservation of the desert tortoise.
Construction of non-linear facilities	This activity involves long-term disturbance of habitat and the loss of these physical and biological features (e.g., removal of burrows, loss of soil structure, etc.). CONS-BIO-IFS-3, which established a disturbance cap of 0.5 percent within all critical habitat of the desert tortoise in the action area, would ensure that the loss of habitat does not appreciably reduce the ability of these physical and biological features to support the conservation of the desert tortoise.
Operations and maintenance of linear facilities	This activity involves short-term disturbance of generally small areas of habitat and will have a negligible effect on the ability of these physical and biological features to support the conservation of the desert tortoise.
Operations and maintenance of non-linear facilities	This activity involves short-term disturbance of generally small areas of habitat and will have a negligible effect on the ability of these physical and biological features to support the conservation of the desert tortoise.
Decommissioning	This activity involves restoration of vegetation and is likely to increase the ability of these physical and biological features to support the conservation of the desert tortoise.
Common ravens, coyotes, and other predators	The attraction of predators to activities will have no effect on these physical and biological features. Measures implemented to manage predators may involve a small amount of off-road driving, which could have a negligible effect on these physical and biological features.
Recreation	Because most activities would occur on open routes and in previously disturbed areas, recreation would have a negligible effect on these physical and biological features.

Habitat Protected from Disturbance and Human-caused Mortality

The various activities that the Bureau would authorize or implement have the potential to increase the amount of disturbance or human-caused mortality.

The proposed action would affect the sixth physical and biological feature as a result of increased human activity in project areas. Although this biological opinion analyzes the effects of numerous activities, we expect that increased levels of activity would not have an appreciable effect on the overall function of critical habitat because the activities would be dispersed over a large area and the disturbance cap would limit the area of disturbance and, consequently, the amount of disturbance and human-caused mortality.

Noise from activities could cause disturbance beyond the boundaries of the activity sites. Given that desert tortoises have been found adjacent to other noisy areas, we expect that they would acclimate to noise; in that regard, the conservation function of the critical habitat surrounding activity sites would not be impaired. Workers could leave the activity sites and engage in activities that could compromise this physical and biological feature; however, we expect that worker education programs would eliminate this potential threat.

Type of activity	**Potential Impact on Habitat Protected from Disturbance and Human-caused Mortality**
Translocation	This activity involves vehicular use on previously disturbed areas and walking in desert tortoise habitat and would have a negligible effect on the ability of this physical and biological feature to support the conservation of the desert tortoise.
Construction of linear facilities	This activity involves short-term disturbance of long but narrow strips of habitat. The construction of linear facilities would temporarily increase the level of disturbance and human-caused mortality. We expect that the disturbance cap would limit this temporary increase so that it does not appreciably affect the function of this physical and biological feature.
Construction of non-linear facilities	This activity involves long-term disturbance of habitat. The construction of non-linear facilities would temporarily increase the level of disturbance and human-caused mortality. We expect that the disturbance cap would limit this temporary increase so that it does not appreciably affect the function of this physical and biological feature.
Operations and maintenance of linear facilities	Operation of linear facilities generally involves driving along authorized routes within rights-of-way, which introduces the potential for human-caused mortality. Conservation and management actions, such as speed limits and worker education programs, should ensure that operations do not have an appreciable adverse effect on this physical and biological feature. Maintenance generally involves short-term disturbance of small areas of habitat. The intermittent and dispersed nature of maintenance activities would have a negligible effect on this physical and biological feature.

Operations and maintenance of non-linear facilities	Operation and maintenance of non-linear facilities generally occur within fenced areas and therefore, do not cause disturbance or human-caused mortality. The repair of perimeter fences may cause negligible disturbance at the edge of the facility. Noise emanating from the facility would likely have a negligible effect on desert tortoises in the immediate area.
Decommissioning	Restoration would have a low potential of disturbance and human-caused mortality during the process of decommissioning because most activities would occur within fenced areas. We expect that all disturbance and human-caused mortality would be absent after completion of decommissioning.
Common ravens, coyotes, and other predators	Predators attracted to activities have the potential to kill desert tortoises (i.e., indirectly human-caused mortality). The Bureau will implement numerous conservation and management actions, which we expect will reduce the provision of subsidies to predators to the extent that it does not appreciably diminish the value of the physical and biological feature. For example, the conservation and management actions include the payment of the raven management fee, which allows the Service and Bureau to implement range-wide management of common ravens.
Recreation	Recreation would introduce disturbance to critical habitat and could result in human-caused mortality. The conservation and management actions provide management direction to protect critical habitat of the desert tortoise; this consultation's provisions that allow for the addition of activity-specific protective measures will allow the Bureau and Service to minimize the effects of recreation with regard to this physical and biological feature.

Effects of the Action Not Specific to Desert Tortoise and Its Critical Habitat

Compensation

The Bureau will require project proponents to compensate for the loss of desert tortoise habitat (LUPA-BIO-COMP-1). The Bureau will apply various ratios to the activity, depending on the resource that is affected; for example, the ratio is 5:1 for activities in desert tortoise critical habitat.

The Bureau will require that project proponents compensate by acquiring the calculated amount of habitat or paying a corresponding fee that the Bureau would use to either acquire lands or implement other actions that would benefit desert tortoises. The project proponent may also use a combination of these measures.

Because land acquisition and other recovery actions would occur in conservation areas, the proposed compensation would benefit the recovery of the desert tortoise. The funding of management actions is likely to result in restoration and rehabilitation of degraded habitat, protection of existing habitat from future sources of degradation, and a reduction in the direct mortality of desert tortoises. In general, the original and revised recovery plans (Service 1994, 2011) identify the actions proposed for compensation as being necessary for the recovery of the desert tortoise. We cannot quantify the level of effects that these actions will have because we do not know the specific actions that will be implemented at this time. However, in light of the continued decline of desert tortoises within conservation areas, the Service (2015a) has emphasized the need "for more aggressive and better prioritized recovery implementation." The use of compensation to address this need is more important than ever.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. The Bureau manages most of the land in the action area; any future action on public lands will require consultation, pursuant to Section 7(a)(2) of the Endangered Species Act. Some activities, such as transmission lines, are likely to occur in areas where land ownership occurs in a checkerboard pattern; that is, non-federal lands are intermingled with lands managed by the Bureau. In such checkerboard areas, most actions on non-federal lands would likely require access across public lands, which would, in turn, require the Bureau to consider issuance of a right-of-way grant. Consequently, we are unaware of any activities in the action area that we would consider to be cumulative effects at this time.

CONCLUSIONS

Desert Tortoise

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, or 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 activities considered in this biological opinion 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 (in this case, the Western Mojave, Eastern Mojave, and Colorado Desert recovery units), 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 measurable effects on the listed entity in the action area may degrade the status of the species to the extent that it is affected at the level of the recovery unit or range-wide.

In the following sections, we will synthesize the analyses of the activities, considered together, discussed in the Effects of the Action section of this biological opinion to determine their effect on the reproduction, number, and distribution of the desert tortoise. We will then assess the effects of the proposed activities 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.

Reproduction

Activities considered in the biological opinion have the potential to introduce new species of invasive, non-native plants into habitat of the desert tortoise; they may also increase the distribution and abundance of non-native species that are already present. In a study using captive individuals, Drake *et al* (2016) found that invasive grasses negatively affect health and survival, and this can ultimately lead to negative effects on population recruitment for desert tortoises. The Bureau will require project proponents to manage invasive and non-native plants during all activities; this direction should decrease the likelihood that invasive and non-native plants will increase in abundance or distribution.

The Bureau will require that all project proponents implement these measures. The Bureau's adoption of a revised disturbance cap system will prompt the restoration of disturbed habitat in desert tortoise conservation areas throughout the desert. We expect that those measures will also function to control non-native species.

As we discussed in more detail previously, Nussear *et al*. (2012) found that, in the first year after translocation, the mean reproductive effort for translocated desert tortoises was slightly less than that of residents. In the second and third years after translocation, the mean number of eggs was not different between resident and translocated desert tortoises. Relatively few desert tortoises are likely to be translocated because the Bureau will require project developers to avoid higher density areas. For these reasons, we expect that the translocation of desert tortoises as a result of activities considered in this biological opinion is likely to result in the short-term reduction of the reproductive of relatively few desert tortoises.

For these reasons, we conclude that the activities considered in this biological opinion are likely to have a minimal negative effect on the reproductive capacity of desert tortoises in the action area.

Numbers

For activities that would disturb habitat, the Bureau (CONS-BIO-IFS-1; DFA-BIO-IFS-3) will require that proponents conduct protocol surveys of sites where activities are proposed. If the results of these surveys indicate that more than 35 individuals larger than 160 millimeters occur on site or the density of desert tortoises exceeds 5 per square mile (160 millimeters or larger), the Bureau will require the proponent to redesign or relocate the project. The Bureau will use the number calculated through the Service's protocol survey, not the actual number of desert tortoises found during surveys, to implement these thresholds.

Desert tortoises seem to survive translocation from project sites when the translocation is conducted appropriately. We acknowledge that we have not monitored translocated animals for longer than

5 years; however, as we discussed previously in this section, translocated desert tortoises had similar rates of survival as resident and control animals within a year or two of translocation.

Various activities that the Bureau implements and authorizes may kill or injure desert tortoises, particularly small ones that are difficult to see. With a few exceptions, most activities that the Bureau authorizes or implements do not result in the death of desert tortoises. We expect that a few desert tortoises, probably mostly smaller individuals, are killed during activities but not detected. Because we do not know the number of desert tortoises the Bureau will encounter during each activity and cannot predict how many of those animals are likely to be killed, the Bureau and Service agree to reinitiate formal consultation if 15 large desert tortoises are killed in any calendar year as a result of activities undertaken through this biological opinion.

We estimated the number of desert tortoises within desert tortoise conservation areas in California, based on the results of the most recent report on range-wide sampling (Service 2015b). Most of the Eastern Mojave Recovery Unit is located in Nevada, as is a small portion of the Colorado Desert Recovery Unit. To account for this, we used half of the number of desert tortoises in the Eastern Mojave Recovery Unit in our exercise; because so little of the Colorado Desert Recovery Unit is outside of California, we included the entire number of desert tortoises for this area.

Recovery Unit	**Estimated Number of Desert Tortoises**
Western Mojave	17,644
Eastern Mojave	2,646
Colorado Desert	42,770
Total	63,060

The loss of 15 large desert tortoises represents 0.024 percent of the estimated total number of large desert tortoises within desert tortoise conservation areas in California (10 / 63,060 x 100 = 0.0237868696479543). This value overestimates the percentage of large desert tortoises that are likely to be killed as a result of activities considered in this biological opinion because our calculation does not include an estimate of the number of large desert tortoises that reside outside of the sampled conservation areas. If we included all large individuals within the action area in the calculation, the percentage of large desert tortoises that would be killed would decrease.

When we extend our calculation to all large desert tortoises within conservation areas range-wide (i.e., 85,686; Service 2015a), the percentage drops from 0.024 to 0.018 (15 / 85,686 x 100 = 0.0175057769063791). Therefore, we conclude that the activities considered in this biological opinion would have a negligible effect on the number of desert tortoises range-wide.

Turner *et al*. (1987) predicted that desert tortoises smaller than 180 millimeters comprised approximately 86.8 percent of the total population at their study site. Occasionally, the Service will use the work of Turner *et al*. to estimate the number of desert tortoises on a project site that are smaller than 180 millimeters. These estimates involve several assumptions and the number of assumptions changes with the size of the activity site. Consequently, we have declined to specifically estimate the number of smaller desert tortoises that may be affected by the activities considered in this biological opinion.

Because smaller desert tortoises are more difficult to find, they are more likely to be missed during surveys; if they are not detected prior to the start of construction, they will likely be killed. The loss of these individuals is not likely to appreciably diminish the numbers of desert tortoises overall because relatively few desert tortoises will be affected by activities considered in this biological opinion in comparison to the number of individuals in the conservation areas. Additionally, smaller desert tortoises have naturally higher rates of mortality than large animals; therefore, the key to protecting desert tortoises in the long term is to focus conservation efforts on the large animals that have higher rates of survival and are currently reproducing.

Distribution

All desert tortoise habitat in the action area occurs within the Bureau's various land use allocations. The Bureau's National Conservation Lands and areas of critical environmental concern encompass most of conservation areas and linkages for the desert tortoise. The Bureau's conservation and management actions prohibit all activities (except transmission) within National Conservation Lands and areas of critical environmental concern that would result in the long-term removal of habitat supporting more than 5 adults per square mile or more than 35 adults total (CONS-BIO-IFS-1 through -3). The conservation and management actions also impose disturbance caps with these areas that are designed to limit or reverse the amount of habitat degradation that may occur as a result of various activities. These provisions ensure that the distribution of desert tortoises within these areas will not be measurably reduced.

The Bureau has not established caps within wilderness areas because all development is prohibited within these areas. The Bureau has also not established caps within variance process lands, general public lands, or development focus areas. However, the areas within these land use allocations comprise a small portion of the modeled desert tortoise habitat within the action area.

For these reasons, we have concluded that the activities within this biological opinion are not likely to appreciably alter the distribution of the desert tortoise.

Effects on Recovery

The Bureau (2015b, page IV.7-186) has included 92, 93, and 89 percent of the desert tortoise conservation areas and linkage habitat within the Colorado Desert, Eastern Mojave, and Western Mojave recovery units, respectively, within areas of critical environmental concern and National Conservation Lands through its land use plan amendment for the Desert Renewable Energy Conservation Plan. The Bureau designates National Conservation Lands to conserve, protect and restore nationally significant ecological, cultural and scientific values. It designates areas of critical environmental concern to highlight areas where special management attention is needed to protect and prevent irreparable damage to important historic, cultural, and scenic values, fish, or wildlife resources, or other natural systems or processes. The Bureau's designation of these land use allocations acknowledges the needs of the desert tortoise and its habitat as nationally significant.

The Bureau has also proposed numerous conservation and management actions to guide its activities throughout the action area. The conservation and management actions contained in the land use plan amendment will guide the Bureau's management of all activities.

For example, the Bureau's use of caps on the amount of land that can be disturbed within areas of critical environmental concern and National Conservation Lands directly addresses the issue of habitat loss and degradation within these areas that are important for the recovery of the desert tortoise. The Bureau is congressionally mandated to manage public lands for multiple uses; consequently, the Service acknowledges that the Bureau cannot eliminate every use that is likely to adversely affect desert tortoises. The conservation and management actions, including the caps on disturbance, will provide the Bureau with a set of tools by which it can manage desert tortoises.

The Bureau's requirement that proponents of all activities that are likely to adversely affect desert tortoises and their habitat compensate for these impacts will provide a mechanism by which the Bureau will be able to acquire additional lands and implement other actions that will benefit the recovery of the desert tortoise. The recovery plans for the desert tortoise (Service 1994, 2011) recommend the acquisition of lands within conservation areas and the implementation of other actions that remove or reduce sources of mortality or restore habitat. Consequently, this aspect of the consultation will provide a substantial benefit to the recovery of the desert tortoise. The land use plan amendment does not specifically address how the Bureau would implement the compensation requirements; generally, compensation to date has been implemented on a project-by-project basis. This method can provide important benefits to the conservation of desert tortoises. It is constrained to some degree in that it does not approach the recovery of the desert tortoise in a planned, systematic manner; additionally, the extent to which recovery actions are implemented is a function of the degree of impact of a single project.

Conclusion

After reviewing the current status of the desert tortoise, the environmental baseline for the action area, the effects of the proposed activities, and the cumulative effects, the activities considered within this biological opinion are not likely to jeopardize the continued existence of the desert tortoise. We have reached this conclusion for the following reasons:

The proposed activities will not affect the reproductive capacity of desert tortoises.

The activities considered within this biological opinion will not appreciably reduce the number of desert tortoises within the action area and, by extension, throughout the range of the desert tortoise.

The proposed activities will not appreciably affect the distribution of the desert tortoise.

The activities considered within this biological opinion will not appreciably diminish our ability to recover the desert tortoise. The Bureau's requirement that the proponents of all activities compensate for the loss of habitat will allow for the implementation of numerous actions (acquisition of land, habitat restoration, fencing of roads, etc.) that will promote the recovery of the desert tortoise.

Critical Habitat

As we stated previously in this biological opinion, "destruction or adverse modification of critical habitat" means a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features (50 CFR 402.02).

Additionally, we determine whether a proposed action is likely to result in the "destruction or adverse modification" 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 the critical habitat unit, and then finally for the entirety of designated critical habitat. Logically, if a proposed action is unlikely to cause a measurable effect on critical habitat within the action area, it is unlikely to affect the species throughout the critical habitat unit or the remainder of critical habitat. Conversely, an action with measurable effects on critical habitat in the action area may degrade the status of critical habitat to the extent that it is affected at the level of the critical habitat unit or the entire designated area of critical habitat.

After reviewing the current status of the critical habitat, the environmental baseline for the action area, the effects of the proposed activities, and the cumulative effects, the activities considered within this biological opinion are not likely to result in the destruction or adverse modification of critical habitat of the desert tortoise. We have reached this conclusion because most of the critical habitat in the action area is located within National Conservation Lands, areas of critical environmental concern, and wilderness. The disturbance caps in the conservation and management actions will ensure that disturbance within the National Conservation Lands and areas of critical environmental concern will be minimal; we do not expect any disturbance within wilderness. Therefore, the activities considered in this biological opinion are not likely to appreciably diminish the value of critical habitat for the conservation of the desert tortoise.

INCIDENTAL TAKE STATEMENT

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

The measures described below are non-discretionary and must be undertaken by the Bureau or the Bureau must make them binding conditions of any authorization provided to permittees. The Bureau has a continuing duty to regulate the activities covered by this incidental take statement. If the Bureau fails to assume and implement the terms and conditions of the incidental take statement or to make them enforceable terms of permit or grant documents, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, the Bureau 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)].

We anticipate that most desert tortoises within the action areas for activities are likely to be taken; in some cases, desert tortoises will be allowed to leave under their own volition. We anticipate that most of the large individuals (i.e., those greater than 180 millimeters in length) within the area will be captured and moved from harm's way to adjacent habitat or translocated. Desert tortoises that are not detected during clearance surveys prior to implementation of activities may be killed or injured; because of the difficulty in finding small desert tortoises, we expect that many of these individuals, as well as eggs, are likely to be killed, injured, or destroyed during activities.

The Bureau and Service have agreed that the Bureau will re-initiate formal consultation if 15 large desert tortoises are killed in a calendar year by Bureau authorized or implemented activities. We have chosen 15 large desert tortoises as the threshold for re-initiation of consultation for the following reasons. Our experience with past projects indicates that authorized biologists will successfully move from harm's way or translocate the vast majority of large desert tortoises from the project site and that project activities are likely to kill or injure few of these individuals. We also acknowledge that it is reasonable to believe that some large desert tortoises are killed or injured that are not detected. Therefore, because of our experience that most large individuals are likely to be translocated, moved from harm's way, or avoided, we consider the detection of 15 dead large desert tortoises to be a reasonable point to re-initiate consultation.

We used large desert tortoises to establish 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. If the amount or extent of take for large desert tortoises is exceeded, the re-initiation of formal consultation would also require re-evaluation of the effects of the action on small desert tortoises.

We are not establishing an independent re-initiation criterion for the number of small desert tortoises or eggs that would be moved out of harm's way during activities considered in this biological opinion. We refrain from establishing re-initiation criteria for small desert tortoises or eggs because they are difficult to find, their numbers change more rapidly over time, and we encourage proponents to aggressively search for these individuals without the fear of project delays.

REASONABLE AND PRUDENT MEASURES AND TERMS AND CONDITIONS

The Bureau's conservation and management actions contain all of the common procedures that it may include in its authorizations and activities to minimize the take of desert tortoises. Additionally, when proponents or the Bureau propose specific activities, the Bureau will coordinate with the Service, as described in the Description of the Proposed Action section of this biological opinion, to determine the applicable conservation and management actions for that activity. If the Bureau and the Service agree that additional measures are necessary to protect desert tortoises for a specific activity, they will include such measures with the applicable conservation and management actions. Consequently, 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

The Bureau must provide an annual report to the Service by February 28 of each year which will include on-going and completed activities from the prior calendar year. Specifically, the reports must include information on any instances when any desert tortoise are killed or injured, the circumstances of such incidents, and any actions undertaken to prevent similar mortalities or injuries from re-occurring.

If desert tortoises are moved from harm's way or translocated, the Bureau must include that information in the report and any other information required by the activity-specific plan.

The Bureau must condition its authorizations to require project proponents to provide as much detail as possible as to the cause of mortality or injury of desert tortoises. This information will assist the Bureau and Service in developing more efficient means of reducing future impacts.

The reports must also include a description of the monitoring efforts that the Bureau implements.

DISPOSITION OF DEAD OR INJURED SPECIMENS

Within 24 hours of locating any dead desert tortoises, you must notify the Palm Springs Fish and Wildlife Office by telephone (760 322-2070) and 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 of any desert tortoise is found injured. If the injured animal has the potential to survive, the Bureau must ensure that it is taken to a qualified veterinarian for treatment. If any injured individual of a listed species survives, the Bureau must contact the Service regarding its final disposition.

The Bureau must ensure that the applicant takes care in handling dead specimens to preserve biological material in the best possible state for later analysis, if such analysis is needed. The Service will make this determination when the Bureau provides notice that a desert tortoise has been killed by project activities.

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:

In the past, project proponents have worked, at least to some degree, independently of the Federal agencies to develop the types of compensation for their projects. We recommend that the Bureau work with us to develop a mechanism whereby the Bureau, in coordination with the Service and other agencies as appropriate, directs compensation towards the highest-priority tasks identified by the Recovery Implementation Teams. Where compensation from a single project is insufficient to complete such a task, we also recommend that the Bureau pool compensation from additional projects. In light of the continued decline of desert tortoises, this approach to compensation would begin to meet the "need for more aggressive and better prioritized recovery implementation," as recommended by the Service (2015a) in its annual report on range-wide monitoring.

We also recommend that the Bureau work with the Service, and other agencies as appropriate, to develop a strategy to translocate desert tortoises from project sites to appropriate augmentation areas whenever appropriate. Although desert tortoises generally adapt more quickly to translocation when moved short distances, we consider longer-distance translocations to be appropriate when the translocated animals are from areas where their current densities are below those that can support a viable population in the long term. The coordinated augmentation of populations in conservation areas would do more to further the recovery of the desert tortoise than moving a few individuals from a project site into adjacent habitat where the agencies are not managing the landscape for the long-term conservation of the species.

We recommend that the Bureau include, in its annual report for this biological opinion, information on conservation activities that the Bureau undertook in the previous year. Such activities may include, but are not limited to, acquisition of land, restoration of habitat, and results of research on desert tortoises conducted, permitted, or funded by the Bureau. As an alternative to including this information in the annual report, the Bureau may elect to develop another means whereby it can assist the Service in tracking the implementation of recovery actions.

We recommend that the Bureau engage the Service to discuss the need to re-initiate consultation if the rate that incidental take is occurring in any given year indicates that it may exceed the re-initiate trigger of 15 large desert tortoises.

RE-INITIATION NOTICE

This concludes formal consultation on the Bureau's activities in the California Desert Conservation Area. As provided in 50 CFR 402.16, 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 this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action.

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

We appreciate the cooperation of your staff during the development of this biological opinion. If you have any questions, please contact Tara Callaway (760 322-2070, extension 417, or tara_callaway@fws.gov) or Ray Bransfield (805 677-3398 or ray_bransfield@fws.gov) of my staff.

Appendices

A. List of programmatic biological opinions for the desert tortoise

B. Activity form

C. Paper or electronic copies of the "Mojave population of the desert tortoise (*Gopherus agassizii*) 5-year review: summary and evaluation" are available upon request and can be found at: https://www.fws.gov/carlsbad/SpeciesStatusList/5YR/20100930_RP_DETO.pdf

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

LITERATURE CITED

Allison, L. 2014. Electronic mail. Range-wide population trends. Dated May 5. Desert tortoise monitoring coordinator, Desert Tortoise Recovery Office, U.S. Fish and Wildlife Service. Reno, Nevada.

Averill-Murray, R.C. 2002. Effects on survival of desert tortoises (*Gopherus agassizii*) urinating during handling. Chelonian Conservation and Biology 4(2):430-435.

Averill-Murray, R.C., C.R. Darst, N. Strout, and M. Wong. 2013. Conserving population linkages for the Mojave desert tortoise. Herpetological Conservation Biology 8(1):1-15.

Boarman, W.I. 2002. Threats to desert tortoise populations: a critical review of the literature. Western Ecological Research Center, U.S. Geological Survey. Riverside, California.

[Bureau] Bureau of Land Management. 2015a. Request for Endangered Species Act consultation for the Bureau of Land Management's proposed land use plan amendment under the Desert Renewable Energy Conservation Plan and biological assessment. Dated July 13. Memorandum to Field Supervisor, Carlsbad and Palm Springs Field Offices, U.S. Fish and Wildlife Service, Carlsbad, California. From Deputy State Director of Natural Resources, Bureau of Land Management. Sacramento, California.

[Bureau] Bureau of Land Management. 2015b. Desert Renewable Energy Conservation Plan. Proposed land use plan amendment and final environmental impact statement. Dated October. Sacramento, California.

[Bureau] Bureau of Land Management. 2016. Desert Renewable Energy Conservation Plan. Land use plan amendment to the California Desert Conservation Area Plan, Bishop Resource Management Plan, and Bakersfield Resource Management Plan. Sacramento, California.

Burroughs, M. 2013. Personal communication. Electronic transmittal of comments on the draft biological opinion for the Stateline and Silver State South proposed solar projects. Dated September 23. Fish and Wildlife Biologist, Southern Nevada Field Office, U.S. Fish and Wildlife Service. Las Vegas, Nevada.

Darst, C. 2014. Electronic mail. Calculations of modeled desert tortoise habitat by recovery unit with impervious surfaces. Dated May 14. Desert Tortoise Recovery Office, U.S. Fish and Wildlife Service. Reno, Nevada.

Drake, K.K., T.C. Esque, K.E. Nussear, C. Aiello, P. Emblidge, and P.A. Medica. 2010. An annual report for desert tortoise translocation research at the Fort Irwin Southern Expansion Translocation Area. Las Vegas Field Station, Western Ecological Research Center, U.S. Geological Survey. Henderson, Nevada.

Drake, K.K., K.E. Nussear, T.C. Esque, A.M. Barber, K.M. Vittum, P.A. Medica, C.R. Tracy, and K.W. Hunter. 2012. Does translocation influence physiological stress in the desert tortoise? Animal Conservation doi:lO.1111/j.1469-1795.2012.00549.x.

Drake, K.K., T.C. Esque, K.E. Nussear, L.A. Defalco, S.J. Scoles-Sciulla, A.T. Modlin, and P.A. Medica. 2015. Desert tortoise use of burned habitat in the eastern Mojave Desert. Journal of Wildlife Management:79(4):618–629; 2015; DOI: 10.1002/jwmg.874.

Drake, K.K., L. Bowen, K.E. Nussear, T.C. Esque, A.J. Berger, N.A. Custer, S.C. Waters, J.D. Johnson, A.K. Miles, and R.L. Lewison. 2016. Negative impacts of invasive plants on conservation of sensitive desert wildlife. Ecosphere 7(10):e01531. 10.1002/ecs2.1531.

Ennen, J.R., J.E. Lovich, K.P. Meyer, C. Bjurlin, and T.R. Arundel. 2012. Nesting ecology of a population of *Gopherus agassizii* at a utility-scale wind energy facility in Southern California. Copeia 2:222-228.

Esque, T.C., K.E. Nussear, K.K. Drake, A.D. Walde, K.H. Berry, R.C. Averill-Murray, A.P. Woodman, W.I. Boarman, P.A. Medica, J. Mack, and J.S. Heaton. 2010. Effects of subsidized predators, resource variability, and human population density on desert tortoise populations in the Mojave Desert, USA. Endangered Species Research 12(2):167-177.

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

Fry J., G. Xian, S. Jin, J. Dewitz, C. Homer, L. Yang, C. Barnes, N. Herold, and J. Wickham. 2011. National Land Cover Database 2006 Percent Developed Imperviousness. Raster digital data. MRLC.gov. www.mrlc.gov/nlcd06_data.php.

Hinderle, D., R.L. Lewison, A.D. Walde, D. Deutschman, and W.I. Boarman. 2015. The effects of homing and movement behaviors on translocation: desert tortoises in the western Mojave Desert. Journal of Wildlife Management 79(1):137–147; 2015; DOI: 10.1002/jwmg.823

Hoffmann, S. 2017. Personal communication. Number of desert tortoises moved from expanded training areas at the Marine Corps Air Ground Combat center, Twentynine Palms. Date June 23. Fish and Wildlife Biologist, Palm Springs Fish and Wildlife Office, U.S. Fish and Wildlife Service. Palm Springs, California.

Hughson, D., and N. Darby. 2011. Desert tortoise and highway traffic: a resource management concern. Science Newsletter 1:14-16. Mojave National Preserve, Bureau. Barstow, California.

Keith, K., K. Berry, and J. Weigand. 2005. Surveys for desert tortoises in the Jawbone-Butterbredt Area of Critical Environmental Concern, eastern Kern County, California. U.S. Geological Survey, Moreno Valley, and Bureau of Land Management, Sacramento, California.

Latch, E.K., W.I. Boarman, A.Walde, and R.C. Fleischer. 2011. Fine-scale analysis reveals cryptic landscape genetic structure in desert tortoises. PLoS ONE 6(11):e27794. doi:10.1371/journal.pone.0027794

Longshore, K.M., J.R Jaeger, and M. Sappington. 2003. Desert tortoise (*Gopherus agassizii*) survival at two eastern Mojave desert sites: death by short-term drought? Journal of Herpetology 37(1):169-177.

Nussear, K.E. 2004. Mechanistic investigation of the distributional limits of the desert tortoise *Gopherus agassizii*. Dissertation. University of Nevada. Reno, Nevada.

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

Nussear, K.E., C.R. Tracy, P.A. Medica, D.S. Wilson, R.W. Marlow, and P.S. Corn. 2012. Translocation as a conservation tool for Agassiz's desert tortoises: Survivorship, reproduction, and movements. The Journal of Wildlife Management; DOI: 10.1002/jwmg.390.

Oftedal, O.T., S. Hillard, and D.J. Morafka. 2002. Selective spring foraging by juvenile desert tortoises (*Gopherus agassizii*) in the Mojave Desert: evidence of an adaptive nutritional strategy. Chelonian Conservation and Biology 4(2):341-352.

Scherer, R.D., M.L. Farnsworth, and B.G. Dickson. 2016. Preliminary survival analysis for ISEGS Mojave desert tortoises: April 2012 – April 2016. For the project entitled: Process- and scale-based determinants of survival for translocated Mojave desert tortoises in the Ivanpah Valley, California. Conservation Science Partners. Truckee, California.

Tracy, C.R., R. Averill-Murray, W.I. Boarman, D. Delehanty, J. Heaton, E. McCoy, D. Morafka, K. Nussear, B. Hagerty, and P. Medica. 2004. Desert tortoise recovery plan assessment. Prepared for the U.S. Fish and Wildlife Service. Reno, Nevada.

Turner, F.B., K.H. Berry, D.C. Randall, and G.C. White. 1987. Population ecology of the desert tortoise at Goffs, California, 1983-1986. Prepared for the Southern California Edison Company. Rosemead, California.

[Service] U.S. Fish and Wildlife Service. 1993. Draft desert tortoise (Mojave population) recovery plan. Portland, Oregon.

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

[Service] U.S. Fish and Wildlife Service. 2004. Biological opinion for the proposed addition of maneuver training lands at Fort Irwin, California (1-8-03-F-48). Dated March 15. Letter to Colonel Edward L. Flinn, Deputy, Commander and Chief of Staff, National Training Center, Fort Irwin, California. From Field Supervisor, Ventura Fish and Wildlife Office. Ventura, California.

[Service] U.S. Fish and Wildlife Service. 2005. Biological opinion for the California Desert Conservation Area Plan [desert tortoise] (6840 CA930(P)) (1-8-04-F-43R). Dated March 31. Memorandum to State Director, Bureau of Land Management, Sacramento, California. From Field Supervisor, Ventura Fish and Wildlife Office. Ventura, California.

[Service] U.S. Fish and Wildlife Service. 2006. Biological opinion for the California Desert Conservation Area Plan [West Mojave Plan] (6840(P) CA-063.50) (1-8-03-F-58). Dated January 9. Memorandum to District Manager, California Desert District, Bureau of Land Management, Moreno Valley, California. From Field Supervisor, Ventura Fish and Wildlife Office. Ventura, California.

[Service] U.S. Fish and Wildlife Service. 2008. Environmental assessment to implement a desert tortoise recovery plan task: reduce common raven predation on the desert tortoise. Ventura Fish and Wildlife Office. Ventura, California.

[Service] U.S. Fish and Wildlife Service. 2010. Mojave population of the desert tortoise (*Gopherus agassizii*) 5-year review: summary and evaluation. Desert Tortoise Recovery Office. Reno, Nevada.

[Service] U.S. Fish and Wildlife Service. 2011. Revised recovery plan for the Mojave population of the desert tortoise (*Gopherus agassizii*). Sacramento, California.

[Service] U.S. Fish and Wildlife Service. 2012. Biological opinion on the proposed addition of maneuver training lands at Fort Irwin, California (8-8-11-F-38R). Dated April 27. Letter to Chief of Staff, Headquarters, National Training Center and Fort Irwin, Fort Irwin, California. From Field Supervisor, Ventura Fish and Wildlife Office. Ventura, California.

[Service] U.S. Fish and Wildlife Service. 2014. Range-wide monitoring of the Mojave desert tortoise (*Gopherus agassizii*): 2012 annual report. Desert Tortoise Recovery Office. Reno, Nevada.

[Service] U.S. Fish and Wildlife Service. 2015a. Update on Mojave desert tortoise population trends. Dated June 19. Desert Tortoise Recovery Office. Reno, Nevada.

[Service] U.S. Fish and Wildlife Service. 2015b. Range-wide monitoring of the Mojave desert tortoise (Gopherus agassizii): 2013 and 2014 annual reporting. Desert Tortoise Recovery Office. Reno, Nevada.

[Service] U.S. Fish and Wildlife Service. 2016. Biological opinion on the proposed land use plan amendment under the Desert Renewable Energy Plan [1340 (CA 930) P, 1150 (CA 930) P]. Dated August 16. Memorandum to Deputy State Director, Division of Natural Resources, Bureau of Land Management, Sacramento, California. From Field Supervisor, Carlsbad Fish and Wildlife Office, U.S. Fish and Wildlife Service. Carlsbad, California.

[Service] U.S. Fish and Wildlife Service. 2017. Biological opinion for land acquisition and airspace establishment, Twentynine Palms, California (8-8-11-F-65R). Dated January 31. Letter to Lieutenant Colonel T.B. Pochop, Marine Corps Air Ground Combat Center, Twentynine Palms, California. From Field Supervisor, Carlsbad Fish and Wildlife Office. Carlsbad, California.

URS. 2010. Supplemental biological assessment for the Calico Solar Project, San Bernardino County, California. San Diego, California.

Walde, A.D., and W.I. Boarman. 2013. Draft final report. Desert tortoise translocation, monitoring, and research within the southern expansion area and translocation areas of Fort Irwin, California. Dated May 13. Prepared for National Training Center and Fort Irwin Directorate of Public Works, Fort Irwin, California. Walde Research and Environmental Consulting, Atascadero, California, and Conservation Science Research and Consulting, Spring Valley, California.

Wilson, D.S., D.J. Morafka, C.R. Tracy, and K.A. Nagy. 1999. Winter activity of juvenile desert tortoises (*Gopherus agassizii*) in the Mojave Desert. Journal of Herpetology 33(3):496-501.

APPENDIX A
List of Programmatic Biological Opinions for the Desert Tortoise

This biological opinion will replace most of the existing programmatic biological opinions between the Bureau and Service in the California Desert Conservation Area. This appendix notes how this biological opinion relates to existing biological opinions. Given the number of consultations in which the Bureau and Service have participated, this list may not be complete. If questions regarding a previously issued a biological opinion arise during the evaluation of a future activity, the Bureau and Service may rely on this biological opinion, provided that the analysis herein adequately describes the likely adverse effects to desert tortoises and critical habitat. Additionally, the Bureau and Service may modify this list if they become aware of existing biological opinions that we have failed to include.

PROGRAMMATIC BIOLOGICAL OPINIONS THAT WILL REMAIN IN PLACE

El Mirage Cooperative Off-Highway Vehicle Management Area	1-6-90-F-36
Johnson Valley Off-Highway Vehicle Management Area	1-6-90-F-39
Spangler Hills Off-Highway Vehicle Management Area	1-6-92-F-4
Route Designation in Northern and Eastern Mojave Desert	1-8-04-F-11
Stoddard Valley Off-Highway Vehicle Management Area	1-8-93-F-1
Imperial Sand Dunes Recreation Area Management Plan	FWS-IMP-09BO172-11F0310
Rainbow Basin Natural Area Management Plan	1-6-91-F-17
Rand Mountain-Fremont Valley Management Plan	1-6-90-F-54

BIOLOGICAL OPINIONS THAT WILL REMAIN PARTIALLY IN PLACE

Biological opinions on livestock management plans will remain in place. However, the Bureau can use the programmatic biological opinion for range improvements conducted under livestock management plans that have previously undergone section 7(a)(2) consultation.

California Desert Conservation Area	
Northern and Eastern Mojave and Northern and Eastern Colorado Plans	1-8-04-F-43R
West Mojave Plan	1-8-03-F-58

The incidental take statements from these biological opinions for the planning efforts for the California Desert Conservation Area will remain in place with regard to causal use (including on authorized routes and mining), livestock grazing (but not range improvements or revised grazing plans).

BIOLOGICAL OPINIONS THAT WILL BE REPLACED

Small Mining	1-6-92-F-28, 1-8-94-F-28R
Southern California Edison	1-8-94-F-53
Southern California Gas Pipeline Maintenance	1-8-95-F-28
Pacific Gas and Electric Company Gas Pipeline System	1-8-99-F-71
Small Projects	1-8-97-F-17
Dual Sport Programmatic	1-6-92-F-2
Road Maintenance and Rehabilitation of Disturbed Areas in the Ridgecrest Resource Area	1-8-95-F-32

APPENDIX B

Activity Request Form

Activity Request Form

This consultation consists of the programmatic biological opinion, the Bureau of Land Management's (Bureau) request to use the programmatic biological opinion for the proposed action with project-specific information (Part A), the Fish and Wildlife Service's (Service) response (Part B), and the Bureau's post-project reporting (Part C). This form will be filled out and sent electronically. If your response to any question does not fit in the fillable box, please add extra pages and note the additional pages in the box.

For projects that affect 10 acres of habitat or less or that do not involve ongoing impacts to desert tortoises that are associated with transportation, the Service's Division Chief will have 30 days to respond via electronic mail if she or he has any concerns with use of the programmatic biological opinion. The Bureau may assume that the Service has no concerns if it does not respond by the close of the 30-day period; as a courtesy, the Service's Division Chief will attempt to notify the Bureau of her or his decision as soon as possible.

For projects that affect more than 10 acres or that will involve ongoing impacts to desert tortoises that are associated with transportation, the Service's Division Chief will respond within 30 days by signing and returning the activity form via electronic mail. The Bureau will not authorize or implement such projects until it receives notification from the Service.

Part A: Request to Implement an Activity by the Bureau

Date of request from Bureau:

Bureau point of contact:

Phone number/e-mail:

Project/activity title:

Proponent/applicant:

Number of desert tortoises potentially impacted:

$>$ 180 mm:

$<$ 180 mm:

Number of acres anticipated to be affected:

Non-critical habitat:

Critical habitat:

Description of Proposed Action:

Attach a map of the action area to form ☐

What is the Federal action (*e.g.*, right-of-way, permit, lease, etc.)?

When would the action begin?

When would the action end?

What are the specific activities that would be implemented?

How will access to work areas be accomplished? List equipment and routes of travel.

List proposed Conservation and Management Actions:

Survey Summary and Results:

Attach survey report to form ☐

Signature (Responsible Bureau Official):

Part B: Service Response

Service File No. for Proposed Activity:

Date of FWS response to Bureau:

Conclusion

Is this project appropriate for use under the programmatic biological opinion? -

Additional protective measures or Conservation and Management Actions agreed to by the Bureau and Service during consultation:

Signature:

Division Chief
Palm Springs Fish and Wildlife Office
Palm Springs, California

Part C: Post-project Reporting

Number of desert tortoises:

Killed:

Injured:

Moved:

Number of acres actually disturbed:

Non-critical habitat:

Critical habitat:

Other effects not described above:

Recommendations to improve protection of desert tortoises during future project activities:

APPENDIX D

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

The following table summarizes information regarding the solar projects that have undergone formal consultation with regard to the desert tortoise. In the Citations column, a single reference indicates that the acres of desert tortoise habitat and number of desert tortoises are estimates from the biological opinion; when the column includes two citations, the first is for the acreage of habitat and the estimated number of desert tortoises from the biological opinion and the second is for number of desert tortoises that were found onsite prior to or during construction.

Project and Recovery Unit	Acres of Desert Tortoise Habitat	Desert Tortoises Estimated[1]	Desert Tortoises Observed[2]	Citations[3]
Eastern Mojave				
Ivanpah Solar Electric Generating System	3,582	1,136	175[7]	Service 2011a, Davis 2014
Stateline	1,685	947	55	Service 2013a, Ironwood 2014
Silver State North – NV	685	14[6]	4	Service 2010a, Cota 2013
Silver State South – NV	2,427[4]	1,020[4]	152	Service 2013a, Cota 2014
Amargosa Farm Road – NV	4,350	4[6]	-	Service 2010e
Nevada Solar One - NV	400	[5]	[5]	Burroughs 2012, 2014
Copper Mountain North - NV	1,400	30[5]	30[5]	Burroughs 2012, 2014
Copper Mountain - NV	380	[5]	[5]	Burroughs 2012, 2014
Townsite - NV	936	2[8]	-	Burroughs 2015
Techren Boulder City - NV	2,304	10	-	Burroughs 2015
Western Mojave				
Abengoa Harper Lake	Primarily in abandoned agricultural fields	4[6]	-	Service 2011b
Chevron Lucerne Valley	516	10	-	Service 2010b
Cinco	500	53	2	Service 2015a, Daitch 2015
Soda Mountain	1,726	78	-	Service 2015b
Northeastern Mojave				
Res Americas Moapa Solar Energy Center - NV	951	95	-	Burroughs 2015
Moapa K Road Solar - NV	2,141	186	157	Service 2012, Burroughs 2013
Colorado				
Genesis	1,774	8	0	Service 2010c, Fraser 2014a
Blythe	6,958	30	0	Service 2010d, Fraser 2014b

Desert Sunlight	4,004	56	7	Service 2011c, Fraser 2014a
McCoy	4,533	15	0	Service 2013b, Fraser 2014b
Desert Harvest	1,300	5	-	Service 2013c
Rice	1,368	18	1	Service 2011d, Fraser 2014a
Total	43,920	3,721	583	

[1]The numbers in this column are not necessarily comparable because the methodologies for estimating the numbers of desert tortoises occasionally vary between projects. When available, we included an estimate of the numbers of small desert tortoises.
[2]This column reflects the numbers of desert tortoises observed 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.
[3]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.
[4]These numbers include Southern California Edison's Primm Substation and its ancillary facilities.
[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. We estimate that all three projects combined will affect fewer than 30 desert tortoises.
[6]These estimates do not include smaller desert tortoises.
[7]In the table attached to the electronic mail, the number of desert tortoises translocated from the project site is represented by the total number of translocated animals minus the number of animals born in the holding pens.
[8]The estimate of the number of desert tortoises is from the portion of the project on Bureau land (52 acres). The remaining lands are covered by the Clark County Multi-species Habitat Conservation Plan; see footnote 5.
[9]The estimate of the number of desert tortoises is from both Bureau (104 acres) and private (2,200 acres) land. The remaining lands are covered by the Clark County Multi-species Habitat Conservation Plan; see footnote 5.

LITERATURE CITED

Burroughs, M. 2012. Electronic mail. Information on solar projects in desert tortoise habitat in Nevada for which the Service has issued biological opinions. Dated April 26. Fish and wildlife biologist, Southern Nevada Field Office, U.S. Fish and Wildlife Service. Las Vegas, Nevada.

Burroughs, M. 2013. Electronic mail. Comments on the draft biological opinion for the Stateline and Silver State Solar South projects, San Bernardino County, California, and Clark County, Nevada (Stateline: 2800(P), CACA-048669, CAD090.01; Silver State South: 6840 (NV-052)) (Stateline: 8-8-13-F-43; Silver State South: 84320-2010-F-0208- R003). Dated September 23. Fish and wildlife biologist, Southern Nevada Field Office, U.S. Fish and Wildlife Service. Las Vegas, Nevada.

Burroughs, M. 2015. Electronic mail. Status of solar projects in Nevada. Dated October 26. Fish and wildlife biologist. Southern Nevada Field Office, U.S. Fish and Wildlife Service. Las Vegas, Nevada.

Burroughs, M. 2014. Electronic mails. Status of solar projects in Nevada. Dated January 27. Fish and wildlife biologist, Southern Nevada Field Office, U.S. Fish and Wildlife Service. Las Vegas, Nevada.

Cota, M. 2013. Electronic mail. Comments on the draft biological opinion for the Stateline and Silver State Solar South projects, San Bernardino County, California, and Clark County, Nevada (Stateline: 2800(P), CACA-048669, CAD090.01; Silver State South: 6840 (NV-052)) (Stateline: 8-8-13-F-43; Silver State South: 84320-2010-F-0208-R003). Dated September 18. Wildlife biologist, Pahrump Field Office, Bureau of Land Management. Las Vegas, Nevada.

Cota, M. 2014. Electronic mail. Number of desert tortoises found on the Silver State South Project site. Dated November 25. Wildlife biologist, Pahrump Field Office, Bureau of Land Management. Las Vegas, Nevada.

Daitch, D. 2015. Electronic mail. Notifications of desert tortoises found on the Cinco Solar project. Dated November 6. Rincon Consultants. Monterey, California.

Davis, D. 2014. Electronic mail. ISEGS master tortoise list, October 2014. Dated November 3. Environmental specialist III, Ivanpah Solar Thermal, Nipton, California.

Fraser, J. 2014a. Electronic mail. Number of desert tortoises found on the Genesis and Desert Sunlight solar sites. Dated January 28. Fish and wildlife biologist, Palm Springs Fish and Wildlife Office, U.S. Fish and Wildlife Service. Palm Springs, California.

Fraser, J. 2014b. Electronic mail. Number of desert tortoises found on the Blythe and McCoy solar sites. Dated November 5. Fish and wildlife biologist, Palm Springs Fish and Wildlife Office, U.S. Fish and Wildlife Service. Palm Springs, California.

[Ironwood] Ironwood Consulting, Inc. 2014. Annual compliance report: April - December 2014. Biological resources. Stateline Solar Farm. Bureau of Land Management case file number: CACA-48669. San Bernardino County, California.

[Service] U.S. Fish and Wildlife Service. 2010a. Formal consultation for the Silver State Solar Project (NextLight Renewable Power, LLC), Clark County, Nevada. File No. 84320-2010-F-0208. Dated September 16. Memorandum to Field Manager, Pahrump Field Office, Bureau of Land Management, Las Vegas, Nevada. From State Supervisor, Nevada Fish and Wildlife Office. Reno, Nevada.

[Service] U.S. Fish and Wildlife Service. 2010b. Revised biological opinion for the Lucerne Valley Chevron Solar Project, San Bernardino County, California (3031 (P) CA-680.33) (8-8-10-F-61R). Memorandum to Field Manager, Barstow Field Office, Bureau of Land Management, Barstow, California. Dated September 29. From Field Supervisor, Ventura Fish and Wildlife Office. Ventura, California.

[Service] U.S. Fish and Wildlife Service. 2010c. Biological opinion on the Genesis Solar Energy Project, Riverside County, California. Memorandum to Field Manager, Palm Springs South Coast Field Office, Bureau of Land Management, Palm Springs, California. Dated November 2. From Field Supervisor, Carlsbad Fish and Wildlife Office. Carlsbad, California.

[Service] U.S. Fish and Wildlife Service. 2010d. Biological opinion on the Blythe Solar Power Plant, Riverside County, California. Memorandum to Field Manager, Palm Springs South Coast Field Office, Bureau of Land Management, Palm Springs, California. Dated October 8. From Field Supervisor, Carlsbad Fish and Wildlife Office. Carlsbad, California.

[Service] U.S. Fish and Wildlife Service. 2010e. Formal and informal consultation under section 7 of the Endangered Species Act for the Amargosa Farm Road Solar Energy Project, Nye County, Nevada. File nos. 84320-2010-F-0315 and 84320-2010-1-0316. Memorandum to Field Manager, Pahrump Field Office, Bureau of Land Management, Las Vegas, Nevada. Dated November 1. From State Supervisor, Nevada Fish and Wildlife Office. Reno, Nevada.

[Service] U.S. Fish and Wildlife Service. 2011a. Biological opinion on BrightSource Energy's Ivanpah Solar Electric Generating System Project, San Bernardino County, California [CACA-48668, 49502, 49503, 49504] (8-8-10-F-24R). Dated June 10. Memorandum to District Manager, California Desert District, Bureau of Land Management, Moreno Valley, California. From Field Supervisor, Ventura Fish and Wildlife Office. Ventura, California.

[Service] U.S. Fish and Wildlife Service. 2011b. Biological opinion on the Mojave Solar, LLC's Mojave Solar Project, San Bernardino County, California (8-8-11-F-3). Letter sent to Director of Environmental Compliance, Loan Guarantee Program, Department of Energy, Washington, D.C. and Field Manager, Barstow Field Office, Bureau of Land Management, Barstow, California. Dated March 17. From Field Supervisor, Ventura Fish and Wildlife Office. Ventura, California.

[Service] U.S. Fish and Wildlife Service. 2011c. Biological opinion on the Desert Sunlight Solar Farm Project, Riverside County, California. Memorandum to Field Manager, Palm Springs South Coast Field Office, Bureau of Land Management, Palm Springs, California. Dated July 6. From Field Supervisor, Carlsbad Fish and Wildlife Office. Carlsbad, California.

[Service] U.S. Fish and Wildlife Service. 2011d. Biological opinion on the Rice Solar Energy Project, Riverside County, California. Dated July 27. Letter to John, Holt, Environmental Manager, Desert Southwest Customer Service Region, Western Area Power Administration, Phoenix, Arizona. From Jim A. Bartel, Field Supervisor, Carlsbad Fish and Wildlife Office. Carlsbad, California.

[Service] U.S. Fish and Wildlife Service. 2012. Biological opinion for the K Road Moapa Solar Project, Moapa River Indian Reservation, Clark County, Nevada. Memorandum to Superintendent, Southern Paiute Agency, Bureau of Indian Affairs. St. George, Utah. Dated March 7. From State Supervisor, Nevada Fish and Wildlife Office. Reno, Nevada.

[Service] U.S. Fish and Wildlife Service. 2013a. Biological opinion for the Stateline Solar and Silver State Solar South Projects, San Bernardino County, California, and Clark County, Nevada. Dated September 30. Memorandum to Field Manager, Needles Field Office, Bureau of Land Management, Needles California, and Assistant Field Manager, Las Vegas Field Office, Bureau of Land Management, Las Vegas, Nevada. From Acting Field Supervisor, Ventura Fish and Wildlife Office. Ventura, California.

[Service] U.S. Fish and Wildlife Service. 2013b. Biological opinion on the McCoy Solar Power Project, Riverside County, California. Dated March 6. Memorandum to Field Manager, California Desert District Office, Bureau of Land Management, Moreno Valley, California. From Field Supervisor, Carlsbad Fish and Wildlife Office. Carlsbad, California.

[Service] U.S. Fish and Wildlife Service. 2013c. Biological opinion on the Desert Harvest Solar Project, Riverside County, California [CACA 044919]. Dated January 15. Memorandum to Field Manager, Palm Springs-South Coast Field Office, Bureau of Land Management, Moreno Valley, California. From Field Supervisor, Carlsbad Fish and Wildlife Office. Carlsbad, California.

[Service] U.S. Fish and Wildlife Service. 2015a. Biological opinion for the RE Barren Ridge 1 LLC's RE Cinco Generation Intertie Line and RE Cinco Solar Project, Kern County, California (2831-03 (P) CACA-53735 CAD000.06). Dated February 11. Memorandum to Field Manager, Ridgecrest Field Office, Bureau of Land Management, Ridgecrest, California, and Deputy Regional Director, Region 8, U.S. Fish and Wildlife Service, Sacramento, California. From Field Supervisor, Carlsbad Fish and Wildlife Office. Carlsbad, California.

[Service] U.S. Fish and Wildlife Service. 2015b. Biological opinion for the Soda Mountain Solar Project, San Bernardino County, California [2831-03(CP), CACA-49584, CAD000.06/CAD080]. Dated January 13. Memorandum to District Manager, California Desert District, Bureau of Land Management, Moreno Valley, California. From Field Supervisor, Carlsbad Fish and Wildlife Office. Carlsbad, California.

Appendix D:

PROGRAMMATIC BIOLOGICAL OPINION FOR BUREAU OF LAND MANAGEMENT ACTIVITIES ADVERSELY AFFECTING 19 LISTED SPECIES AND CRITICAL HABITAT

United States Department of the Interior

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

January 2, 2013
File No. 84320-2010-F-0365

Memorandum

To: Assistant Field Manager, Division of Renewable Resources, Las Vegas Field Office, Bureau of Land Management, Las Vegas, Nevada

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

Subject: Formal Programmatic Consultation under Section 7 of the Endangered Species Act for Effects to Threatened and Endangered Species and their Critical Habitat that May Occur as a Result of Actions Proposed by the Southern Nevada District Office, Bureau of Land Management

This transmits the Fish and Wildlife Service's (Service) programmatic biological opinion (PBO) based on our review of programmatic activities proposed for implementation by the Bureau of Land Management's (BLM) Southern Nevada District Office. These programs are described in your June 2010 programmatic biological assessment (BLM 2010). This consultation evaluates potential effects on 19 federally listed species and critical habitat for 13 of these species in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act) (16 U.S.C. 1531 *et seq.*). Revised critical habitat has been proposed for the southwestern willow flycatcher (*Empidonax trailii extimus*) *but* will not affect the action area for this consultation. The term of the proposed action is through calendar year 2015 when the Southern Nevada District RMP is scheduled to be completed and a biological opinion issued for the plan.

The enclosed PBO is based on information provided by BLM including the programmatic biological assessment; memorandum from BLM to the Service requesting formal consultation dated June 17, 2010; references cited; draft Service guidance for PBOs (Service 2003); discussions and email communication between BLM and the Service; comments on, and responses to draft programmatic biological assessments; interagency section 7 consultation regulations in 50 CFR Part 402; and our files. This PBO replaces the existing PBOs as reinitiated and amended for the Las Vegas Valley (1-5-96-F-023); the district-wide multiple-use PBO (1-5-97-F-251); and the Las Vegas Resource Management Plan PBO (1-5-98-F-053). A complete record of this consultation is on file in the Nevada Fish and Wildlife Office in Las Vegas.

Please contact Michael Burroughs in the Nevada Fish and Wildlife Office in Las Vegas at (702) 515-5230 if you have any questions.

Edward D. Koch (FOR)

Attachment

cc:
Supervisory Biologist - Habitat, Nevada Department of Wildlife, Las Vegas, Nevada
Field Manager, Caliente Field Office, Bureau of Land Management, Caliente, Nevada
District Manager, Ely District Office, Bureau of Land Management, Ely, Nevada
Field Manager, Tonopah Field Office, Bureau of Land Management, Tonopah, Nevada
District Manager, Battle Mountain District Office, Bureau of Land Management, Battle Mountain, Nevada
State Director, Bureau of Land Management, Reno, Nevada

Programmatic Biological Opinion for Bureau of Land Management Activities Adversely Affecting 19 Listed Species and Critical Habitat

FILE NO. 84320-2010-F-0365

Issued to the Bureau of Land Management
Southern Nevada District Office
Las Vegas, Nevada

Prepared by the Nevada Fish and Wildlife Office
January 2, 2013

Table of Contents

Tables:

Figures:

GLOSSARY AND ACRONYMS

ac = acre(s)

ACEC (area of critical environmental concern) - the ACEC program was conceived in the 1976 Federal Lands Policy and Management Act, which established the first conservation ecology mandate for the BLM. The FLPMA mandate directs the BLM to protect important riparian corridors, threatened and endangered species habitats, cultural and archeological resources, and unique scenic landscapes that the agency assesses as in need of special management attention.

Act = Endangered Species Act of 1973, as amended

action area - all areas to be affected directly or indirectly by the Federal action, including interrelated and interdependent actions, and not merely the immediate area involved in the action (50 CFR § 402.02)

adverse effect – there is no definition of adverse effect in the Act; the Service considers adverse effects to the desert tortoise to include actions that result in any form of take (as defined below); reduced reproduction; a tortoise voiding its bladder as a direct or indirect of the action; behavior of any individual tortoise is modified which may negatively affect its breeding, feeding, or sheltering (*e.g.,* causing a tortoise to emerge from its burrow); and habitat is disturbed or degraded to the extent that important habitat features are removed such as shrubs used for shelter, burrows, nests, forage, etc. that may result in harm to any tortoise. Adverse effects to designated critical habitat include effects to any of the essential features of critical habitat that would diminish the value of the habitat for the survival and recovery of the species. Adverse effects vary from species to species. Contact a Service biologist for more information.

AFY (acre-feet per year) - used most often to measure groundwater use; 1 acre-foot = 325,851 gallons or the volume of liquid that would cover an acre 1 foot deep

AML = appropriate management level (wild horse and burro)

ATV = all-terrain vehicle

AUM (animal unit month) - the amount of forage needed to sustain one cow and her calf, one horse, or five sheep or goats for a month

BA = biological assessment

BCCE = Boulder City Conservation Easement

C = Celsius

CHU =critical habitat unit

CFR = Code of Federal Regulations

CFS = cubic feet per second

conference = a process of early interagency cooperation involving informal or formal discussions between a Federal agency and the Service regarding the likely impact of an action on species proposed for listing as threatened or endangered or areas proposed to be designated as critical habitat. If formal consultation occurs, a conference opinion is issued by the Service

conservation area (desert tortoise) - includes desert tortoise habitat within critical habitat, Desert Wildlife Management Areas, Areas of Critical Environmental Concern, Desert National Wildlife Refuge, National Park Service lands, and other areas or easements managed for desert tortoise recovery

critical habitat - area essential to the conservation (recovery) of a listed species, though the area need not actually be occupied by the species at the time it is designated. This is a specific term and designation within the Act. Critical habitat consists of: (1) the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the provisions of section 4 of the Act, on which are found those physical or biological features (constituent elements) (a) essential to the conservation of the species and (b) which may require special management considerations or protection; and (2) specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provisions of section 4 of the Act.

CSI = Coyote Springs Investment

DCP = desert conservation plan

desert tortoise active/inactive periods - Desert tortoises are known to be active aboveground every month of the year under certain conditions. The active period for the desert tortoise is generally defined by the geographic area (elevation, latitude, etc.), temperature, precipitation, breeding season, forage availability, and age class of the tortoise. Desert tortoises are predicted to be least active when ambient temperatures exceed 100 degrees F or below 60 degrees F and during prolonged dry conditions; however, small tortoises have been observed during project monitoring when temperatures were as low as the upper 40s. Within the action area for this consultation, most desert tortoise activity is predicted to occur mid-March through May; during monsoon precipitation events in the summer; and September through October. For this consultation, the BLM and Service consider tortoises active and potentially at greatest risk as a result of project activities during March 16-31, April, May, September, and October.

DWMA (desert wildlife management area) - general areas recommended by the 1994 Recovery Plan within which recovery efforts for the desert tortoise would be concentrated. BLM formalized the general DWMAs as Areas of Critical Environmental Concern

EPA = U.S. Environmental Protection Agency

event (recreation) = a single, structured, organized, consolidated or scheduled meeting or occurrence for recreational use of public land and water resources; may be comprised of several related activities

F = Fahrenheit

Federal action - any action authorized, funded, or carried out in whole or in part by a Federal agency which may involve non-Federal lands

Federal nexus - connection between a Federal and non-Federal action

FCR = field contact representative or compliance inspection contractor

FLPMA = Federal Land Policy and Management Act; governs the way in which the public lands administered by the BLM are managed

FMP = fire management plan

ft = foot/feet

ft² = square foot/feet

GIS = geographic information system

GPS = global positioning system

ha = hectare(s)

harm = any act which actually kills or injures fish or wildlife… [emphasis] such acts may include significant habitat modification or degradation that significantly impairs essential behavioral patterns of fish or wildlife (64 *Federal Register* 60727; also see adverse effects definition above)

harass = intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering

HCP (habitat conservation plan) - under section 10(a)(2)(A) of the Act, a planning document that is a mandatory component of an incidental take permit application

HMA = herd management area

IC = incident command (fire)

incidental take - take (see definition below) that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity.

km = kilometer

km² = square kilometer

listed species – species listed as threatened or endangered under the Act

low-density desert tortoise habitat – for the purposes of this consultation, these areas occur outside Areas A and B and consist of areas characterized as suitable for desert tortoises but not of sufficient quality to support moderate to large tortoise populations. The USGS (2009) modeled desert tortoise habitat and assigned values from 0.0 to 1.0 with 1.0 representing the highest quality habitat (Figure 1). Habitat in the action area with values 0.5 and below are generally considered low-density habitat.

LSTS (large-scale translocation site)- approximately 34 square mi along Interstate 15 south of Jean, Nevada where over 8,000 captive desert tortoises have been released since 1997, most of which were held by the public as pets

m = meter

mi = mile(s)

mi² = square mile(s)

MOA = memorandum of agreement

mph = miles per hour

MSHCP = Multiple Species Habitat Conservation Plan

mm = millimeter

MVWD = Meadow Valley Water District

NAC = Nevada Administrative Code

NCA = national conservation area

NDOT = Nevada Department of Transportation

NDOW = Nevada Department of Wildlife

NRS = Nevada Revised Statute

NWR = National Wildlife Refuge (U.S. Fish and Wildlife Service managed land)

OHV = off-highway vehicle

OSHA = Occupational Safety and Health Administration

PBA = programmatic biological assessment

PBO = programmatic biological opinion

PNC = potential natural community

R&PP Act (Recreation and Public Purposes Act) - established by Congress as a means for state and local governments and non-profit organizations to acquire public lands at no cost or reduced cost for needed local services and recreational activities

recovery - improvement in the status of a listed species to the point at which listing is no longer appropriate under the criteria set out in section 4(a)(1) of the Act

recovery unit - management subsets of the listed species range that are created to establish recovery goals or carrying out management actions

RMP = resource management plan

ROW = right-of-way

Section 7 (of the Act) - describes the responsibilities of Federal agencies in conserving threatened and endangered species. Section 7(a)(1) requires all Federal agencies "in consultation with and with the assistance of the Secretary [to] utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species and threatened species." Section 7(a)(2) requires Federal agencies to "ensure that any action authorized, funded, or carried out by such agency...is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of..." designated critical habitat.

Section 9 (of the Act) - the section of the Act dealing with prohibited acts, including the "take" of any listed species without specific authorization of the Service for species under the jurisdiction of each agency.

Section 10 (of the Act) - the section of the Act dealing with exceptions to the prohibitions of section 9 of the Act. Section 10(a)(1)(A) allows for permits for the taking of threatened or endangered species for scientific purposes or for purposes of enhancement of propagation or survival; section 10(a)(1)(B) allows for permits for incidental taking of threatened or endangered species, typically issued for HCPs.

Service = U.S. Fish and Wildlife Service

SEZ = solar energy zone

SNDO = BLM's Southern Nevada District Office

SNWA = Southern Nevada Water Authority

SR = state route (highway)

SRP (special recreation permit) - an authorization that allows specified recreational uses of the public lands and related waters. Special recreation permits are issued as a means to manage visitor use and to protect natural and cultural resources and as a mechanism to authorize commercial, competitive, and vending use; organized group activities and events; and individual or group use of special areas.

take (Act definition) - to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. There are no take provisions for plants.

UDWR = Utah Division of Wildlife Resources

USGS = U.S. Geological Survey

UTV= utility task vehicle

WHB Act = Wild Horses and Burros Act of 1971

Section 1: Consultation History

1.1 Prior Programmatic Desert Tortoise Consultations

This programmatic biological opinion (PBO) is a comprehensive document that replaces the three previous PBOs issued to the Bureau of Land Management (BLM) in southern Nevada that involve the action area, as described below. Refer to the Consultation History of these PBOs for more information on the consultation history for BLM actions in southern Nevada. These PBOs are discussed in detail in the Environmental Baseline section of this PBO.

1.1.1 Las Vegas Valley PBO (File No. 1-5-96-F-023R3)

On December 20, 2004, the Fish and Wildlife Service (Service) issued a PBO for potential adverse effects on the desert tortoise and conference opinion on the Las Vegas buckwheat (*Eriogonum corymbosum* var. *nilesii*), a plant taxon proposed by the State of Nevada for critically endangered status in accordance with Nevada Revised Statutes (NRS) 527.270-300. While the Las Vegas buckwheat was not proposed for listing as endangered or threatened under the Endangered Species Act of 1973, as amended (Act), BLM and the Service agreed conferencing was appropriate to identify pertinent conservation measures that would reduce the level of effects to the species that are likely to occur from implementation of the proposed action and subsequent activities.

1.1.2 PBO for Multiple Use Activities within the Las Vegas Field Office (File No. 1-5-97-F-251)

On November 21, 1997, the Service issued a PBO to BLM for implementation of multiple-use actions within their Las Vegas District, excluding desert tortoise critical habitat, proposed desert tortoise Areas of Critical Environmental Concern (ACECs), and the area covered by the Las Vegas Valley PBO. BLM may authorize activities within the programmatic area that would result in loss of tortoises or their habitat through surface disturbance, land disposal, and fencing, for a period of 5 years. The total area covered by this PBO is approximately 2,636,600 acres (ac) which includes approximately 263,900 ac of BLM-withdrawn lands in Clark County.

1.1.3 PBO for the Las Vegas Resource Management Plan (RMP; File No. 1-5-98-F-053)

On June 18, 1998, the Service issued a PBO to BLM for implementation of the Las Vegas RMP. The project area for this consultation covers all lands managed by BLM's Las Vegas Field Office, including desert tortoise critical habitat, desert tortoise ACECs, and BLM-withdrawn lands.

On March 20, 2009, the Service issued an amendment to the PBO for the Las Vegas RMP. The amendment modified the Terms and Conditions, and method of inclusion of future BLM actions in the category of *Management of Speed and Non-speed Off-Highway Vehicle (OHV) Events* in the PBO. The Service determined that certain speed and non-speed OHV events resulted in effects outside the analysis for the actions in the PBO; therefore, separate section 7 consultation is required for speed OHV events as they are no longer covered under the PBO.

1.2 Chronology of Events Leading to Initiation of Consultation

- August 6, 2002: The first meeting of the Level 1 Team was held in Las Vegas to discuss the details and scope of this programmatic consultation.
- September 5, 2002: The Level 1 Team met to discuss the timeline, list of covered species, and effects threshold limits for the consultation.
- October 28, 2004, BLM and the Service met to discuss extending the term of the PBO for multiple use activities within the Las Vegas Field Office.
- February 3, 2006: The Level 1 Team met with the BLM contractor for preparing the BA for this consultation, to discuss the general approach, format, and potential covered activities for the programmatic consultation were discussed.
- On June 18, 2008, BLM provided the first draft programmatic biological assessment (PBA) to the Service for review and comments. During the next 2 years, BLM and the Service met periodically to discuss the proposed action and exchange comments on drafts of the PBA.
- On June 17, 2010, BLM submitted a final PBA to the Service with their request for formal consultation. BLM determined that implementation of the proposed action *may affect, and is likely to adversely affect* 19 threatened or endangered species, 13 of which have designated critical habitat within the action area for this consultation. The Service received this request and PBA on June 17, 2010, and determined that BLM provided information sufficient to initiate formal consultation, at which time consultation was initiated. The final determinations of program-specific effects are provided in Table 1.
- Following initiation of consultation, the Service and BLM met periodically to discuss issues associated with the consultation including workload issues and limitations that would determine the procedures that would append future BLM actions to the PBO in accordance with the 2003 draft guidance. Other events occurred during this timeframe including a 5-year review and revised recovery plan for the desert tortoise, and a substantial BLM and Service workload for solar energy projects.
- On September 24-27, 2012, and prior, BLM and Service biologists met to discuss the proposed action and potential effects to listed species. BLM and the Service agree to modifications to Table 2.
- A draft of this PBO was provided to the BLM for review on October 4, 2012. The Service received all BLM comments on the draft by October 18, 2012.

Table 1. Species/critical habitat that may be adversely affected by the proposed action

	Common Name	**Scientific Name**	**Federal Status**	**Critical Habitat**
1.	Desert tortoise	*Gopherus agassizii*	T	Clark and Nye Counties
2.	Southwestern willow flycatcher	*Empidonax trailii extimus*	E	Clark County
3.	Yuma clapper rail	*Rallus longirostris yumanensis*	E	No critical habitat designated
4.	Virgin River chub	*Gila seminuda*	E	Clark County
5.	Woundfin	*Plagopterus argentissimus*	E	Clark County
6.	Spring-loving centaury	*Zeltnera (=Centaurium) namophilum*	T	Nye County
7.	Ash Meadows sunray	*Enceliopsis nudicaulis var. corrugata*	T	Nye County
8.	Ash Meadows milkvetch	*Astragalus phoenix*	T	Nye County
9.	Ash Meadows ivesia	*Ivesia kingii* var. *eremica*	T	Nye County
10.	Ash Meadows gumplant	*Grindelia fraxino-pratensis*	T	Nye County
11.	Amargosa niterwort	*Nitrophila mohavensis*	E	No critical habitat within planning area
12.	Ash Meadows naucorid	*Ambrysus aamargosus*	T	Nye County
13.	Ash Meadows Amargosa pupfish	*Cyprinodon nevadensis mionectes*	E	Nye County
14.	Ash Meadows speckled dace	*Rhinichthys osculus nevadensis*	E	Nye County
15.	Warm Springs pupfish	*Cyprinodon nevadensis pectoralis*	E	No critical habitat in planning area
	Indirect adverse effects only because species are not known to occur on BLM administered land			
16.	Moapa dace	*Moapa coriacea*	E	No critical habitat designated

Section 2: Programmatic Consultations

This PBO was prepared in accordance with the July 16, 2003, draft guidance for programmatic-level consultations (Service 2003). The term "programmatic consultation" has become a generic term encompassing a broad category of section 7 consultations that evaluate the potential for Federal agency programs to affect listed and proposed species, and designated and proposed critical habitat. Such programs typically guide implementation of future agency actions by establishing standards, guidelines, or governing criteria to which future actions must adhere. At times the term *programmatic consultation* has been used to refer to consultations on a large group of similar actions (*e.g.*, a National Forest's timber harvest program for a particular year) as well as to refer to consultations covering different types of actions proposed within a large geographic area, such as a watershed. Such consultations can provide the benefit of streamlining the consultation process while leading to a more landscape-based approach to consultations that can minimize the potential "piecemeal" effects that can occur when evaluating individual projects out of the context of the complete agency program.

This PBO analyzes the potential effects of implementing BLM actions, or actions with a BLM nexus, followed by the appropriate project-specific procedures or documentation addressing the effects of individual projects. This PBO contains all of the elements found in a standard biological opinion. The format of this PBO is based on the *appended programmatic consultation approach* in our 2003 draft guidance.

If a proposed action is anticipated to result in adverse effects to the desert tortoise and the effects exceed the acreage threshold (*i.e.*, 5 ac critical habitat or 20 ac non-critical habitat affected), BLM and the Service will produce project-specific documentation that is physically appended to this PBO before the action occurs. The incidental take for proposed actions that fall below the acreage threshold for desert tortoise is exempted in this PBO. The PBO, together with the appended documentation, fulfills the consultation requirements for implementation of both program-level and project-level actions.

If the proposed action is below the acreage threshold, BLM will submit information on the project and its effects to desert tortoise in quarterly reports, due within 15 calendar days following each quarter (*e.g.*, report due April 15 for quarter, January-March). The Service will review the information and effects analysis provided for each proposed project to be appended and this project-specific review is documented in accordance with the guidance provided below. In this PBO, the Service determined the overall anticipated incidental take of desert tortoise for all proposed BLM activities in the action area by program, through calendar year 2015. As each action is submitted by BLM to the Service to be appended to this PBO, the Service will determine the anticipated incidental take for each action, at the project level, as a subset of the incidental take anticipated in the PBO.

On a limited, project-by-project basis, additional effects may occur in project action areas that extend beyond the project footprint, but are subject to a Federal nexus as defined in 50 CFR 402.02 (activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States) and section 7 consultation. Analysis of these effects will occur at the project consultation level.

Reports prepared by BLM and submitted to the Service for review assure that the effects analysis in the PBO are accurate including a comprehensive review of how the PBO is working, and whether its implementing procedures are in compliance. During this review, the environmental baseline should be reviewed and updated as needed to account for unanticipated effects or the lack of anticipated effects. BLM shall be responsible for accurately reporting any incidental take of listed species to the Service that occurs in association with actions covered under this PBO. During this process it may be determined that the program-level biological opinion is functioning as anticipated and, therefore, activities may continue to be appended to the PBO.

2.1 Project-Level Procedures

Federal actions that may adversely affect less than 20 ac of desert tortoise habitat or 5 ac of desert tortoise critical habitat may proceed without further review by the Service beyond the programmatic level, provided the BLM requires appropriate protective measures in accordance with the measures and terms and conditions of this PBO; the BLM tracks this activity and includes it in the quarterly report provided to the Service within the required timeframe; and the BLM has discretion over the action and provides sufficient oversight to ensure compliance with this PBO. Federal actions that exceed the acreage threshold will follow the appended procedures described below. The Service and BLM may revisit and modify the thresholds during the term of this PBO if information becomes available that project effects to the desert tortoise differ from our analysis. No threshold option take exemption is provided at the programmatic consultation level for listed species other than the desert tortoise.

Future BLM actions are expected to fall within the scope of one of the eight programs; however, some projects may not match the proposed action for any of these programs but the effects to listed species are similar. In such cases the BLM proposes the appropriate program to include the action to be covered under the PBO.

BLM and the Service may, through a Federal nexus to a BLM action, extend SNDO discretion to non-Federal lands and cover future actions under this PBO if all involved parties agree in writing that BLM will exercise total discretion and oversight over the action throughout the action area during activities that may result in adverse effects to listed species. BLM must have sufficient involvement or oversight over the project to ensure compliance with this PBO and all required measures in the appended consultation document. BLM may delegate specific responsibilities to other agencies but remains the ultimate responsible entity for compliance with section 7 of the Act. BLM and the Service will agree on the extent of BLM's responsibility for compliance during the project-level consultation.

This consultation covers the activities of the BLM, and other Federal agencies and non-Federal entities if: 1) a nexus exists to a SNDO action, 2) all discretionary Federal agencies that are involved in the project or action agree that the SNDO is the lead office for the consultation, and 3) the SNDO has discretion over the action to enforce terms and conditions of any incidental take exemption for the action. The scope of the proposed action is established by acreage thresholds for each program and sub-program as identified in Table 3.

If a project is proposed on non-Federal lands that falls under purview of a section 10 incidental take permit (*e.g.,* the MSHCP) involving a nexus to a BLM action with adverse effects to the desert tortoise, such projects may be covered or appended to this PBO. The project-level consultation would evaluate only the effects of the Federal component as effects to the non-Federal portion were analyzed prior to issuance of the section 10 permit. For example, if a project involves effects to BLM land below 20 ac of desert tortoise habitat or 5 ac of desert tortoise critical habitat, the project may proceed as stated above; if the BLM acreage threshold is exceeded, the project would be appended.

The following general steps should be followed for future actions to be appended to this PBO:

Step 1. BLM will submit a request by hard copy or email to the Assistant Field Supervisor and Deputy Assistant Field Supervisor, Southern Nevada Office of the Service's Nevada Fish and Wildlife Office, to append the action to the PBO. Part A of the form provided in Appendix A should be completed for each action to be appended to the PBO.

Step 2. The Service will review the request within 5 days and determine if the information is sufficient. If the information is insufficient, the Service will promptly notify BLM. Incomplete information will likely delay the Service's response. If the information is sufficient, the Service will prepare a response Part B of the form in Appendix A appending the action to the PBO. Prompt processing of appended actions will be dependent upon complete information on the project including all minimization measures and status of the desert tortoise in the action area including survey results.

Step 3. The Service will respond to BLM by email and a hard copy will be filed in the Southern Nevada Office of the Nevada Fish and Wildlife Service. The regulatory timeframe to complete formal consultation and deliver the biological opinion to the Federal agency is 135 days. However, the estimated time required for the project-level consultation under programmatic consultation procedures is based on the scope of the action and the potential effects to listed species and their critical habitat. For example, a project that would disturb 40 ac and relatively few tortoises may require 30 days to complete while a 100-ac project with a complex effects analysis may require 90 days.

Step 4. Once the Service response has been received, BLM may proceed with the proposed action.

Section 3: Description of Proposed Action by Program

The proposed action for this consultation is implementation of BLM projects and activities (Federal actions) under eight separate programs described below beginning with the date this PBO is issued to BLM until replaced by the PBO to be issued for the revised RMP for the SNDO. BLM estimates the RMP revision will be completed and PBO issued through calendar year 2015. BLM and the Service expect all future SNDO activities to fall within one of the eight programs, except renewable energy projects on BLM lands which are beyond the scope of this PBO.

3.1 Definition of the Action Area

The action area is defined as all areas to be affected directly or indirectly by the Federal action, including interrelated and interdependent actions, and not merely the immediate area involved in the action (50 CFR § 402.02). Subsequent analyses of the environmental baseline, effects of the action, cumulative effects, and levels of incidental take are based upon the action area as determined by the Service. The action area includes habitat for 16 species and designated critical habitat for 12 species (Table 1).

The action area for this programmatic consultation is broadly defined as, all BLM land administered by the SNDO except Red Rock Canyon National Conservation Area (NCA) and Sloan Canyon NCA (Figure 2), and other lands which have a nexus to an SNDO action as described above (Section 2.1). Projects may be covered under this PBO only if: 1) the SNDO is designated the lead Federal agency for the consultation, 2) BLM retains discretion sufficient to ensure compliance with all applicable measures, or terms and conditions required for the proposed action, 3) the action is appended, or exempted from appending procedures, as specified in this PBO.

3.2 Programs

BLM proposes to authorize, fund, or carry out various actions and projects that may adversely affect threatened and endangered species and their designated critical habitat (Table 2). These actions will be within the scope of the Las Vegas RMP. This consultation covers the activities of BLM, and other Federal agencies and non-Federal entities if: 1) a nexus exists to an SNDO action, 2) all discretionary Federal agencies that are involved in the project or action agree that the SNDO is the lead office for the consultation, and 3) the SNDO has discretion over the action to enforce terms and conditions of any incidental take exemption for the action. The scope of the proposed action is established by acreage thresholds for each program and sub-program as identified in Table 3.

The proposed action consists of eight categories or *programs* of activities with sub-categories:

1. **Lands and Realty Actions**
   Land disposals
   Recreation and Public Purposes Act (R&PP) Leases
   Airport leases
   Section 302 Federal Land Policy and Management Act (FLPMA) actions

2. **Rights-of-Way (ROW)**
   Pre-project geotechnical explorations
   Linear ROWs
   Site-type ROWs

3. **Mining**
   Locatable minerals
   Leasable minerals
   Saleable minerals

4. **Recreation Management**
   Special Recreation Permits – speed events
   Special Recreation Permits – non-speed and organized events
   Trails
   Casual recreation- unpermitted

5. **Livestock Grazing Management**
   Term permits

6. **Fire Management**
   Fire suppression
   Fire breaks and fuels treatments
   Habitat rehabilitation and revegetation
   Emergency stabilization and rehabilitation
   Prescription fire and fuel treatment monitoring

7. **Vegetation Management**
   Restoration
   Noxious weed treatment

8. **Resource Management**
   Fish and wildlife projects (guzzlers, catchments, fish barriers)
   Resource protection (fencing)
   Abandoned mine closures (vehicles and equipment to sites)
   Public information and education projects (kiosks with minor disturbance)
   Cultural and paleontological resources
   Wild horse and burro management

Table 2. Potential adverse effects determination by program.

Species/Critical Habitat (CH)	**Lands and Realty**	**Rights-of-way**	**Mining**	**Recreation**	**Livestock Grazing**	**Fire Management**	**Vegetation Management**	**Resource Management**
1. Desert tortoise	X	X	X	X	X	X	X	X
1a. Desert tortoise CH	X	X	X	X	-	X	X	X
2. Southwestern willow flycatcher	-	X	-	X	-	X	-	-
2a. Southwestern willow flycatcher CH	-	X	-	-	-	X	X	-
3. Yuma clapper rail	-	X	-	-	-	X	X	-
4. Virgin River chub	-	X	-	-	-	X	-	-
4a. Virgin River chub CH	-	X	-	-	-	X	-	-
5. Woundfin	-	X	-	-	-	X	-	-
5a. Woundfin CH	-	X	-	-	-	X	-	-
6. Moapa dace	-	X	X	-	-	X	-	-
Ash Meadows Species								
7. Spring-loving centaury	-	X	X	-	-	X	X	X
7a. Spring-loving centaury CH	-	X	X	-	-	X	X	X
8. Ash Meadows sunray	-	-	X	-	-	X	-	X
8a. Ash Meadows sunray CH	-	-	X	-	-	X	X	X
9. Ash Meadows milkvetch	-	-	X	-	-	X	-	X
9a. Ash Meadows milkvetch CH	-	-	X	-	-	X	X	X
10. Ash Meadows ivesia	-	-	X	-	-	X	-	X
10a. Ash Meadows ivesia CH	-	-	X	-	-	X	X	X
11. Ash Meadows gumplant	-	X	X	-	-	X	X	X
11a. Ash Meadows gumplant CH	-	X	X	-	-	X	X	X
12. Amargosa niterwort	-	X	X	-	-	X	-	X
13. Ash Meadows naucorid	-	X	-	-	-	X	-	-
13a Ash Meadows naucorid CH	-	X	-	-	-	X	-	-
14. Ash Meadows Amargosa pupfish	-	X	-	-	-	X	-	-
14a. Ash Meadows Amargosa pupfish CH	-	X	-	-	-	X	-	-
15. Ash Meadows speckled dace	-	X	-	-	-	X	-	-
15a. Ash Meadows speckled dace CH	-	X	-	-	-	X	-	-
16. Warm Springs pupfish	-	X	-	-	-	X	-	-

X = adverse effects anticipated

Table 3. Summary of adverse effect thresholds for desert tortoise habitat.

PROGRAM	Maximum No. Acres Affected by Program	
	CRITICAL	**NON-CRITICAL**
1. Lands and Realty		
• Land disposal	0	3,000
• R&PP leases	0	1,000
• Airport leases	0	650
• Section 302 FLPMA actions	0	0
2. Rights-of-way		
• Pre-project geotechnical	5	100
• Linear ROWs[a]	1,000	4,000
• Site-type ROWs	25	750
3. Mining		
• Locatable	100	500
• Leasable	25	200
• Saleable	100	500
4. Recreation Management		
• Speed events (50 ac disturbance along existing or re-aligned courses, 40 ac course re-alignment, 20 ac new pits, 20 ac new spectator areas)	0	130
• Non-speed events	0	5
• Casual, non-permitted recreation	0	0
• Trails	5	15
5. Livestock Grazing[b]	0	unknown[b]
6. Fire Management		
• Suppression and rehabilitation[c]	unknown[c]	unknown[c]
• Fuel breaks	800	200
7. Vegetation Management	5	20
8. Resource Management	5	20

[a] Major linear ROWs will be situated in corridors within the planning area; other ROWs may occur outside corridors. ACECs will be considered avoidance areas for rights-of-way and other land use authorizations in the future, but additional ROWs could be authorized subject to environmental impact analysis and section 7 consultation for specific applications. An unquantified portion of the designated utility corridors already have been disturbed or destroyed.

[b] Currently, up to 200,000 ac of non-critical desert tortoise habitat occur in grazing allotments that may be grazed (Table 2-1 in PBA). No new habitat disturbance is anticipated as a result of proposed grazing; however, continuation of grazing is anticipated to result in some level of habitat disturbance and impact which will be determined at the allotment-level consultation for each allotment.

[c] The number of acres of fire suppression and rehabilitation activities are unknown. The actual acreage is dependent upon too many environmental factors to predict with accuracy.

3.2.1 **Lands and Realty Program**

Land and realty actions may adversely affect only the desert tortoise and indirectly affect desert tortoise critical habitat.

3.2.1.1 Land Disposals

BLM proposes to dispose of up to 3,000 ac of land in designated disposal areas as outlined in the RMP (as amended legislatively) by the end of calendar year 2015. As of 2008, approximately 26,000 ac of public land are available for disposal within the boundary designated by Southern Nevada Public Lands Management Act and expanded by the Clark County Act. The proposed action for land disposal is based on the number of acres disposed from 2007 to 2012 and the projected demand by the local governments to include parcels in the nomination process. No critical habitat for any listed species will be disposed. Following disposal, the incidental take and other adverse effects to desert tortoises would fall under purview of section 10(a)(1)(B) of the Act unless BLM retains discretion over the action sufficient to ensure that all adverse effects to the desert tortoise have been minimized in compliance with the measures in this PBO and appended documents. Once BLM's discretion ends, additional effects to the desert tortoise would occur under section 7 with another Federal nexus or section 10(a)(1)(B) of the Act.

The lands may be transferred to local governments or offered for sale at fair market value in accordance with the procedures specified by law. Lands may become available for residential, commercial, and light industrial development. Activities associated with the development of the land may involve: earthmoving and other construction activities; modification of native desert flora to residential and commercial landscapes; increased groundwater pumping to meet the increased water demand; alteration of the topography of the land; alteration of natural drainage patterns; an increase in storm water flows, stream sedimentation, and construction of flood-control structures; an increase in urban runoff that contains petroleum products and other contaminants; and indirect effects associated with an increase in human population densities in the region.

3.2.1.2 Leases

Recreation and Public Purposes Act Leases. A Federal action occurs when BLM proposes an action in response to an application for an R&PP lease, lease renewal, or any lease amendment. BLM proposes to issue R&PP leases under the term of this PBO for up to 1,000 ac. No leases will be proposed that involve critical habitat for listed species. R&PP Act leases may be issued for lands within designated disposal areas for appropriate facilities such as schools, parks, police stations, and churches. Generally, facilities are constructed under an R&PP lease and the land may be patented to the entity, transferring the lands out of Federal ownership under the authority of the R&PP Act. The R&PP lease contains a provision that ensures that use of the lands remain consistent with the intent of the R&PP Act. Lands leased under the authority of the R&PP Act remain under the jurisdiction of BLM until a patent is issued during which time BLM has jurisdiction over ensuring compliance with the terms and conditions of the lease. Once patented, BLM retains jurisdiction only for ensuring compliance with the patent provision mentioned.

Public Airport Leases. During the term of this PBO, BLM may issue one lease for up to 650 ac for a public airport which may adversely affect the desert tortoise. Native vegetation would be removed, the soil compacted, and buildings, runways and lighting guidance systems constructed. Construction of new airports often requires construction of support facilities, utilities, road rights-of-way, and flood-control structures in addition to the airport lease area. Airports may result in increased vehicle traffic and economic development on adjacent parcels. Land may be sold through direct sale to the local government following construction of the airport. BLM anticipates that all land within the lease will be lost as habitat unless the airport lease includes measures to preserve open space.

The Federal Aviation Administration may be the lead agency for consultation on future airport projects; however, if BLM proposes a Federal action such as a lease, the Service expects the action will be appended to this PBO or the acreage of disturbance or otherwise tracked under this PBO.

3.2.1.3 Section 302 FLPMA Actions

3.2.1.3.1 *Film Permits.*

Film permits are issued for still photography and video where mechanized equipment and motorized vehicles are allowed. Film permits within the SNDO are most often issued for the Red Rock Canyon NCA, Jean Dry Lakebed, Big Dune in Nye County, Logandale Trails, and the Bittersprings Backcountry Byway. Permitted filming actions range in intensity from single photographers who take commercial photographs of the landscape to production film crews that shoot movies, television shows, commercials, or music videos. Actions may involve concentration of large numbers of vehicles and individuals, construction of temporary sets including unnatural features or buildings, use of helicopters, and placement and operation of cameras off existing roads. Most filming activities occur outside listed species habitat, on dry lakebeds, existing roads and on unvegetated portions of sand dunes and do not involve new disturbance of habitat for listed species.

3.2.1.3.2 *Other Land Use Authorizations.*

Land use authorizations may be issued for research projects, field trips, class use, apiary sites, etc. The authorization process involves analysis of potential impacts to the environment that could result from the proposed action. Authorizations are done on a case-by-case basis when such uses do not fall under other land use categories and do not involve new disturbance of habitat for listed species.

3.2.2 Rights-of-way Program

Rights-of-way issued by BLM would result in the most effects to listed species. ROWs may adversely affect all listed species in the action area except the Ash Meadows sunray, Ash Meadows milkvetch, and Ash Meadows ivesia. BLM issues ROWs for facilities over, on, under, or through public lands for construction, operation, maintenance, or termination of a project. Public lands are available throughout the planning area for ROWs. BLM designates ROW corridors to facilitate long distance transmission of utilities and resources, and transportation. ROWs are not restricted to designated corridors, though their use is highly encouraged. The planning area is subject to ROWs with the exception of defined exclusion areas. Exclusion and avoidance areas are areas where special environmental and/or management consideration exists. ROWs will not be authorized within exclusion zones, but may be granted within avoidance areas subject to stringent terms and conditions. ROW authorizations are processed on a case-by-case basis as proposals for use are received.

BLM authorizes ROWs on BLM lands for a variety of uses including but not limited to roads, electrical power plants and substations with associated transmission and distribution lines, telephone and fiber-optic lines, sewer lines, water lines, natural gas and petroleum pipelines, communication sites, and flood-control structures. Material site ROWs are granted to the Federal Highway Administration, the Nevada Department of Transportation (NDOT), and local municipalities. These ROWs provide sand and gravel for road maintenance and construction.

Activities associated with the installation, maintenance or modification of ROWs include use of heavy equipment for clearing of vegetation, trenching, blading, and grading areas for installation of facilities, as well as improvements and maintenance to access roads.

3.2.2.1 Pre-Activity Geotechnical Excavations and Sampling

Excavations and sampling of soils and subsurface materials may occur prior to ROW construction or development. BLM estimates that up to 5 ac of desert tortoise critical habitat and 100 ac of non-critical tortoise habitat may be disturbed as a result of these proposed excavation and sampling activities. Activities are generally conducted to examine soils and substrata for engineering analyses prior to construction and to determine where underground aquifers can be tapped for wells. These activities generally follow BLM authorization of the project; however, in some cases the proponent needs more information about the project area in order to submit an application. Test holes are usually excavated using a track-mounted excavator or backhoe and are generally, but not always, 2 feet (ft) wide, 20 ft long and 20 ft deep. After the material is sampled, the test hole is immediately backfilled and recontoured to the original grade, using either the excavator or a small bulldozer. A drill rig or backhoe may also be used for the sampling. Access requires driving through vegetation or temporary road construction.

3.2.2.2 Linear ROWs

BLM grants ROWs for underground and aboveground linear ROWs. BLM also authorizes maintenance of lines, structures, facilities, etc. on ROWs including those issued prior to listing the desert tortoise. Underground ROWs are issued for the construction or expansion of a buried pipeline, sewer, power, or fiber-optic cable. Activities associated with this action include the use of heavy equipment for clearing vegetation, grading, digging trenches, road construction; construction, and blasting of the underground facility; construction of aboveground facilities; and worker vehicle travel and access. Up to 1,000 ac of desert tortoise critical habitat and 4,000 ac of non-critical tortoise habitat may be disturbed by proposed linear ROW activities.

All pipelines would be buried in accordance with Federal standards for depth from surface. The depth and width of trench is determined also by the size of the pipe or conduit being installed and the amount of room personnel need for construction of the line. For example, for natural gas lines, the minimum ditch width would be 56 inches (in), ditch depth would be sufficient to allow a minimum cover of 48 in over the pipe under normal conditions, coverage across dry washes will be a minimum depth of 60 in, and 54 in under roads. Where rock or rocky formations are crossed, a minimum depth of 18 in will be provided. In areas where the pipeline crosses over other underground facilities, a minimum clearance of 12 in will be provided.

Short-term ROWs are often required for linear projects and are generally up to 100 ft in width. A 50-ft wide permanent ROW is typically required for gas pipelines. Total disturbed acreage will vary with size of project. Staging areas are typically required for each project, though the number of staging areas is determined by the size or length of the project. Construction force will vary according to size of project.

Most fiber-optic cables would be buried 36 to 40 in deep in a plowable conduit. Construction equipment may include a plow train, backhoes, trenchers, rock saws, air compressors, and dump trucks. Concrete manholes/vaults would be placed within the ROW to facilitate road crossings, splicing of cable, and future cable restoration. After conduit is buried, the original ground level would be restored as much as practical. Buried cable signs would be placed at 500-ft intervals. Existing transportation and utility corridors would be followed wherever possible. Construction of fiber-optic lines typically requires a 25-ft ROW. Long-term disturbance would typically involve a 15-ft wide path along the proposed ROW and short-term disturbance would occur along the remaining 10-ft width of the ROW.

Maintenance activities would occur on granted ROWs. ROWs would be routinely patrolled and inspected by pedestrian inspectors or by vehicles using existing access roads. If damaged, the line would be repaired or sections replaced. The proposed maintenance and repair activities have been grouped into the following five general categories:

Class I (Routine): Maintenance activities that do not result in new surface disturbance

Class II (Major): Maintenance activities that result in surface disturbance during seasons desert tortoises are inactive

Class III (Major): Maintenance activities that result in surface disturbance during seasons desert tortoises are active

Class IV (Major): Maintenance activities that may extend outside the disturbed pipeline ROW into undisturbed soils and vegetation

Class V: Emergency repairs

BLM also issues ROWs for building substations and linear transmission or distribution including: buildings, combustion turbine generators, tanks for storage of backup fuel oil, aboveground water storage tanks, administrative and warehouse buildings, evaporative ponds, transformers, switchyards, wells, water pipelines, buried and overhead electric power lines, well pumps, roads, new natural gas pipelines, chain-link security fences, and septic systems. Gas pipelines transport natural gas from the gas company pipeline to the turbines. The evaporative ponds are lined and collect blowdown from the turbine intake coolers. During construction the average daily number of truck and worker vehicle trips range from 10 to 50 round trips. Construction activities include drilling, trenching, paving, and material/equipment staging. Smaller ROWs are usually necessary for the long-term operation and maintenance of facilities. A limited number of vehicles would be used for operation and maintenance throughout the year.

BLM provides road ROWs to allow access to sites to accommodate various land uses including development, access to private property, infrastructure for future development, and inter- and intra-state transportation. Grants may be issued to authorize use of existing public roads, and for access to and maintenance of projects such as mining claims or other facilities.

Project proponents may maintain existing and future paved and unpaved roads. Roadwork may require the use of heavy machinery and water trucks. The activities associated with construction, use, maintenance, and modification of roads include: Motorized and mechanized vehicular traffic; grading; grubbing of vegetation; grooming and grading of dirt roads; installation of gravel or pavement; installation of water bars, culverts or other drainage features; installation of protective barriers, posts or other barricades to limit proliferation of disturbance; installation and maintenance of signs, trailhead markers, cattle and tortoise guards, retaining walls, fences, and gates; and development of turn-around points, vehicle pull-out sites; use of water trucks to apply water or palliatives for dust control; and staging/fueling areas. Palliatives may be used as an alternative to water only if approved by BLM and the Service. Most maintenance actions will be limited to existing disturbed areas.

Road widths range from a single lane approximately 8-ft-wide to 200-ft-wide highways. They may be paved or unpaved. The length of time involved in construction of a proposed road will vary depending upon the road length, width, and the complexity of the engineering. Temporary work areas may be required.

3.2.2.3 Site-Type ROWs

3.2.2.3.1 *Communication Sites*

Operation, maintenance, and modifications of existing communication sites and construction of new communications sites may occur within the action area. Sites typically occur on mountain tops and along highways. Communication sites generally include one or more towers bearing antennae and dishes; block houses or sheds containing electronic equipment; chain-link fencing to keep the public from accessing the facility; generators with fuel storage tanks or power lines providing power to the facility; and an access road. Multiple companies and multiple types of transmission may occur at the same site. Communications sites generally measure 100 ft by 100 ft with multi-use sites measuring 1 to 2 ac in size. Applications for communication sites may be received with towers exceeding 1,000 ft in height. Towers of that height require anchor points for guy wires up to 0.25 mile (mi) from the base of the tower, increasing the area required for the ROW and additional temporary habitat disturbance during construction from vehicles driving and crushing vegetation to access the anchor points. Habitat disturbance may also result from burying grounding wires.

Ground-disturbance activities related to the construction and maintenance of communication sites include blading, bulldozing, driving cross-country, constructing buildings, erecting fences, drilling anchor points, and constructing access roads. Clearing of vegetation and maintaining some areas clear after construction would also be needed.

3.2.2.3.2 *Flood-Control Structures*

Flood-control activities reduce impacts from flash floods and strengthen dikes around facilities. Flood-control systems include dikes, levees, channels, pipes, boxes, bridges, detention basins, and storm drains. Most flood-control projects occur on BLM lands in and around population centers such as the outskirts of the Las Vegas Valley, the east side of Pahrump, and the disposal boundaries of the towns and rural communities in Clark and southern Nye counties. Construction activities associated with flood-control include the following: clearing and grubbing of vegetation; grading; cut and fill of washes; removal of excess soil to a stockpile location or disposed of through a mineral material sale; salvage of vegetation such as cactus and yucca; stockpile of topsoil; construction of the facility; and revegetation of disturbed areas and spreading out topsoil as required in the reclamation plan.

Operation and maintenance associated with flood-control structures include: inspections at least annually and after significant rain events; removal of vegetation and soil from basins, channels, and washes; disposal of sediment; repairs may be similar to construction activities discussed above; and installation of erosion control measures.

3.2.2.3.3 *Wells*

BLM issues ROWs for water production and monitoring wells and access to these sites. Activities include exploration, drilling, and operation, and maintenance. During exploration, soil sampling, seismic testing, and test drilling may occur. Exploration may involve cross-country driving, bulldozing of a drill pad or soil test holes, and drilling holes with drill rigs. Drilling may involve construction of access roads and a drill pad; drilling holes with truck mounted or tower mounted augers; storing and installing pipes and casing; installing a well head, pump house, and human exclusion fence; and conveyance structures like belowground water lines or canals. Water production well ROWs are often associated with linear pipelines.

3.2.3 **Mining Program**

BLM mining actions may adversely affect the desert tortoise and its critical habitat, the Moapa dace, and all Ash Meadows plants. BLM mining authorizations usually involve permits, leases, or contracts. BLM may authorize mining actions under three mineral programs – locatable, leasable, or saleable minerals. The programs are based on the type of commodity that is sought and each program has its own laws and regulations which will be implemented.

3.2.3.1 Locatable Minerals

All “valuable mineral deposits” are locatable under the General Mining Law of 1872 (30 U.S. Code 22-54), except those listed in the leasable and saleable categories. Locatable minerals generally include metals and most industrial minerals such as gypsum, cement grade limestone, carbonates, silicates, and “uncommon” varieties of sand, stone, cinders, pumice, clay, etc.

Locatable minerals are generally found and developed in mountains or pediments that have shallow or outcropping rock exposures. All locatable mining activity (except casual use) takes place within the polygons shown on Figure 2. Mineral actions generally consist of exploration, mining, processing, and reclamation. Activities include blading; road construction; trenching; pit excavation; drilling, crushing and screening of rock materials; blasting hardrock; chemical and non-chemical processing of ore including washing of materials to concentrate minerals; and waste storage of mine and mill rock products. If gold is being mined, the ore piles may be sprayed with chemicals to leach out the gold. Reclamation actions attempt to restore surface disturbances and vegetation to its former state and neutralize any process activities that have created human and wildlife health and safety issues.

All mine operations permitted under the locatable minerals program are analyzed on a case-by-case basis. Operators are subject to general and performance standards that include technology, mitigating measures specified by BLM, mine wastes, erosion control, air quality, water quality, solid wastes, wildlife and plant habitat, cultural and paleontological resources, acid-forming, toxic, or other deleterious materials, leaching operations and impoundments, and maintenance and public safety. Operators are required to submit plans to BLM that describe the entire operation including disturbance area, the nature and location of proposed structures and facilities, operating plans for mining areas, site access, water management plans, quality assurance plans, spill contingency plans, reclamation plans, and monitoring plans. The plans must demonstrate that the proposed operation would not result in unnecessary or undue degradation to public lands.

Access routes. Access routes shall be planned for only the minimum width needed for operations and shall follow natural contours, where practicable to minimize cut and fill. The authorized officer may require the operator to use existing roads to minimize the number of access routes, and, if practicable, to construct access roads within a designated transportation or utility corridor. When commercial hauling is involved and the use of an existing road is required, the authorized officer may require the operator to make appropriate arrangements for use and maintenance.

Mining wastes. All tailings, dumps, deleterious materials or substances, and other waste produced by the operations shall be disposed to prevent unnecessary or undue degradation and in accordance with applicable Federal and State Laws.

Reclamation. At the earliest feasible time, the operator shall reclaim the area disturbed, except to the extent necessary to preserve evidence of mineralization, by taking reasonable measures to prevent or control onsite and offsite damage of the Federal lands. Reclamation shall include, but shall not be limited to: salvaging topsoil; controlling erosion, landslides, and water runoff; isolate, remove, or control toxic materials; reshaping the area disturbed; and application of the topsoil and revegetation of disturbed areas.

Acid-forming, toxic, or other deleterious materials. Operators will incorporate identification, handling, and placement of potentially acid-forming, toxic or other deleterious materials into operation plans to minimize the likelihood of acid formation and toxic and other deleterious leachate generation (source control); if the operator cannot prevent the formation of acid, toxic, or other deleterious drainage, the uncontrolled migration of leachate will be captured and treated. Long-term, or post-mining effluent capture and treatment cannot substitute for source and migration control.

Leaching operations and impoundments. All leach pads, tailings impoundments, ponds, and solution-holding facilities will be designed, constructed, and operated according to standard engineering practices to achieve and maintain stability and facilitate reclamation. A low-permeability liner or containment system will be constructed to minimize the release of leaching solutions to the environment. Monitoring will be performed to detect potential releases of contaminants. Cyanide or other leaching facilities and impoundments will be designed, constructed, and operated to contain precipitation from the local 100-year, 24-hour storm event in addition to the maximum process solution inventory. A secondary containment system will be constructed around vats, tanks, or recovery circuits adequate to prevent the release of toxic solutions to the environment in the event of primary containment failure. Wildlife access to solution containment and transfer structures that contain lethal levels of cyanide or other solutions will be excluded. During closure and at final reclamation, leaching solutions and toxic materials will be detoxified by natural degradation, rinsing, chemical treatment, or equally successful alternative methods.

3.2.3.2 Leasable Minerals

In the action area, leasable minerals include phosphate, oil, gas, borates, and solid and semi-solid bitumen and bituminous rock resources. Leases are granted on a competitive and non-competitive basis and require an annual rental fee. Upon production, a royalty is paid to the United States government. Testing, drilling, and production of leasable minerals are all Federal actions. Leasable mineral areas include all types of terrain including valley floors. Lands available for mineral leasing are all BLM jurisdictional lands within the SNDO, subject to no surface occupancy except disposal areas, ACECs (solid minerals only), and riparian areas. A parcel must be nominated for leasing by the proponent and the lands are then leased by competitive bidding.

The proposed action for leasable minerals is generally the same as those for locatables differing mostly in the performance standards associated with the various commodities. There are specific standards with regard to geothermal operations, oil and gas operations, etc., which are not part of the locatable program.

3.2.3.3 Saleable Minerals

Saleable minerals include common varieties of sand, stone, gravel, cinders, pumice, pumicite, clay, decorative rock and boulders. The saleable minerals are generally common construction materials. BLM issues competitive and non-competitive contracts, free-use permits, exploration permits, and designated community pits. Free-use permits may be issued to any local, State, or Federal agency for periods up to 10 years. BLM issues a similar authorization to the NDOT for their established material site ROWs. BLM may require the operator to submit mining and reclamation plans before issuing a contract or permit.

The sale and removal of mineral materials generally occur in the valleys, alluvial fans, and lower elevations of the surrounding hills. The sale of mineral materials by BLM is a discretionary action subject to other land uses in the area. The sale may take place in a community pit which is an area designated by BLM to mine mineral materials, or in a place chosen by the proponent.

The proposed actions in the saleable program are like those in the locatable program and involve mining, processing, and reclamation. However, processing of mineral materials generally does not involve chemicals and does not generate waste products that require special handling, isolation, or treatment.

Mining of materials is usually accomplished with bulldozers, loaders, water trucks, and haul trucks. The extracted material may then be crushed, screened, or washed during processing. Process areas may also include concrete and asphalt batch plants on site. Mining activity occurs year round. Access and haul roads may use existing roads or may require construction of new roads or widening of existing roads.

3.2.4 **Recreation Management Program**

Recreation on BLM lands may adversely affect the desert tortoise and its critical habitat and the southwestern willow flycatcher. Annually, the SNDO issues approximately 60 special recreation permits (SRPs) for various uses. The action area for recreation is divided into eight Special Recreation Management Areas and one Southern Nevada Extensive Recreation Management Area. Within desert tortoise ACECs authorized uses are allowed only on designated roads and trails. In ACECs not designated for tortoise, authorized uses are allowed on roads, trails, and dry washes.

3.2.4.1 Special Recreation Permits- Speed Events

BLM proposes to issue approximately 21 SRPs per year for speed-based events consisting of 9 truck and buggy events, 11 motorcycle/ATV events, and 1 rally car event. Locations of the courses for the speed events are in Figures 4-16 in Appendix B. The majority of the speed-based OHV permits are located in the valleys or foothills. Speed-based events are not allowed in tortoise ACECs; however, they may be allowed on historic routes within desert tortoise critical habitat outside ACECs in the Nelson/Eldorado Special Recreation Management Area. Mountain bike events and horse endurance rides would be allowed in ACECs not designated for desert tortoise on a case-by-case basis. Major OHV use areas include Eldorado Valley (outside the Piute-Eldorado ACEC), Nelson Hills, Laughlin, Nellis Dunes, Ivanpah Valley, Pahrump Valley, Dry Lake Valley, Lower Mormon Mesa and Amargosa Valley. Speed-based SRPs are classified as commercial, competitive, and organized group activity permits. Permits may be combinations of commercial-competitive and organized group-competitive; however, speed is the common element in each permitted activity. SRPs are classified as speed-based when the participants exceed an average speed of 25 miles per hour (mph). Speed-based permits pose a greater risk to desert tortoises than non-speed events because desert tortoises become more difficult to see as the vehicle speed increases.

Within desert tortoise ACECs: A maximum of 12 permitted non-speed events or non-speed portions of speed based events, with a limit of 300 vehicles, may be allowed annually from November 1 through February 28/29, and with no more than four events per ACEC.

OHV racing is the predominant type of speed-based activity permitted by the SNDO. Truck and buggy race courses are typically 25 ft wide with 25-ft buffer areas on both sides. Motorcycle and ATV race courses are typically 4 ft wide with 8-ft buffers.

Speed-based permits may generate more dust than non-speed permits and often participants rely on using GPS technology to navigate through the authorized routes. Speed-based permits also involve the use of check-points along the race course to prevent short-coursing. Check-points are generally located in existing disturbed areas such as road crossings.

Events would be permitted consistent with OHV designations and are limited to existing authorized routes. In designated open areas, such as Nellis Dune and Big Dune recreation areas, or dry lake beds, permits may be issued for unconfined speed-based use because there are mostly no definable roads/routes in such areas.

Desert tortoises are most active during the months of April, May, September, and October during which time they are at greatest risk due to vehicle travel. BLM will not permit speed-based events during March 16 through May 31; September and October speed-based events will be limited to low-density desert tortoise habitat. Speed-based SRP restrictions are listed in Tables 4 and 5. BLM anticipates that no more than 1.5 ac of new disturbance would incidentally occur for each truck and buggy race event, not to exceed 50 ac over the term of this PBO. In addition, 40 ac (13 mi by 25 ft wide) of habitat disturbance may occur as a result of course reconnection of severed courses during the term of this PBO.

BLM proposes to permit year-round speed events in the North Jean Pit (Figure 14) after the area is fenced and cattle guards installed to exclude tortoises. BLM also proposes to permit year-round speed events in the Laughlin OHV area (Figure 16). BLM will assess habitat restoration fees based on acres of new disturbance. This fee will be collected and off-site restoration will take place in desert tortoise conservation areas.

BLM proposes to further evaluate an area bounded by SR 373 to the south, U. D. Highway 95 (US 95) to the east, the California state line to the west, and the SNDO management boundary line to the north for year-round high speed OHV events. BLM will coordinate with the Service to conduct tortoise surveys to establish that the area is very low density tortoise habitat. One course will be selected by the Pahrump recreation planner for evaluation.

3.2.4.1.1 *Pits for Speed-based Events*

Pits are typically located in previously disturbed areas. If a new pit is required, construction may consist of clearing, leveling or grading the site using bulldozers and graders. The surface would not be paved but will consist of compacted soils, gravel, or sand. No more than 20 ac of new pit areas would be created through calendar year 2015.

Table 4. Seasonal restrictions in desert tortoise habitat for proposed speed-based events.

Month	Restriction
January-February	Allowed; post-event mortality sweep & standard measures apply.
March	Allowed March 1-15 and not allowed March 16-31; pre-event surveys; pen tortoise along event course; post-event mortality sweep & standard measures apply. The Mint 400 event would be proposed for late March 2013, afterwards all events will be subject to these seasonal restrictions.
April-May	No high speed events allowed in desert tortoise habitat outside Laughlin, North Jean Pit, and Pahrump areas as described above.
June-July-August	Allowed; pre-event surveys; pen tortoise along event course; post-event mortality sweep and standards measures; less measures for night high speed events one-half hour after sunset and the event must be finished by one-half hour before sunrise
September	No high speed events allowed in desert tortoise habitat outside Laughlin, North Jean Pit, and Pahrump areas as described above.
October	High speed events only allowed in low density areas (including the North Jean Pit area); pre-event surveys; pen tortoise along event course; post-event mortality sweep and standard measures.
November-December	Allowed; post-event mortality sweep and standard measures apply.

Table 5. Additional restrictions for speed-based events

RESTRICTIONS	INSIDE ACECs	CRITICAL HABITAT (outside ACECs)	OUTSIDE CRITICAL HABITAT AND OUTSIDE ACECs
Maximum no. entrants (buggy races)	No races permitted	100	determine on case-by-case basis
Maximum no. entrants (MC[1/]ATV RACES)	No races permitted	160	determine on case-by-case basis
Maximum no. laps	N/A	5	determine on case-by-case basis
Maximum no. events/year	N/A	5 MC/ATV[2/] 4 BUGGY[2/]	38 various types
Seasonal constraints, time allowed(buggy)	N/A	Inactive Season[3/]	Inactive Season[3/]
Seasonal constraints, time allowed (MC/ATV)	N/A	Inactive Season[3/]	Inactive Season[3/]
Publicity run allowed	NO	Inactive Season[3/]	Inactive Season[3/]
Mini-event allowed	NO	YES[2/]	YES
Starting interval (buggy)	N/A	1 every 30-60 seconds	1 to 2 every 30-60 seconds
Starting interval (MC/ATV)	N/A	2 every 30 seconds	By class, on a case-by-case basis, not to exceed 12 at a time[4/]
High-speed testing allowed	NO	NO	YES

1- Motorcycle; 2- Nelson Hills and McCullough Pass (BCCE); 3- inactive season November 1 to March 15 and June 1 to August 31. October in low density areas and Laughlin year round; 4- starting interval is 5 to 10 minutes depending on the size of the vehicle.

3.2.4.1.2 *Spectator Areas*

Spectator areas facilitate crowd control and decrease habitat disturbance by discouraging displaced event viewing. Spectator areas are typically located in existing disturbed sites but are not utilized with every speed-based SRP and may receive large periods of rest between scheduled permits. During the event, the spectator areas will be marked, monitored, and patrolled by BLM Law Enforcement for compliance with stipulations. No more than 20 ac of new spectator areas would be created through calendar year 2015.

3.2.4.1.3 *Course Maintenance*

Over time the routes used by speed-based permits become almost impassible due to deep ruts and whoops. Currently, BLM may authorize route grading associated with speed-based permits immediately following the event and proposes to grade the routes prior to a speed-based permit. BLM may also authorize course grading during the inactive season or winter months. The purpose of pre-grading the routes is to keep the participants from straying into vegetation due to the deteriorated road condition and reduce route widening. Course maintenance would also encourage casual users to remain on the existing roadway. BLM acknowledges that up to 1.5 ac of unintentional new disturbance may result from each race due to poor visibility and sandy conditions which will be mitigated by restoring habitat and fees paid to BLM to ensure no net increase in overall habitat degradation as a result of OHV events.

3.2.4.2 Horse Endurance Rides

Horse endurance rides will be limited to existing roads, trails and dry washes. Horse endurance rides will not be permitted in desert tortoise ACECs. Use in other ACECs will be evaluated on a case-by-case basis.

3.2.4.3 Mountain Bike Events

Mountain bike events will be limited to existing roads, trails and dry washes. Mountain bike events will not be permitted in desert tortoise ACECs. Use in other ACECs will be evaluated on a case-by-case basis.

3.2.4.4 Special Recreation Permits for Non-Speed and Organized Events

BLM proposes to issue SRPs for non-speed events including commercial, competitive, and organized group activities in desert tortoise habitat. An SRP would be required for all organized groups with more than 25 vehicles or any commercial competitive event regardless of the number of vehicles.

Non-speed events are allowed in desert tortoise ACECs and designated critical habitat with limitations stated in the Las Vegas RMP record of decision. Within desert tortoise ACECs, a maximum of five permitted non-speed events, or non-speed portions of speed based events, with a limit of 100 vehicles, may be allowed annually from March 1 through 15 and June 15 through August 14, with no more than three events per ACEC; and no non-speed events, or non-speed portions of speed based events, will be permitted from March 15 through June 14, and from August 15 through October 31. These dates may vary up to 3 days to allow a full weekend *(i.e.*, Saturday and Sunday) for an event. Following BLM and Service review of monitoring data, these limits may be adjusted as mutually agreed by BLM and the Service.

Non-speed or non-speed sections of speed events will not be permitted between March 1 and October 31 within the Piute-Eldorado ACEC, and south of old State Route (SR) 164/Cottonwood Cove Road, within the following townships: Township (T) 28 South, Range (R) 62 East; T. 29 South, R. 62 East; T. 29 South, R. 63 East (except the unpaved road that traverses sections 10, 15, and 23); T. 30 South, R. 63 East; T. 30 South, R. 64 East; T. 31 South, R. 63 East; and T. 31 South, R. 64 East.

Permits may be combinations of commercial and competitive or organized group activity with competition; however, average speeds are lower than 25 mph. At speeds less than 25 mph, participants are more capable of identifying small desert tortoises.

Non-speed and organized events proposed to be permitted by BLM are not anticipated to result in disturbance of critical habitat for any listed species and no more than 5 ac of disturbance of non-critical desert tortoise habitat.

A commercial tour guide using OHVs is the predominant non-speed commercial permit issued by the SNDO. Non-speed commercial permits involve trucks, buggies, cars, ATVs, motorcycles, UTVs, rock crawling vehicles, equestrians, outfitter and guide services, geocaching, etc. Other examples of non-speed permits are: foot races, rock crawling and jeep rides, charity activities, publicity permits, high adventure sports, mountain bike races, rocket launches, large group activities like camping, festivals, and paintball, etc. Non-speed permitted activities use authorized routes and/or locations to conduct the permitted activity.

BLM may issue SRPs for individuals to operate or ride in a competitive OHV race vehicle. BLM will continue to monitor the effects of these tours and determine if the number of events needs to be reduced and ensure all incidental take is reported. All tours are limited to 25 mph or less unless a road is otherwise signed. Unsigned roads within Clark County restrict vehicles to a maximum speed of 25 mph. The Jean lake bed does not have a speed limit.

The Jean course for non-speed OHV tours during January, February, November, and December is 55 mi long and has an access route out of Primm and during March through October tours are restricted to a 46-mi route in the Jean area (Figure 17).

The Pahrump non-speed OHV tours may occur year-round. The course loop is 203 mi long and each event may use up to 50 to 60 mi on average (Figure 18). The access point is the town of Pahrump.

3.2.4.5 Paintball Games

Paintball is a casual and permitted recreation activity that would occur in the Laughlin Events Park, dry lake beds, and in old gravel pits. Casual use (non-permitted) paintball is difficult to differentiate from permitted paintball activities because paintball game format is universal. Generally, groups of people gather and divide into teams. The goal of the game is to eliminate the other team by shooting the players with paintballs. A game lasts approximately 20 to 30 minutes and is over when only one team remains with team members that have not been shot with paint balls. Teams are made up of 4 to 20 players, depending on the size of the range. A typical paintball range is 1 to 5 ac and multiple paintball ranges can be operating in the same area at a time.

Paintball games involve the use of barricades to conceal the players. Barricades are natural (steep washes, large rocks, trees, etc.) and man-made (plywood, wire spools, inflatable objects, other desert trash, etc) and require no maintenance. Paintballs are water soluble and will break down over a short period of time; however, it is common to have large quantities of unbroken paintballs piled-up on the ground from loading the weapons. These paintballs will take longer to break down and have a greater chance of creating a temporary colored stain in the environment. It is also possible for tortoises to ingest the unused paintballs or empty paintball husks because of their bright color and size.

Paintballs are filled with a combination of water, *Sorbitol* (color dye), and varying amounts of wax. *Sorbitol*, a food sweetener, is non toxic to humans, water soluble, and breaks down very quickly. The dyes are commercial food coloring such as those found on a nutritional label. Wax is added to thicken the fill and makes them more difficult to wipe off. Paintball fills with iodine-based material are no longer used.

3.2.4.6 Casual Shooting

The action area is open to casual shooting with exceptions surrounding Las Vegas, Pahrump, and within 1,000 ft of residences and developments. Shooting will continue to become displaced as Las Vegas and surrounding communities continue to grow. BLM does not issue permits for any shooting activities.

3.2.4.7 Dual Sport Events

Dual sport tours are non-speed, non-competitive, non-timed self-guided scenic motorcycle touring. All entrants follow roll chart maps provided by the promoter, and riders leisurely stop at any time to enjoy the scenery and aesthetics of the ride, take breaks and photographs. These tours generally use unpaved roads.

The SNDO has issued SRPs to many dual sport tour events over the last 15 years. One regularly used route takes riders from Barstow, California to Las Vegas, Nevada. Another uses the old Mojave Road, approximately 6 mi of which enters the SNDO area near Laughlin, Nevada.

3.2.4.8 Model Rockets

The Tripoli Vegas Rocketry Club holds annual model rocketry competitive rocket launches. The events typically consist of 150 to 250 entrants, and 200 to 300 families and friends. Rocket events occur on dry lake beds four to six times per year. Participants drive on existing roads and then walk to retrieve their rockets. No cross country driving is allowed.

All entrants must be over 18 years of age, and all compete in three certification levels based on manufacturer, motors, designs, and aerodynamics. Rockets stand 2 to 8 ft in height, and are powered by ammonium perchlorate, a solid rocket fuel. Each level is capable of attaining 10,000 to 20,000 ft or higher. FAA standing waivers and McCarran Airport Traffic Control are notified. Event officials enforce strict flight line protocol at the launch site. All parking, staging, and registration occur away from the launch site.

3.2.4.9 Adventure Racing

Adventure racing is a combination of two or more disciplines including hiking, mountain biking, cross-country running, orienteering, climbing, and paddling. Mountain biking is considered a speed event and not allowed in desert tortoise ACECs but may be considered in other ACECs on a case-by-case basis. Expedition events span 1 to 10 days with 10 to 150 entrants. Many events involve lands other than BLM including NPS lands. All participants are limited to existing roads and trails.

3.2.4.10 Compass Orienteering

Compass orienteering is performed by hiking only and consists of a timed compass course. Cross-country hiking is preferred rather than use of roads and trails. Entrants are judged and scored by their arrival at sequential compass locations. Events and activities involve 5 to 10 teams with two to four people per team.

3.2.4.11 Biathalon/Triathlon Events

Biathlon and triathlon events use cycling (mountain or road bikes), swimming, and/or running or kayaking. Mountain biking is considered a speed event and not allowed in desert tortoise ACECs but may be considered in other ACECs on a case-by-case basis. All staging, registration, technical inspection, first aid, etc. occurs in disturbed areas with good vehicle access. Mountain bike portions of the event are limited to existing roads, trails, and dry washes in non-tortoise ACECs.

3.2.4.12 Casual, Non-permitted Recreation

BLM allows public use of existing roads and trails without the need for an SRP or other authorization unless the level of use meets the requirements for a permit. Open OHV areas allow vehicle use off existing roads and trails (*e.g.*, Nellis Dunes Recreation Area). BLM is preparing a travel and recreation plan for most land in the action area. BLM minimizes the effects of casual use on the desert tortoise and flycatcher by restricting vehicles to existing or designated roads and trails; providing law enforcement and public information and education through personal contacts in the field; and informative maps and pamphlets.

3.2.4.13 Trails

Trails provide recreational opportunities for hiking, horseback riding, and appropriate casual use of OHVs. The proposed action for trails includes the installation of trails, trailheads, and parking areas; restoration of trails or areas around trails; and trail maintenance. Activities may include trail inventory and designation, trail improvement or realignment, trail closure, or new trail construction to accommodate increased uses or reduce natural resource or user group conflicts. The activities associated with the construction, use, and maintenance of non-motorized trails include: foot, equestrian and mountain bicycle travel; presence of people and domestic pets such as dogs; cutting of vegetation to clear trail tread; digging and reshaping of soil to construct and maintain trails; installation of water bars, walls and other structures for stabilization; installation and maintenance of signs, trailhead markers, and registration points; grading of trailheads and vehicle turn-around areas; wildlife viewing; photography; and picnicking.

3.2.5 **Livestock Grazing Program**

Livestock grazing on BLM land may adversely affect the desert tortoise. The SNDO proposes to issue or renew term permits and administer five ephemeral allotments currently open to grazing: Flat Top Mesa, Hidden Valley, Lower Mormon Mesa, Muddy River, and Wheeler Wash. Only three of the allotments are actively grazed: Flat Top Mesa Allotment, Hidden Valley Allotment, and Lower Mormon Mesa Allotment. The location of these allotments is shown on Figure 19. There are four additional allotments that are and will continue to be managed by the Arizona BLM Field Office that partially cross into eastern Nevada near Mesquite and are not considered in this consultation.

The number of Animal Unit Months (AUMs) authorized for livestock grazing in open allotments is based on results from the current year's production studies in accordance with Ephemeral Range Rules.

Voluntary relinquishment of grazing permits may reduce this number. No other allotments provide forage on a yearly basis, or are permanently adjudicated AUMs for any allotment within the SNDO. In the Las Vegas RMP, BLM authorizes livestock grazing outside ACECs and under prescription 2 grazing management.

Under prescription 2, livestock use would occur year-round on open allotments in desert tortoise habitat outside of ACECs. From March 1 to October 14, forage utilization management levels are 40 percent on key perennial grasses, forbs, and shrubs. Between October 15 and February 28, forage utilization management levels are 50 percent on key perennial grasses, and 45 percent on key shrubs and perennial forbs. When use levels are reached, livestock would be moved to another location within the allotment or taken entirely off the allotment. Within allotments classified as *ephemeral*, the number of livestock to be licensed during a particular period would be based upon the availability of forage consistent with the season of use and utilization management levels identified in the proposed grazing prescription.

Permittees may install and maintain range improvements that include boundary fences, interior pasture fences, drift fences, corrals, exclosures, vegetation study exclosures, cattle guards, troughs, spring developments, pipelines, water troughs, water storage tanks, earthen water tanks, loading chutes, temporary water hauls, vegetation manipulations such as seeding, cow trails and others. With the closure of the allotments in the RMP and relinquishment of additional grazing permits, BLM may remove range improvements in disrepair or those that no longer serve a purpose; those that have a purpose may be repaired.

3.2.5.1 Livestock Monitoring

Monitoring studies designed to measure results of livestock management are essential to measure progress toward meeting management objectives and making necessary changes over time. The minimum methods and procedures for monitoring studies on active allotments will be those identified in the Nevada Rangeland Monitoring Handbook (Nevada Range Studies Task Group 1984). Types of monitoring used on the allotment will include: use pattern mapping, utilization, frequency and canopy cover. Each key management area will have a utilization cage. A trend aspect photograph, ecological condition rating, species list (for diversity), and percent canopy cover will be documented for each site. Plant vigor and changes in use levels or species present can be detected through photo interpretation. A quadrant frequency and canopy cover study will also be done on key areas with frequency/trend plots. Species diversity for each key area will be determined and then re-assessed every 3 to 5 years or as needed.

Use pattern mapping will be used to assess livestock distribution, identify any areas of unacceptable utilization and to determine long-term stocking rate. Actual use will be submitted by each permittee and compared to utilization studies. Use pattern mapping will be done each year when livestock are moved off each use area or allotment. Periodic checks will be made during the period of authorized use to determine if livestock need to be moved earlier than scheduled. Trend photos will be taken every year for the first 3 to 5 years and every 4 years thereafter. Key area utilization monitoring studies will be conducted at least twice annually on the actively grazed portions of allotments.

The use data for each key species and use pattern maps will be compiled and analyzed each year. Interpretations will include climatic conditions. Proper stocking rates by pasture and allotment will be assessed in relation to vegetative production. Utilization cages will be used for calibration and photo documentation of use levels. Adjustment to management will be ongoing, based upon utilization levels and climatic conditions (precipitation and temperature).

Frequency and canopy cover trend data will be collected every 3 to 5 years. Aspect photos will be analyzed when taken and compared to previous years. Frequency and cover data from belt transects will be analyzed statistically using *PC MONITOR*. This program includes analysis of variance and Duncan's Multiple Range Test.

Ecological condition and existing plant community data will be collected for each active allotment, as time and funding permits and every 5 years thereafter, until ecological condition objectives are met or stable conditions are determined to exist. Since it is not known how fast changes in ecological condition can or will occur, no time frames are set. However, if trend is determined to be upward, then movement toward the ecological condition objectives will be considered as met.

After all key management area objectives and use level constraints have been assessed and evaluated, the studies will be consolidated and a determination will be made concerning the attainment of allotment level objectives at the end of each 3 to 5 year period. Management changes or alternatives will be considered at this time. Once conditions stabilize and long-term objectives are being met, the time intervals for evaluations may be greater than 3 to 5 years. This will be determined at the time the allotment evaluation is completed.

For the purpose of meeting the above objectives, the upper limits of production of desirable plant species as described for the potential natural community (PNC) for each range site should be achieved. PNC is that vegetative community that is the highest successional stage that could be obtained were it not for the effects of man or natural phenomena that would have the effect of causing the community to be at a lower successional stage. Areas disturbed or degraded by previous human activities may require restoration methods to attain PNC objectives. It is assumed that the closer the vegetative community is toward reaching its maximum potential towards a truly natural condition unaffected by man, the better the community will meet the needs of the desert tortoise. This is because the natural community in many cases, particularly as it relates to the Mojave Desert, is representative of a more diverse plant community with a more complex horizontal and vertical plant structure. This provides not only an increase in forage availability of desirable plant species but also increased ground cover, both of which would benefit the tortoise.

3.2.6 **Fire Management Program**

Because wildfires may occur throughout the action area, fire management activities may adversely affect all listed species and their critical habitat in the action area. BLM manages fire on approximately 3,332,000 ac of public lands based on Fire Management Unit objectives and strategies. The SNDO Fire Management Plan (FMP; BLM 2004) describes these objectives and units. Fire management includes prevention, detection, suppression, emergency rehabilitation, use of prescribed fire, non-fire fuel treatments, and community assistance on every acre of burnable vegetation within the SNDO. The FMP emphasizes that firefighter and public safety is the first priority and prescribes objectives and strategies to improve wildfire prevention and suppression, reduce hazardous fuels, restore fire adapted ecosystems, and promote community assistance.

Table 2-7a of the PBA identifies 23 fire management units established in the FMP which determines how fire suppression and management activities are managed. BLM conducts monitoring of active fuels projects and post-fire assessments for emergency stabilization and restoration annually. Additionally, monitoring will be conducted as needed and appropriate. Monitoring may consist of an interdisciplinary team conducting a vegetation and fuels assessment.

Protection of human life is the first and most important consideration in all wildfire events and suppression actions. Consultations for wildfire suppression activities that result in adverse effects to listed species typically follow emergency consultation procedures. Upon discovery of a wildfire, BLM contacts the Service to begin coordination and consultation for suppression if listed species may be affected by the fire or BLM activities. The measures in this PBO are general and intended to inform BLM of actions to consider for minimizing effects to the species.

Where appropriate, wildland fire will be used to restore and/or sustain ecosystem health, improve the ecological condition and productivity of range ecosystems, and maintain natural plant community diversity. In order to achieve long-term beneficial effects, it may be necessary to cause short-term adverse effects to listed species. Fire will be allowed to function in its ecological role when appropriate for the site and situation to protect, maintain, and enhance resource values.

3.2.6.1 Fire Suppression

Fire suppression activities may include: constructing firelines by hand or with heavy equipment, fire trucks or other vehicles driving cross country, aerial water drops, aerial fire retardant drops, establishment and operation of temporary fire camps, staging areas, and heliports.

3.2.6.2 Fuels Treatments

Prescribed fire and non-fire fuels treatments (mechanical, chemical, and biological) will be developed and implemented in order to create fire safe communities, protect private property, achieve resource management objectives, and restore ecosystem health. The Las Vegas 1998 RMP allows for prescribed burns for resource enhancement in four areas: Gold Butte Allotment, South McCullough Range, Virgin River Floodplains, and Ash Meadows/Amargosa Flat area. Prescribed burns and non-fire fuel treatments include reseeding with native species to the extent practicable wherever residual vegetation is not adequately abundant to revegetate the sites naturally; prevent domination by nonnative weed species; and meet ecosystem restoration objectives.

Wildland Urban Interface areas are of great concern to BLM and will be considered for fuels treatment projects. These areas are identified in the Communities at Risk section of each Fire Management Unit description. Additional collaborative project-level planning will be completed prior to implementation of fuels management actions. Additional at-risk areas and projects may be identified through a collaborative process on a case-by-case basis.

3.2.6.3 Virgin River Fuels Treatments

BLM will continue fuel treatments along the Virgin River started in 1998 to reduce threats to the communities of Mesquite, Bunkerville, and Riverside previously described in informal consultations 1-5-98-I-316, 1-5-03-I-438, 1-5-03-I-510,and 1-5-03-I-535. The Virgin River riparian corridor has converted to a dense saltcedar stand that contains a large fuel load that, if it ignites would create a hot, fast fire and threaten adjacent communities. BLM has rehabilitated parcels burned in 1998 and 2003 and treated additional stretches of BLM lands on the river to reduce saltcedar.

The 2005 floods altered the treatment sites and adjacent BLM lands within the floodplain. The floodplain was overwhelmed with flood waters. Vegetation on treatment sites and semi-wet and wet terraces were either scoured clear or buried by silt, and the channel moved within the floodplain creating new sandbars and new dry terraces.

Treatments completed on the Virgin River have utilized mechanical removal of noxious and invasive vegetation such as saltcedar, chemical treatment of noxious or nonnative species, and prescribed fire. As an opportunistic response to dynamic flood-caused changes or wildfire caused changes, chemical treatments may occur on the semi-wet and wet terraces under conditions where the vegetative cover has either been scoured clear or buried by silt. Previous treatments buffered these areas leaving nonnative, invasive plants. The sole treatment in these areas consists of applying the herbicide *Habitat* (imazapyr), using the foliar method. The foliar method involves spraying the leaves of target plants during the growing season with a low concentration of herbicide. Other herbicide formulations or application methods that improve upon this method or treatment will be brought forward to the Service on a case-by-case basis. The exclusive purpose for this method is to treat saltcedar seedlings and re-sprouts in post-flood or burned areas. Initial chemical treatment of these bare sites will only extend through the first two or three green-ups following flood disturbance, or until the saltcedar seedlings have exceeded an average height limit to be determined by the Service. Maintenance using chemical treatment of these acres will continue to the minimum extent necessary to prevent site re-infestation and dominance by saltcedar.

3.2.6.4 Revegetation

The treatment sites will be monitored for native recruitment and re-establishment. The SNDO with assistance from the National Resources Conservation Service, the Southern Nevada Restoration team, and other cooperators would conduct active revegetation operations (seeding, planting, watering, drip-irrigating) where necessary.

3.2.6.5 Emergency Stabilization and Rehabilitation

Emergency stabilization and rehabilitation (ESR) efforts will be designed and implemented to achieve vegetation, habitat, soil stability, and watershed objectives. Aggressive actions will be taken in burned areas susceptible to conversion to cheatgrass or other invasive species. ESR activities will be developed for each wildfire in consultation with the Service.

3.2.6.6 Prescription Fire and Fuel Treatment Monitoring

Increased emphasis will be placed on natural resource objectives for each fire and fuels management treatment. A monitoring and evaluation program will be established to determine the effectiveness of the management actions. The program will include the purposeful collection and analysis of data to determine the results of implementing management actions and monitoring for both pre- and post-fire environmental conditions. Information from the monitoring and evaluation program will be used to adjust management determinations including adjustment in fire and fuels management practices.

3.2.6.7 Fuel Breaks

A common fuel treatment strategy is to modify or remove fuels to reduce the likelihood of ignition, lessen potential fire damage, and lessen resistance to suppression control efforts. Fuel breaks can be used to modify fuel characteristics in blocks or in strips to change fire behavior characteristics and allow fires to be more readily controlled. A fuel break system can be utilized by strategically placing treatments to tie strips and blocks together around land units. Fuel projects and treatments are subject to and follow the FMP, RMP, and the National Fire Plan. Fuel projects are identified by need and priority annually. Currently, new fuels projects are brought forward on a case-by-case basis to the Service for consultation where a proposed activity has not been previously consulted on or covered through previous consultations.

3.2.7 **Vegetation Management Program**

Vegetation management includes both restoration and weed control. BLM monitors and treats noxious weed infestations on an as-needed basis. Methods, standard operating procedures, and chemical types for noxious weed control are defined and analyzed in detail in the *Final Programmatic EIS Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States* (BLM 2007).

3.2.7.1 Restoration

Restoration may be conducted to reduce trail proliferation; minimize erosion; improve habitat conditions; restore closed and unauthorized transportation routes, abandoned mine roads, trespass incursions; and fire scars. Restoration of riparian areas also will be implemented when necessary to improve riparian conditions. In addition, periodically illegal trespass activities occur such as unauthorized construction of roads, mines and other facilities; restoration of these sites would also occur.

Fencing may be installed to protect biologically sensitive areas from trampling, visitor access, and other disturbance activities. Barriers may be installed around areas such as springs or riparian habitats, and along or across roads or trails. Barriers are typically made of fencing such as post and cable, smooth or barbed wire, large rocks, wooden pillars, or densely planted vegetation. Installation is done by hand tools or small backhoe and trencher.

Restoration activities include scarification or ripping of compacted soils, recontouring of the surface, soil amendments, seeding, and transplant of native plants. Bobcats or other heavy equipment may be necessary for recontouring or decompacting soils. Water trucks or ATVs may be utilized on larger scale projects where intense replanting is required. In situations that require new disturbance, plants may be salvaged from areas planned for disturbance and stockpiled onsite. Where appropriate, berms, fences or other features may be constructed or installed to block roads and aid in reducing recovery timeframes. The scale of restoration activities vary considerably and depend on the purpose and desired outcome.

BLM may conduct extensive restoration of riparian areas on public lands along the Muddy River, Virgin River, and Meadow Valley Wash. Restoration would involve removal and treatment of river stretches infested with saltcedar and other noxious weeds in order to improve habitat for southwestern willow flycatcher, and other riparian species. Treatments would be similar to those conducted as fuel treatments on the Virgin River, discussed under Fire above. Bulldozers, root plows, and chainsaws would be used as well as herbicides previously authorized for use on the Virgin River and others approved for use.

3.2.7.2 Noxious Weed Treatment

Typical procedures for weed abatement include pre-treatment surveys, development of treatment recommendations, implementation of treatments, and monitoring of treatment areas. Access to sites occurs via existing roads. Treatment methods include manual, mechanical, and chemical (herbicide) for vegetation removal and control. Manual treatments include the use of simple hand tools such as saws, axes, shovels, machetes, mattocks, and brush hooks for hand grubbing, cutting, and girdling operations. Mechanical treatments include removal of aboveground portions of plants by mowing, chipping, cutting (including use of chain saws) or roller chopping and removal of the entire plant by plowing, tilling, and brush-beating. Herbicide treatments include the use of backpack sprayers, truck mounted power sprayers, and broadcast applications; treatment sites may utilize one or all of these methods but will only be used if approved by BLM and the Service.

3.2.8 Resource Management Program

This program of activities include fish and wildlife projects such as development and maintenance of wildlife guzzlers and catchments (collect and provide water for wildlife); construction and maintenance of protective fencing; closure of abandoned mine sites; construction of public kiosks, field work associated with cultural and paleontological resources; and wild horse and burro management.

3.2.8.1 Fish and Wildlife Projects

Actions in this category include wildlife developments and other actions to benefit fish and wildlife in the action area. Wildlife developments are man-made structures or treatments designed to protect resources or provide and maintain sufficient quality and quantity of food, water, cover, and space to satisfy needs of fish and wildlife. Improvements may include installation or removal of boundary fences or tortoise exclusion fencing, drift fences, corrals, exclosures, spring water developments, guzzlers, pipelines, water troughs, water storage tanks, earthen water tanks, and fish barriers. BLM may remove tortoise exclusionary fencing at the northern and southern boundaries of the LSTS in consultation with the Service. Captive-held desert tortoises may be translocated to BLM land to augment natural populations in coordination with the Service.

Wildlife water developments (guzzlers) usually involve the installation of a water collection apron, a short pipeline, aboveground tanks, and drinkers both aboveground for large animals, and belowground for small animals. Typically, large guzzlers (3,600 gallons) are constructed with a 30-ft by 40-ft metal apron and pipe rail fence. Small guzzlers (325 gallons) constructed with an 8-ft by 12-ft metal apron and barbed wire fence. All guzzlers have wildlife escape ramps installed if deep enough to trap wildlife. Remotely located water developments are installed using a helicopter staged at road intersections or in some other disturbed area.

Spring water developments generally include installing a spring box at the source, a pipeline from the source, and a trough. All troughs have wildlife escape ramps installed if deep enough to trap wildlife. Excavation may be done by hand or with a backhoe.

3.2.8.2 Desert Clean-up

The accumulation of trash and debris on public land is a continuous and growing problem in the Las Vegas Valley and surrounding areas. Hundreds of illegal dump sites exist throughout southern Nevada. Materials found in these sites can include hazardous materials, landscape trimmings, household garbage, abandoned vehicles, target shooting debris, and construction rubble. Sites can contain a few localized garbage bags or be spread along miles of roadway. These sites are generally found in areas with easy vehicular access, but also occur deep in the desert via low-use roads. Activities associated with debris removal included driving to sites using existing roads, removing trash by hand and occasionally a Bobcat, loading trash into vehicles or dumpsters, proper disposal of debris, and placing appropriate signage. Vegetation may be crushed by vehicles or personnel during these activities.

3.2.8.3 Hazardous Materials

The Hazardous Materials Program has the responsibility for compliance with Federal, State, interstate and local management requirements. Waste is defined to include solid and hazardous waste, hazardous materials, and hazardous substances, as defined by BLM statutes (518 DM 2.3). Hazardous materials on the SNDO are commonly in the form of petroleum products (vehicle fuels, lubricants, hydraulic, etc.), mining and ore processing chemicals, and agricultural chemicals (herbicides and pesticides) that are in immediate use, active storage, or abandoned storage or illegal dumps. No permanent hazardous waste disposal sites are maintained on SNDO lands.

Most of the hazardous materials sites in the SNDO are illegal dump sites or abandoned mine sites in previously disturbed areas, on or near roads, or other points of easy access. Hazardous materials could potentially occur throughout the SNDO in the form of illegal dumping. However, most hazard sites are associated with abandoned and orphaned mines, mill sites, closed landfills, and "midnight dumping" locations. In some cases, the material is contained and there is no release to the soil.

When hazardous materials are found on BLM lands, the site must be remediated. Everything on the site that is contaminated must be removed. The number of vehicles and personnel associated with the cleanup and the extent of habitat disturbance will be based upon the size and type of hazardous materials encountered. Cleanups associated with abandoned and orphaned mines may involve removal of extensive debris left by the operator including old storage tanks, evaporation ponds and miscellaneous containers. Desert tortoises may occupy these sites and may be hidden under debris that must be removed. "Midnight dumping" sites are generally cleaned up before the hazardous material containers leak. BLM has an aggressive enforcement program which appears to be reducing incidents of illegal hazardous material dumping.

Activities associated with remediation include: testing of the materials to identify the hazard; driving vehicles to the site (this may involve cross-county driving through vegetation); placing all contaminated containers, materials and soil into a hazardous materials transport vehicle; and recontouring and restoring the site. Vegetation may be crushed by vehicles or trampled by personnel during these activities.

3.2.8.4 Abandoned Mine Land Closures

BLM works cooperatively with the State of Nevada Division of Minerals to eliminate abandoned mines through closure. Closures are conducted with a goal of remediating hazard sites, restoring the mine and adjoining area to a naturally appearing condition, and addressing wildlife occupancy and use of the site. Activities associated with mine closures include wildlife surveys, hazard inventories, use of heavy equipment to move spoils and tailings, construction of gates and fences, remediation of hazardous wastes, and access to the mine site over primitive roads or cross-country. The Abandoned Mine Land program is administered under Nevada Administrative Code (NAC) 513. Since 2002, the SNDO has authorized approximately 36 actions totaling 0.1 ac of new disturbance within potential desert tortoise habitat.

Initial surveys are conducted to determine access routes, potential for habitat, and presence or absence of federally listed species. Immediately prior to closure, mines are surveyed for bat occupancy, and recommended for soft (bat gate) or hard (filling) closure. If filling is deemed appropriate, remaining tailing piles are bulldozed back into the mineshaft. As many mines are very old and the roads to them may have deteriorated to varying degrees, access to these sites may require some cross-country travel. Restoration of disturbances is conducted as described for general restoration activities.

3.2.8.5 Public Information/Education

BLM provides public education through interpretive programs, signing, brochures, kiosks, etc. The majority of interpretation occurs where visitation is highest in the NCAs at the Red Rock Canyon NCA Visitor Center and on the guided hikes within Sloan Canyon NCA which are outside the action area for this consultation. Less intensive public education uses unmanned kiosks to explain the resource values of an area, public use restrictions and locations of available uses. Signs and markers are used extensively to mark roads, trails, closures, and points of interest. Educational trailers provide manned public outreach to events that are temporal in nature.

This action includes the construction (and maintenance) of informational kiosks, signs, or visitor centers. Associated construction may include the development of restrooms, picnic areas, parking areas, trailheads, visitor information centers, utilities, spring protection, and educational sites.

Public information and education activities can occur throughout BLM jurisdictional lands within the SNDO. Signs will be used throughout the SNDO. Kiosks would be sited as needed, although they are most likely installed in areas with easy access to existing roads and trails. More intensive interpretive facilities would be authorized outside site-type ROW exclusion areas.

Most public information and education activities would involve installing signs with hand tools. Installation of kiosks may require the use of heavy equipment. Intensely used and previously disturbed sites are preferred locations for this authorized action but if unavailable, disturbance is generally less than 100 square feet (ft^2).

More intensive educational facilities would require trenching, blading, and grading areas during construction. Asphalt and concrete may be installed during construction and maintenance. A ROW may be required in addition to this action for water, powerlines, and other utilities.

3.2.8.6 Cultural and Paleontological Resources

Cultural and paleontological resources are found throughout the SNDO. Site specific locations are considered proprietary information and therefore, not identified for this consultation. Cultural and paleontological resources are typically found in disturbed sites with high human activity. Use of existing roads, trails and/or dry washes will be used to access the sites. Cultural and paleontological sites are generally left in place. Identification of sites and properties does not involve ground disturbance. If a site must be mitigated or a scientific excavation is initiated, ground disturbance may result. This may involve hand digging of small trenches, test pits, extracting fossils of small and large animals, excavating village sites, etc. Some vegetation may be removed.

3.2.8.7 Wild Horse and Burro Management

The objective of the wild horse and burro management program is to manage for healthy, genetically viable herds of wild horses and/or burros in a natural, thriving ecological balance with other rangeland uses. BLM manages wild horses and burros pursuant to multiple-use resource management requirements established by the RMPs, BLM policies, and implementing regulations under the *Wild and Free-Roaming Horses and Burros Act* of 1971 (WHB Act; Public Law 92-195). The WHB Act mandates that wild and free-roaming horses and burros be protected from unauthorized capture, branding, harassment, or death. The WHB Act also mandates that these animals are to be considered an integral part of the natural system, based on their distribution at the time the law was enacted.

Burros inhabit the lower desert areas throughout the year. Wild horses are found at lower elevations during the winter, then retreat to the mountains during the summer months. Both wild horses and burros have been observed at distances over 10 mi from permanent water sources. Ecological impacts are most intense near water sources (*e.g.*, 1 to 2 mi) and diminish as distance increases. The diets of wild horses and burros show a moderately low degree of overlap, with wild horses consuming more grasses and burros utilizing more shrubs. Both species consume forbs when these plants are available, although burros tend to eat more dry forbs, and wild horses prefer more dry grasses. The diets of both have a moderate-to-high overlap with cattle and the desert tortoise.

Herd populations are monitored and managed using the following program sequence:

- Ground observation of animal condition conducted on a continuing basis
- annual forage pattern mapping
- aerial population inventories to establish population numbers and distribution
- herd reduction gathers as needed to attain AML objectives, and
- calculation of AML.

Ground observations are accomplished through direct field observations by BLM staff and volunteers. Implementation of population inventories is dependent upon funding availability and priority needs. Aerial population inventories for the Herd Management Areas (HMA) were conducted in 1995, 1997, 2000, 2004, 2006, 2007, 2008, 2009, 2011, and 2012.

AML for wild horses and burros is defined as, the optimum number of animals within a specific HMA that will support achievement of multiple-use resource management objectives, while maintaining a thriving ecological balance. These levels are determined by evaluating current utilization patterns within the HMA and comparing that to the desired percent utilization of key forage plants within the HMA. This desired percent utilization is determined based on the level of use the range is capable of supporting while maintaining the resource management objectives defined in the RMP.

The AML will be adjusted when monitoring determines that the animal population, forage, water, riparian or other ecosystem management objectives are not being met. Wild horses and burros will be scheduled for removal when herds have expanded beyond designated herd area boundaries or the AML is exceeded. Since wild horses and burros are free-roaming, herds cannot be maintained at the exact AML at all times. Depending upon scheduling and funding for gathers, the number of animals within HMAs may exceed the AML and then be gathered down to low end of the AML. The herd would then be allowed to expand for a few years until it reaches or exceeds the AML, at which time another gather would be held.

Utilization of current year's production in desert tortoise habitat, by all herbivores on key perennial forage species within HMAs would be limited to 50 percent of biomass for perennial grasses and 45 percent for shrubs and forbs. BLM will develop and maintain dependable water sources to allow more even distribution of horses and burros throughout the HMAs.

The geographic areas of public lands that were used as habitat for wild horses and burros in 1971 were delineated as HMAs. A total of eight HMAs are located within the BLM SNDO, four of which BLM determined that the desert tortoise may be adversely affected by wild horses and burros (Gold Butte, Johnnie, Muddy Mountain, and Wheeler Pass HMAs which is managed by BLM and the Forest Service). The Amargosa, Ash Meadows, and Eldorado HMAs are managed for zero horses and burros. Consultation for the Red Rock HMA was conducted as a part of the Red Rock Canyon NCA PBO and is therefore excluded from this document.

Activities involved in wild horse and burro management include population inventories, developing water hauls or springs (with an exclosure around the water source), and gathers which involve herding animals with horses or helicopters, constructing temporary corrals, removing some animals from the herd, and releasing the remaining animals.

3.3 Proposed Minimization Measures

3.3.1 General Compliance Measures (all activities, species)

- BLM wildlife staff (702/515-5000) and the Service (702/515-5230) must be notified immediately of death or injury of any listed species associated with a project, no later than close of business on the workday of the incident or the beginning of the next workday.

- BLM shall designated an individual(s) as contact representative who would be responsible for overseeing compliance with the terms and conditions contained in the biological opinion and provide coordination with the Service.

- Project proponents will provide BLM with compliance reports.

- Tracking Log: BLM will keep an up-to-date log of all actions taken under this consultation including acreage affected, survey and removal activities (including reported number of desert tortoise injured, killed, or removed from the project site), and fees paid for each project.

3.3.2 Desert Tortoise Measures

Many of the minimization measures identified below apply to all actions and will be employed within all areas of desert tortoise habitat. Other measures are specific to certain activities types, such as livestock management, wild horse and burro management, hazardous materials management and fire. These project-specific measures are identified under an activity header.

In addition, desert tortoise habitat has been classified into three categories identified below based on habitat quality, density of desert tortoises, and importance for recovery.

Desert tortoise conservation areas as defined in the revised desert tortoise recovery plan (Service 2011), include critical habitat and high value habitat that links or connects tortoise populations (Figure 20).

3.3.2.1 Tortoise Handling Measures

- Desert tortoises shall be handled in accordance with the Desert Tortoise Field Manual (Service 2009). At the project-level consultation, additional or modified measures may be required which take precedence over the measures in the field manual.

- An authorized desert tortoise biologist is typically required when tortoises may be encountered during an action. An authorized desert tortoise biologist should possess a bachelor's degree in biology, ecology, wildlife biology, herpetology, or closely related field. The biologist must have demonstrated prior field experience using accepted resource agency techniques. As a guideline, Service approval of an authorized biologist requires that the applicant have at least 60 days project experience as a desert tortoise monitor. In addition, the biologist shall have the ability to recognize and accurately record survey results and must be familiar with the terms and conditions of the biological opinion that resulted from project-level consultation between BLM and the Service. All tortoise biologists shall be familiar with the field manual (Service 2009).

- **Biologist approval:** The Service must approve authorized desert tortoise biologists. Any biologist seeking approval as an authorized desert tortoise biologist must submit the most recent Statement of Qualifications to the Service's Nevada Fish and Wildlife Office (available at: http://www.fws.gov/nevada/desert_tortoise/documents/form/DT_authorized_biologist_request_form.pdf). Other personnel may assist with implementing conservation measures, but must be under direct field supervision by the authorized biologist.

3.3.2.2 Measures to minimize take of desert tortoises due to project-related activities in all areas:

- The project applicant shall notify BLM wildlife staff at 702-515-5000 at least 10 days before initiation of the project. Notification shall occur before any activities begin that will damage or remove vegetation, such as off-road vehicle travel for surveys, soil testing, and clearing vegetation off the project site. The purpose of the notification is to ensure that the proper education program is given and to review expectations for compliance with the terms and conditions of the biological opinion.

- BLM, or their designee, shall present a tortoise education program to all foremen, workers, permittees and other employees or participants involved on projects covered under this opinion. The program will consist of a presentation or a fact sheet, as determined by BLM and the Service. The program and fact sheet will include information on the life history of the desert tortoise, legal protection for desert tortoises, penalties for violations of Federal and State laws, general tortoise activity patterns, reporting requirements, measures to protect tortoises including all terms and conditions of the biological opinion, and personal measures employees can take to promote the conservation of desert tortoises. The definition of "take" will also be explained. Workers and project associates will be encouraged to carpool to and from the project sites.

- During construction activities, tortoise burrows shall be avoided whenever possible. If a tortoise is found onsite during project activities which may result in take of the tortoise (*i.e.*, in harm's way), such activities shall cease until the tortoise moves, or is moved out of harm's way.

- Overnight parking and storage of equipment and materials, including stockpiling, shall be in previously disturbed areas or areas cleared by a tortoise biologist. If not possible, areas for overnight parking and storage of equipment shall be designated by the tortoise biologist in coordination with BLM and project proponent, which will minimize habitat disturbance.

- Project activity areas will be clearly marked or flagged at the outer boundaries before the onset of construction. All activities shall be confined to designated areas.

- All project areas including construction sites, access routes, staging areas and fencelines will be cleared (all tortoises removed) by an authorized biologist before the start of construction or ground disturbance. The area shall be surveyed for desert tortoises using survey techniques, which provide 100-percent coverage.

- Most projects shall require an authorized desert tortoise biologist onsite full time during construction activities unless determined by BLM and the Service that a biologist is not necessary. Unless previously fenced and cleared, projects will require an onsite monitor during all portions of the project within the active season (March 1 to October 31) where activities could result in harm to tortoises. BLM wildlife staff may reduce the requirements for monitoring to part-time or on call when activities that threaten tortoises have been sufficiently reduced or have ceased. Unseasonably warm weather and/or precipitation outside peak tortoise activity periods may warrant adherence to requirements established for periods of greater activity. BLM may determine that additional measures are appropriate for projects planned when conditions are suitable for desert tortoises to be active.

- Projects will require desert tortoise exclusion fencing in Areas A and B unless BLM and the Service determine that the project should not be fenced (*e.g.*, powerlines, pipelines, and some roads). The fence may be permanent or temporary, as determined on a case-by-case basis. Fenced projects will require an initial tortoise clearance of the fenceline prior to fence construction, and a tortoise clearance (removal) within the fenced area following fence construction as described in the Desert Tortoise Field Manual (Service 2009).

- An authorized desert tortoise biologist shall be onsite during construction of the tortoise-proof fence to ensure that no tortoises are harmed unless determined unnecessary by BLM and the Service. Any desert tortoises or eggs found in the fenceline will be relocated offsite by an authorized desert tortoise biologist in accordance with approved protocol (Service 2009). Tortoise burrows that occur immediately outside the fence alignment that can be avoided by fence construction activities shall be clearly marked to prevent damage to the burrow.

- Following fence construction and prior to start of project activities within the fenced area, all desert tortoises shall be removed from the site. An authorized desert tortoise biologist shall oversee the survey for and removal of tortoises using techniques providing 100-percent coverage of all areas. All desert tortoise burrows and other species burrows, which may be used by tortoises, will be examined to determine occupancy of each burrow by desert tortoises. Tortoise burrows shall be cleared of tortoises and eggs, and collapsed. Any desert tortoise or eggs in the fenced area will be removed under the supervision of an authorized desert tortoise biologist in accordance with Service protocol (Service 2009).

- On phased development projects, the operator will have the option of initially fencing less than the total project acreage. The fenced area will be enlarged as the disturbance expands.

- Inspection of exclusion fencing: The project proponent or operator shall be responsible for inspecting the fencing in accordance with Service requirements (Term and Condition 1.m.). Maintenance and repairs shall be performed promptly including removal of trash, sediment accumulation, tumbleweeds and other debris against the fence and restoration of zero ground clearance between the ground and the bottom of the fence, including recovering the bent or buried portion of the fence if not buried. A log shall be maintained to document dates of inspections, condition and issues observed, and date issues were resolved. The log shall be provided to BLM with project reports.

- Removal of exclusion fencing: *Temporary fencing* shall be removed at the end of the construction activity. *Permanent fencing* may be removed upon termination and reclamation of the project, or when it is determined by BLM and the Service that a fence is no longer necessary.

- Exclusion fencing along highways: Fencing should be installed to allow tortoises to use adequately sized culverts to cross under the road. During project design, the proponent and BLM will identify: 1) culverts that may serve as movement corridors underneath the road; 2) modifications that will be needed for culvert use by desert tortoises; and 3) locations suitable for installation of culverts at a future date, should it be determined necessary, and provide to the Service in writing.

- Within desert tortoise habitat, any construction pipe, culvert, or similar structure with a diameter greater than 3 inches stored less than 8 inches above the ground will be inspected for tortoises before the material is moved, buried, or capped.

- Trenches: All trenches and holes will be covered, fenced or backfilled to ensure desert tortoises do not become trapped unless alternate measures are in place as agreed by BLM and the Service. If trenches or holes are to remain open during construction, they will be checked for tortoises at least four times a day, at the start of day, at mid-morning, early afternoon, and at the end of the work day. The trenches or holes will also be checked immediately before backfilling regardless of the season. Tortoises found in the trench will be reported and moved out of harm's way in accordance with handling protocols (Service 2009).

- Litter-control: A litter-control program shall be implemented by the proponent to keep ravens and other predators from being attracted to the project site and thereby increasing the potential for predation on tortoises nearby. This program will include the use of covered, raven-proof trash containers (bins and dumpsters), removal of trash from the construction site to the trash containers at the end of each work day, and proper disposal of trash in a designated landfill or transfer facility. Vehicles hauling trash to the landfill or transfer facility must be secured to prevent litter from blowing out along the road.

- Ravens and other avian tortoise predators: All towers and poles will be fitted with "bird-be-gone" or other perch deterrent devices to minimize the potential for increased predation from aerial predators following construction.

- Speed limit: Vehicles will comply with the posted speed limit. A speed limit of 25 mph shall be required on unposted county roads and unpaved roads and trails used to access the project site (except for speed portions of OHV events).

- Vehicles: All project/event-related individuals shall check underneath stationary vehicles before moving them. Tortoises often take cover under vehicles. All vehicle use will be restricted to existing roads. New access roads will be created only when absolutely necessary and only when approved by BLM. Workers shall not drive or park vehicles where catalytic converters can ignite dry vegetation and to exhibit care when smoking in natural areas. Fire protective mats or shields shall be used during grinding or welding.

3.3.2.3 Speed and Non-Speed SRPs (including horse endurance rides)

- Except for race vehicles during a race, vehicles shall not exceed the legal speed limit (posted or unposted) of the roads used during events. Clark County speed limit for unposted roads is 25 mph. If the speed limit is not posted, the speed limit shall be 25 mph.

- BLM and the event proponent shall consider an alternative event route, which shall be used if rainfall occurs along a portion or the proposed route to the extent that tortoises may be attracted to the course.

- For all events which cross other BLM jurisdictions, the event will only be authorized in accordance with the Ely or Tonopah BLM PBOs.

- If a vehicle breaks down, it will be moved to the side of the race course, avoiding damage to vegetation to the extent possible. Teams will not be allowed to retrieve vehicles without an event official escort to the retrieval site. This will ensure that no additional habitat disturbance takes place during this process. Participants who stop to rest will pull over onto side roads or areas devoid of perennial vegetation, if possible. Riders who no longer participate in the event will either wait along the course for their crew to pick them up, or travel on the course to a pit area. Chase crews will be limited to retrieving vehicles that are broken down along the course. All chase vehicles must have a pit pass, retrieval pass or other form of access permission from BLM. No travel off the course will be authorized.

- For speed events: Spectator vehicles will be allowed only in designated spectator areas outside ACECs. Spectator areas shall be confined to existing disturbed areas. If new spectator areas are required, BLM and the Service will mutually agree on the locations before they are used.

- Temporary or permanent fences/boundary markers shall be installed around pit and spectator areas to clearly delineate the boundaries of these areas from adjacent desert habitat, using sturdy materials such as rope and T-posts. Monitor(s) will be placed at each pit and spectator area to ensure that spectators remain within the designated boundary.

- For speed events: Pit crews will use only authorized pit areas. Pits shall be confined to existing disturbed areas, unless otherwise approved by the Service. Pit areas will be marked with a sign stating that a pit pass is required. Under no circumstances will the issuance of pit passes contribute to expansion of designated pit areas.

- For speed events, including non-speed sections: All event-related activities will be confined to authorized vehicle routes, pit areas, spectator areas, and the course itself, and will not stray into vegetated areas. All major access routes leading into restricted areas will be monitored, or marked closed and bannered off. Personnel shall be stationed at these areas, as appropriate, to enforce access restrictions. Directional signs to spectator and pit areas will be posted at all main access points. "Race-in-progress" signs will be posted at each location where the race crosses another road. Other disqualification or hazard zones will be monitored periodically during the event.

- BLM staff will be present to check for compliance with stipulations of the race permit. The importance of staying on the race course will be stressed to all participants by BLM and the promoter.

- For all events: A sufficient number of BLM rangers, monitors, and crowd control officials, as determined by BLM in coordination with the Service, will be required to enforce compliance with stipulations of the event permit. Monitors may be BLM or proponent personnel and shall be stationed at all disqualification or hazard areas to record any violations. As a general guideline, BLM will provide one law enforcement officer per 50 participants, to enforce terms and conditions of SRP, control unauthorized vehicular travel off existing roads, and ensure that habitat damage does not occur. The number of law enforcement officers present may be increased or decreased based on the event proponents past history of event management and stipulation compliance, the estimated number of spectators, geographic setting of the event, or experience gained from previous similar events.

- To help control spectators, the event promoter will station at least one person at the primary entrance to the spectator area for at least 2 hours before the start of the race and 1 hour after the start of the race. This individual will stop all cars coming into the area, give the occupants information on the limits of the spectator area, and advise them where they can and cannot park. (This will not apply to the Nellis Dunes Recreation Lands, which are primarily sand dunes and gypsum hills. The area supports low densities of tortoises, and receives high casual use by the public.)

- For all events: Permittees shall be responsible for trash and litter clean-up along the course and in spectator and pit areas. Stakes, flagging materials, temporary facilities, litter, and all other event-related materials shall be removed from the course and pit, parking, and spectator areas. The race courses and parking areas shall be restored, at a minimum, to pre-event conditions within 15 days after the event. Garbage and food will be removed from the site of the event at the end of each day and will be disposed of in authorized sanitary landfills.

- For speed events, including non-speed sections: To reduce casual use within the vicinity of courses, on a case-by-case basis, race areas may be legally closed to casual use on the day of the event. The determination as to whether to close the event area will be made after reviewing the type of event, number of spectators and pit crews expected, location, ability to access the event area and history of similar events. If an area is closed, the promoter will be required to station monitors and/or post signs at road intersections, prohibiting public access, where the general public is likely to access the race course. If the promoter does not control access, BLM will perform this function.

- For all events: Any desert tortoises found on or adjacent to the event course shall be moved into undisturbed desert within 1,000 ft by BLM personnel experienced or trained in the handling of tortoises, or authorized desert tortoise biologists. Tortoises shall be moved solely for the purpose of moving them out of harm's way. Desert tortoises shall not be placed on lands not under the ownership of BLM without the written permission of the landowner. All personnel involved in tortoise capture shall obtain appropriate permits from NDOW prior to handling any desert tortoise. All road repair and course cleanup crews shall be accompanied by BLM personnel or their designee to ensure that no tortoises or tortoise burrows are harmed during repair and cleaning operations.

- For speed events: Publicity runs will not occur within ACECs, and all event-related vehicular activity will be confined to authorized routes and the course itself and will not stray into vegetated areas.

- For all events: To the extent possible, the event course shall be cleared of all unauthorized vehicles and personnel prior to each event.

- All speed based portions of OHV events are prohibited within desert tortoise ACECs.

- Any disturbance of desert tortoise habitat that results from OHV events will require onsite or offsite restoration and payment of remuneration fees.

- During pre-race and post-race maintenance activities involving the use of heavy equipment a tortoise monitor will be present to check for tortoise in areas to be graded.

- Watering of the pit areas for dust control should not result in pools being created as this could potentially attract tortoises to these areas.

- Prior to the start of the time trial, an authorized desert tortoise biologist will sweep the course to check for tortoise activity on the race course. Any tortoise found on the course will be moved in accordance with term and conditions. This part of the course will be marked as an area of tortoise activity and will be inspected for tortoise activity prior to the start of the race. Any tortoise found prior to the start will be moved in accordance with terms and conditions.

- In the section of race course that allows for passing, passing is authorized in those areas that have a clear and defined second lane. Areas not authorized for passing will be clearly flagged. Vehicles passing in areas not authorized will be disqualified.

- Individuals assigned to the check points will conduct a 15-minute search along both sides of the course prior to the start of the race. Any tortoise found will be moved as stated above.

- BLM will inspect the course after the race activities to document any observable instances of "take" to desert tortoise from implementation of the proposed action. Timing of the inspection will be determined for each event.

- BLM or the promoter will inform all event-related staff and participants of the stipulations for the event during a pre-race meeting with BLM.

- <u>Horse endurance rides</u> will be limited to existing roads and trails. Horse endurance rides are considered speed events and will not be permitted in desert tortoise ACECs until the RMP is amended to reclassify the event.

- Any temporary water troughs will be removed upon conclusion of the event. If drained onsite, they will be drained in such a way as to minimize disturbance to natural wash systems.

- Certified weed-free hay will be required by permittees and participants associated with horse trail and endurance rides, if available.

- Staging/veterinarian check stations will be returned to pre-event conditions within one week of the event. Should pre-event conditions not be restored, the applicant will be responsible for reimbursement of costs accrued during clean-up or restoration.

3.3.2.4 <u>Livestock Grazing Measures</u>

- All vehicle use in desert tortoise habitat associated with livestock grazing, with the exception of range improvements, shall be restricted to existing roads, trails, large sandy washes, and ways. Permittees and associated workers shall comply with posted speed limits on access roads. Within Clark County, the speed limit is 25 mph on unposted county roads. No new access roads shall be created. Range improvement projects associated with grazing allotments administered by the SNDO shall comply with terms and conditions outlined above for construction projects.

- Tortoises discovered by the permittee to be in imminent danger during routine cattle movement or maintenance activities, may be moved out of harm's way by the permittee if it is necessary to save the tortoise. If such an incident occurs, the permittee shall notify BLM within 48 hours, and BLM will promptly notify the Service.

- Trash and garbage shall be removed from each project site that is associated with livestock grazing operation and be disposed offsite in a designated facility. No trash or garbage shall be buried on BLM land.

- Use of hay or grains as a feeding supplement shall be prohibited within grazing allotments outside corrals or similar enclosures to avoid the introduction of nonnative plant species. Mineral and salt blocks are authorized subject to 43 CFR section 4130.6-2(c) and placed in previously disturbed areas wherever possible, to minimize impacts to desert tortoise and its habitat. In some cases, blocks may be placed in areas that have a net benefit to tortoise by distributing livestock more evenly throughout the allotment, and minimizing concentrations of livestock that result in habitat damage.

- Only weed-free hay will be used if supplemental feeding is required and is available.

- Manage for a minimum of 15 percent canopy cover for each ecological site located in the valleys of each allotment or a different canopy based on the expected natural conditions of the site in coordination with the Service. Canopy cover will be determined by measuring only the native perennial species and will be evaluated within the limitations of the ecological sites potential.

  NOTE: Native and introduced annuals are not included in the canopy cover because introduced annuals are not desirable and both are climatically variable in their potential for cover on a particular year. For example, if the existing cover is 45 percent for a specific ecological site, then this will be maintained. On the other hand, if the existing cover is 10 percent and the ecological site and existing soil and vegetation conditions indicate that 15 percent or greater is possible, management will strive to attain a minimum of 15 percent canopy cover.

- Manage for native perennial grass, native perennial forbs, shrub and tree species diversity specific to respective ecological sites on each. This will be analyzed and evaluated within the limitations of the ecological site potential

  NOTE: If a range site currently has 30 different native plant species, this will be maintained or increased, depending on the range site potential. On the other hand, if the existing species diversity is six and the ecological site and existing soil and vegetation conditions indicate that 15 or greater is possible, management will strive to attain a minimum of 15 different native perennial grass, forb, shrub and tree species.

- Manage for the reestablishment by seedling and/or resprouting/regrowth of perennial grass and shrub species endemic to the respective ecological sites.

- Livestock grazing on open allotments is managed under prescription 2. If the allotment is in good ecological condition (*i.e.*, 51 percent of the PNC or greater), or in a static or upward trend: (1) From March 1 to October 14, forage utilization management levels are 40 percent on key perennial grasses, forbs, and shrubs; (2) between October 15 and February 28, forage utilization management levels are 50 percent on key perennial grasses and 45 percent on key shrubs and perennial forbs; (3) when the use levels are reached, livestock will be moved to another location within the allotment or taken entirely off the allotment; and (4) management will attempt to maintain a minimum diversity of 15 species for native perennial grass, forb, shrub and tree species, where applicable.

- Livestock levels will be adjusted to reflect significant, unusual climatic conditions which result in a dramatic change in range conditions (*e.g*., drought and fire), which negatively impact the ability of the allotment to support both tortoises and cattle to a degree considered by the Service beyond the scope of this consultation.

- Short-term management objectives (*e.g.*, use-pattern mapping) shall be evaluated and consolidated annually to determine if short-term objectives are being met. Long-term management objectives (*e.g*., trend, ecological condition, and frequency) will be evaluated and consolidated every 3-5 years to determine if long-term objectives are being met. Range studies shall be consolidated and a determination will be made concerning the attainment of allotment-level objectives at the end of each year of each permit period. Any needed management changes or alternatives shall be considered at this time.

- Any livestock that move into areas closed to grazing shall be promptly captured, ear-tagged with BLM-issued tags, and moved back to the allotment within 72 hours of notification of straying. The authorized officer may approve some other time frame based on extraordinary circumstances whenever the permittee independently discovers cattle have strayed or when notified by BLM or other entity. The ear-tag numbers of these cattle will be recorded and submitted in writing by the permittee to the SNDO and the Service's Nevada Fish and Wildlife Office in Las Vegas within 5 days of tagging. If offending livestock are identified in critical habitat a total of three times, they shall be permanently removed from the allotment. If straying of livestock becomes problematic, BLM, in consultation with the Service, shall take measures to ensure straying is prevented.

- Regular site visits shall be made to open allotments that are actively grazed by livestock by BLM rangeland specialists and other qualified personnel, including Service biologists, to ensure compliance with the terms and conditions of the biological opinion and the stipulations of the grazing license. Any items in non-compliance shall be rectified by BLM and reported to the Service.

3.3.3 Measures for Listed Birds

Although this PBO does not exempt incidental take for listed birds, the measures proposed below by BLM may be applied towards projects to be appended under this PBO to minimize potential effects to the species.

- No project activities will occur from April 15 through September 15 within 0.5 mi of southwestern willow flycatchers or Yuma clapper rail nests.

- Conduct protocol surveys in the vicinity of the project area.

- Minimize noise disturbance near southwestern willow flycatcher and Yuma clapper rail breeding habitat. Birds are sensitive to vibration, which occurs with low-frequency noise (Bowles 1995). Such efforts include rerouting trails and day-use areas away from occupied habitat.

- Minimize attractants to scavengers, predators, and brown-headed cowbirds. Where recreation users congregate, provide adequate waste facilities (covered trash receptacles, restrooms) and regular collection service. Place horse stables away from suitable and occupied habitat. Avoid use of birdseed feeders that use cowbird preferred seeds such as millet.

- Verify evidence of new southwestern willow flycatcher or Yuma clapper rail presence (via non-project related surveys, observations, etc.) by BLM, Service, or contract biologists. Vegetation management activity will be halted pending verification of each sighting. Confirmations will be documented in the official GIS project map as treatment avoidance polygons. The polygon dimension and shape will be determined by the Service. As a minimum default, point source sightings will be GIS buffered to a 200-ft radius.

- Do not allow competitive OHV events within 0.25 mi of natural water sources and associated riparian areas.

- Exclusively use the U.S Environmental Protection Agency (EPA) aquatic registered herbicide *Habitat* within 25 ft of the daily high water mark of a river.

- Within 25 ft of the daily high water mark, use backpack sprayers. Spraying methods will include cut-stump, low volume basal bark and/or foliar.

- Beyond 25 ft of the daily water mark, use either *Garlon 4* or *Habitat*, dependent upon site conditions. EPA label compliance, minimization of chemical uses overall, and saltcedar efficacy will be the selection criteria. Equipment will consist of ATV-mounted sprayers and backpack sprayers.

- Site or project access will be by existing road. Vehicles will not exceed 25 mph on unposted dirt roads.

- Protect important resting/nesting habitat such as riparian areas and mesquite/acacia woodlands. Minimize impacts that may result from projects that may adversely affect the water table supporting plant communities that provide habitat for these avian species.

- Equipment staging and storage areas will be situated outside of the riverbed.

- Remove all construction equipment from the river channel prior to onset of storm events.

- Replace trees with native species that are removed for structure placement.

- Place structures to avoid sensitive features such as, but not limited to, riparian areas and watercourses and/or to allow electric conductors to clearly span the features, within limits of the standard structure design. If the sensitive features cannot be completely avoided, structures will be placed to minimize disturbance.

- If off-site fill material is utilized, survey the fill source site for nonnative plants. Only fill from non-contaminated sites shall be used.

- Obtain water used for dust abatement and other construction activities from a source free of nonnative plant seeds, if possible.

- Implement temporary or final erosion control measures immediately upon completion of clearing and grade building to reduce erosion during rainfall events. Material used for erosion control (straw, etc.) must be certified as weed free. Disturbed areas will be rehabilitated by seeding with native species collected from the project or general area. A list of seeds to be collected will be created and recommended seeding rates established, then reviewed and approved by the Service prior to the beginning of construction work. Seed collecting will be conducted when appropriate before the seed is needed so that the seed is viable when planted. Seeding needs to be done in the appropriate season to enhance germination (*i.e.*, timed for rain).

- Minimize removal of vegetation by having transmission lines span washes.

- Whenever possible, avoid surface occupancy in riparian zones.

- Provide protection (such as fencing) around springs and riparian habitats to prevent habitat degradation from excessive use by grazing animals.

- Control and/or eradicate saltcedar in a manner not to disturb breeding or nesting birds. Rehabilitate the area with native species to help reduce the potential for saltcedar reestablishment and improve ecosystem health.

- Improve riparian areas, giving priority to areas functioning at risk with a downward trend. Implement measures to protect riparian areas, such as fencing and/or alternate water sources away from the riparian area. Insure that the minimum requirement of Proper Functioning Condition on all riparian areas is maintained or achieved.

- Prior to commencing mechanized removal of standing live saltcedar, ground-truth and revise GIS data to insure that such treatment activity is solely restricted to non-suitable southwestern willow flycatcher or Yuma clapper rail habitat.

- Prohibit hand-treatment activity in potential suitable southwestern willow flycatcher or Yuma clapper rail habitat during the breeding season until negative presence data has been collected in 3 years of successive surveys, per the Service-approved protocol.

- Prohibit mechanical removal of standing saltcedar during the southwestern willow flycatcher breeding season in Nevada, which is from April 15 through September 15.

- Schedule subsurface mechanical removal of saltcedar root crowns (root plowing) outside the southwestern willow flycatcher breeding season in Nevada (April 15 through September 15). Root removal drastically increases the saltcedar kill rate; thus reducing the volume of (post-mechanical) chemical that must be applied to the saltcedar re-sprouts. Should abnormal delays (weather, logistics, etc.) develop during the spring root plowing treatment period, adherence to the April 15 shut-down date may be negotiated case-by-case with the Service. Such contingencies will trigger an additional minimization measure, in the form of leaving a 200-ft untreated buffer along any off-site vegetation that poses potential harassment take of southwestern willow flycatcher.

- To prevent herbicide/sediment run-off, a minimum 30-ft-wide buffer of standing vegetation will remain untreated, measured from the daily high water mark (no treatment within 30 ft of daily high water mark).

- Prohibit native trees from being cut, shredded, crushed or otherwise intentionally affected during the vegetation management activities. Patches of native shrubs greater than 15 ft in diameter will be avoided to the extent feasible, during mechanized treatment operations. Saltcedar in these patches will be hand-cut and backhauled.

- Where monitoring reveals that a treated site is sustaining unacceptable effects from trespass cattle, ATV use, etc., erect temporary exclosure fencing. Fences will be located on prior disturbance and will not affect native vegetation.

- Monitor weather reports. Chemical applications will not occur within 24 hours of forecasted precipitation, nor whenever ground level wind speeds exceed 10 mph.

- Mix and transfer chemicals in secondary containment tubs, to capture any spillage and to minimize exposure no closer than 200 ft from the daily high water mark, in order to catch spillage and to minimize exposure to non-target areas.

- Handle containers/equipment per the chemical label instructions. Spill responses will comply with the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR 300).

- Except during mechanical treatment operations, favor the use of ATV equipment over full-sized vehicles to the extent feasible, during on-site activities (seeding, harrowing, supply transport, spraying, etc.).

- Manage livestock grazing consistent with riparian objectives of reaching or maintaining Proper Functioning Condition.

- As grazing systems are developed for each allotment, ensure the system is consistent with the conservation of BLM listed species.

- Exercise due diligence to prevent work-related wildfires. Due diligence will consist of adhering to the specific measures identified above for hazardous fuels projects.

- After fire suppression is completed in Yuma clapper rail habitat, review any available survey records of the burn site and record in the fire report the number of rails recorded from the vicinity during these surveys.

- Evaluate past surveys for Yuma clapper rails as part of the planning for prescribed fire projects to document reduction in clapper rail use of the site that may be related to reduction in habitat quality. Post-project surveys should also be conducted to document the regrowth of cattail habitats and occupancy by clapper rails. This information will enhance our knowledge of the appropriate management cycle to maintain clapper rail habitat along the Colorado River.

- Conduct prescribed burns prior to the breeding season. There will be habitat adjacent to the burn area suitable for breeding.

3.3.3.1 <u>Measures to Minimize Effects of Wildfire Fuel Reduction Projects on Listed Birds</u>

- Any evidence of new southwestern willow flycatcher presence (via non-project related surveys, observations, etc.) will be immediately verified by BLM, Service, or contract biologists. Fuels project activity will be halted pending verification of each sighting. Confirmations will be documented in the official GIS project map as treatment avoidance polygons. The polygon dimension and shape will be determined by the Service. As a minimum default, point source southwestern willow flycatcher sightings will be GIS buffered to a 200-ft radius.

- Mechanical removal of standing saltcedar will occur outside of the southwestern willow flycatcher breeding season in Nevada, which is from April 15 through September 15.

- Subsurface mechanical removal of saltcedar root crowns (root plowing) will be scheduled outside the southwestern willow flycatcher breeding season in Nevada

(April 15 through September 15). Root removal drastically increases the saltcedar kill rate; thus reducing the volume of (post-mechanical) chemical that must be applied to the saltcedar re-sprouts. Should abnormal delays (weather, logistics, etc.) develop during the spring root plowing treatment period, adherence to the April 15 shut-down date may be negotiated case-by-case with the Service. Such contingencies will trigger an additional minimization measure, in the form of leaving a 200-ft untreated buffer along any off-site vegetation that poses potential harassment take of southwestern willow flycatcher.

- To prevent herbicide/sediment run-off, a minimum 30-ft-wide buffer of standing vegetation will remain untreated, measured from the daily high water mark (no treatment within 30 ft of daily high water mark).

- Where fish monitoring studies indicate such need, supplemental buffer structures (silt fences, straw wattles, etc.) will be installed on fuels treatment sites to remediate run-off impacts.

- No native trees will be cut, shredded, crushed or otherwise intentionally impacted during the hazardous fuels treatment activities. Patches of native shrubs greater than 15 ft in diameter will be avoided to the extent feasible during mechanized treatment operations. Saltcedar in these patches will be hand-cut and backhauled.

- Where monitoring reveals that a treated site is sustaining unacceptable impacts, temporary exclosure fencing may be erected. Fences will be located on prior disturbance and will not impact native vegetation.

- The herbicide *Habitat* will be the exclusive use herbicide within 25 ft of the daily high water mark of the river.

- Within 25 ft of the daily high water mark, herbicide equipment will consist of backpack sprayers. Spraying methods will include: cut-stump, low volume basal bark and/or foliar.

- Beyond 25 ft of the daily water mark, herbicides will consist of either *Garlon 4* or *Habitat*, dependent upon site conditions. EPA label compliance, minimization of chemical uses overall, plus saltcedar efficacy will be the selection criteria. Equipment will consist of ATV-mounted sprayers and backpack sprayers.

- Non-toxic marking dye will be added to the herbicide solution to insure adequate coverage and to avoid redundant spraying of individual target plants.

- Weather reports will be monitored. Chemical applications will not occur within 24 hours of forecasted precipitation; nor whenever ground-level wind speeds exceed 10 mph.

- To minimize volatilization, *Garlon 4* use will occur when ambient air temperatures are between 60 and 90°F.

- Mixing/transfer of chemicals will be done in secondary containment tubs, to capture any spillage and to minimize exposure no closer than 200 ft from the daily high water mark, in order to catch spillage and to minimize exposure to non-target areas.

- Containers/equipment will be handled per the chemical label instructions. Spill responses will comply with National Oil and Hazardous Substances Pollution Contingency Plan.

- Access will be by existing road. Vehicles will not exceed 25 mph on unposted dirt roads.

- Except during mechanical treatment operations, the use of ATV equipment will be preferred over full-sized vehicles to the extent feasible during on-site activities (seeding, harrowing, supply transport, spraying, etc.).

- No excavation or earthmoving will occur that would trigger the Section 404 Clean Water Act permit process with the U.S. Army Corps of Engineers.

- Monitoring will be conducted to detect initial presence or post-treatment recruitment of invasive or noxious weed species, including saltcedar. Monitoring and control efforts will comply with BLM Manual 9025.8 and the Nevada Weed Management Strategy.

- BLM or its contractors will exercise due diligence to prevent work-related wildfires. Due diligence will consist of adhering to these specific measures:

    - Hot chainsaws will only be set down on bare ground. If bare ground is not present, the crew will clear ground cover vegetation/duff in an appropriate, minimum dimension.

    - All chainsaws shall be equipped with OSHA-standard spark arrestors.

    - No open flames shall be permitted in the project area.

    - No smoking shall be permitted in the project area.

    - Crews operating chainsaws shall be equipped with one 10-pound fire extinguisher and two fire shovels, at minimum. This suppression gear shall be kept in immediate reach at all times during chainsaw operations.

    - If the above due diligence is exercised but an unintentional wildfire nonetheless is caused by the project proponents/contractors, BLM will consult with the Service on a case-by-case basis to identify appropriate rehabilitation treatment options.

3.3.4 Measures for Ash Meadows Plants

- All proposed projects in the Ash Meadows ACEC and adjacent BLM lands will be surveyed for listed plants species using techniques appropriate for the species. Projects will be sited to avoid impacts to the species, to the greatest extent possible.

- Projects sited within habitat of the Ash Meadows plants will be designed to reduce surface disturbance and loss of plants to the greatest extent possible if avoidance cannot be achieved.

- Prohibit commercial collection of vegetative specimens within the Ash Meadows ACEC.

- Avoid or minimize alterations of surface hydrology to ensure habitat is maintained for the species.

- Implement best management practices to prevent spills, drift, or erosion that will degrade habitat quality.

- Utilize existing roads to access mines and other use areas to the maximum extent feasible to reduce new habitat disturbance. Roads that will no longer be needed will be analyzed for closure and restoration.

- For spring-loving centaury, Ash Meadows gumplant, Ash Meadows ivesia, and Amargosa niterwort, BLM will install signs at springs explaining the need for their protection and to reiterate State law that prohibits camping within 100 yards (91 m) of water sources, on a case-by-case basis.

- Monitor nonnative species within habitat for the Ash Meadows plants. Make treatment of incipient weed populations a high priority.

3.3.5 Ash Meadows Naucorid Measures

- Avoid, or minimize when avoidance is not possible, alterations of surface and subsurface hydrology to ensure habitat is maintained for the species.

- Utilize existing roads to access mines and other use areas to the maximum extent feasible to reduce new habitat disturbance. Roads that are no longer needed will be analyzed for closure and restoration.

3.3.6 **Listed Fish Species Measures**

- Avoid, or minimize when avoidance is not possible, alterations of available groundwater to ensure habitat is maintained for the species.

- A qualified biologist will conduct fish surveys 200 ft upstream and downstream of project areas - once in spring or fall prior to initiation of projects occurring within Muddy River and Virgin River. If Moapa dace, Virgin River chub (Virgin River population), or woundfin are found, BLM will contact the Service immediately to determine if additional minimization measures are necessary.

- Projects occurring in areas potentially occupied by listed fish will be required to have a qualified biologist, permitted by the Service and BLM, onsite to monitor project compliance. The biologist will coordinate with BLM wildlife staff to determine the level/intensity of monitoring required (full-time or spot checks).

- Use of *Garlon 4* is prohibited within 25 ft of water.

- Only use fish safe herbicides (*Rodeo* or *Roundup*) adjacent the water or within the lower floodplain.

- Implement best management practices to prevent spills, drift, or erosion that will degrade habitat quality.

- Where fish monitoring studies indicate, install supplemental buffer structures (silt fences, straw wattles, etc.) on fuels treatment sites to remediate run-off effects.

- Do not allow competitive off-road vehicle events within 0.25 mi of natural water sources and associated riparian areas.

- Avoid, or minimize when avoidance is not possible, alterations of available groundwater to ensure habitat is maintained for the species.

- Utilize existing roads to access mines and other use areas to the maximum extent feasible to reduce new habitat disturbance. Roads that are no longer needed will be analyzed for closure and restoration.

- Implement best management practices to prevent spills, drift, or erosion that will degrade habitat quality.

3.3.7 **Wild horse and Burro Management Measures**

- Trap sites will be located in previously disturbed areas where possible. Any significant surface disturbance resulting from herd gathers will be restored to prevent continued public use.

- Only weed-free hay will be used if available and supplemental feeding is required.

3.3.8 Measures to Minimize Threat of Nonnative Plants

- Rehabilitate, reclaim, or revegetate areas subjected to surface-disturbing activities where feasible. Habitat will be reclaimed so that pre-disturbance conditions can be reached within a reasonable time frame. Reclamation may include salvage and transplant of cacti and yucca, recontouring the area, scarification of compacted soil, soil amendments, seeding, vertical mulch, and transplant of seedling shrubs. If necessary subsequent seeding or transplanting efforts may be required, should monitoring indicate that the original effort was not successful.

- Complete a Weed Risk Assessment for the proposed project prior to construction activities. This document will address the presence of any weeds; the potential for weeds within the project area to be spread to non-infested areas within the project area; the potential for introducing weeds into the project area via vehicles, equipment, fill material, and water brought in from an outside source; and minimization to reduce the potential for spreading weeds.

- If off-site fill material is used, survey the site where the fill source comes from for noxious plants. Only fill from non-contaminated sites shall be used.

- Certify that all plant material including animal feed and material used for erosion control (straw, etc.) is weed-free.

- Clean all equipment of weed and grass seeds, stems, stalks, etc., prior to arrival and release from the project site. The washdown will concentrate on the undercarriage, with special emphasis on axles, crossmembers, motor mounts, and on and underneath steps, running boards and front bumper/bushguard assemblies.

- Should there be concentrated areas of noxious weeds within the project area, additional spraying of equipment may be required to prevent the contamination of uninfested areas.

- Wash sites will be mapped for future monitoring of weed infestations.

- Mechanized treatments will not be conducted on slopes greater than 30 percent to minimize erosion.

- Treatments that compact and disturb the soil to the degree that runoff and erosion would be increased should be ripped and properly drained.

- Untreated islands of natural vegetation would be left to minimize negative impacts of the natural community.

- When herbicide use is approved by BLM and the Service, applicant will follow information and guidelines provided on label and pesticide use permit.

- Use appropriate buffer strips when herbicide is applied near streams, lakes, and ponds. Buffer strip widths will be based on the chemical to be applied and determined specifically when future actions are proposed to be appended to this PBO.

- Implement water monitoring studies to ensure buffer strips and administrative controls were adequate to prevent water quality and aquatic environment impacts.

3.3.9 Fire Management Measures

- Recognizing the protection of human life and the safety of firefighters are the first priorities of wildland firefighting, the following minimization measures will be used to minimize impacts to threatened and endangered plants and wildlife present.

- Apply Minimum Impact Suppression Techniques (MIST) within riparian habitat.

- In riparian areas, prioritize suppression actions to minimize damage to native vegetation from wildfire or suppression operations.

- Fire suppression in riparian habitat will be coordinated with the approved Resource Advisor if the fire exceeds 10 ac in size.

- In riparian areas, use natural barriers or openings in riparian vegetation where possible as the easiest, safest method to manage a riparian wildfire. Where possible and practical use wet firebreaks rather than constructing firelines by hand or with heavy equipment.

- Avoid burning out unburned islands, whenever possible.

- Utilize firing tactics only if necessary to protect firefighter or public safety.

- Avoid surface-disturbing suppression activities in riparian areas whenever possible.

- Avoid dropping retardant within 300 ft of water sources, to the maximum extent feasible. Because of the extremely sensitive nature of aquatic ecosystems, any equipment used for water drops must be cleaned and disinfected by following the *Operational Guidelines for Aquatic Invasive Species Prevention and Equipment Cleaning* prior to arrival. Only municipal and designated water sources will be used for fire suppression activities in the Ash Meadows ACEC. Because of the potential to transmit nonnative fishes and invertebrates, any water drops taken from Crystal Reservoir must be used 100 ft or more away from springs, streams or other water natural sources.

- Use of containment systems for portable pumps to avoid fuel spills in riparian or aquatic systems will be required.

- BLM will coordinate with the Service's Fire Management Officer and the Ash Meadows NWR Manager, Ash Meadows NWR biologist, or designee, for any fire within the Ash Meadows ACEC.

- The Incident Command (IC) will be required to call for a resource advisor for any fire in the Ash Meadows ACEC.

- No water flow from any spring or stream will be diverted from the existing water course unless specifically authorized by the Ash Meadows NWR Manager.

- Rare plant habitat in the Ash Meadows area appears barren and largely devoid of vegetation; to minimize potential impacts to rare plant habitat, the IC will coordinate the placement of staging areas, fire camps and fire line with the resource advisor. To the extent practical, the staging areas, fire camps and other ground-disturbing activities will use the areas recommended and will avoid rare plant habitat.

- Unless otherwise required for safety and control concerns, islands of unburned vegetation or unburned fingers will not be burned out.

- The resource advisor will provide guidance to the IC to prevent the spread of noxious, invasive species. This may include the use of wash stations or other measures prior to arrival or departure from the incident.

- During Type I and Type II incidents all incoming fire personnel will be briefed on listed species in the Ash Meadows area, their habitat, and impact minimize measures. Type 1 incidents are determined by higher complexity due to political issues, values at risk, proximity to cities and multiple agencies involved, etc.

- During the mopping up phase and prior to leaving an incident, a resource advisor will provide the IC with a list of post fire stabilization and rehabilitation actions needed to repair suppression impacts, such as obliterating overland vehicle tracks, installing vertical mulch and rocks to block access to temporary access roads and staging areas.

- On an annual basis, BLM renewable resources will provide awareness training to local fire personnel and IC staff regarding listed species. Natural resource protection awareness materials will be posted in local fire stations and in fire camps at larger incidents.

- BLM ESR program processes will be employed to evaluate potential treatments in a manner favorable to listed species.

- To the extent practical, BLM will monitor for newly introduced populations of weeds resulting from suppression activities.

- To the extent practical and within funding constraints, BLM will monitor long-term and cumulative fire effects on listed species.

3.3.9.1 Measures for fire suppression in the Virgin River, Muddy River, and Meadow Valley Wash

- All applicable measures above shall be implemented.

- The resource management goal of fire suppression activities will be to minimize damage to stands of native vegetation and cultural resources from wildfire and fire suppression activities.

- The Virgin River above Halfway Wash and the Muddy River cannot be used as water sources for suppression activities (dip sites, pump drafting, etc.) without specific authorization from a resource advisor or biologist knowledgeable about listed species in the watershed, unless there is an imminent threat to human health and safety as determined by the IC.

- To avoid damage to biologica resources, ground-disturbing activities will be minimized in riparian habitat and the adjacent river terraces. The IC will solicit guidance from resource advisors regarding placement of fire camps, staging areas and other ground-disturbing activities.

- During Type I and Type II incidents, all incoming fire personnel will be briefed on listed species in the Virgin River, Muddy River, and Meadow Valley Wash, their habitat, and impact minimization measures, particularly those associated with vehicle use.

- On an annual basis, BLM renewable resources will provide awareness training to local fire personnel and IC staff regarding listed species in the Virgin River, Muddy River, and Meadow Valley Wash. Natural resource protection awareness materials will be posted in local fire stations.

3.3.9.2 Measures for wildfire suppression to minimize effects to the desert tortoise and its critical habitat

- All applicable measures above shall be implemented.

- The IC will call for a resource advisor for all fires larger than 10 ac.

- Establish fire camps, staging areas, and helispots in previously disturbed areas outside of ACEC's and designated critical habitat units (CHU), where possible, in consultation with a qualified Resource Advisor.

- Provide all firefighters and support personnel with a briefing on desert tortoises and their habitat to minimize take, particularly those associated with vehicle use.

- BLM will give priority to keeping each wildfire in desert tortoise habitat to less than 50 ac in size.

- The IC will consider immediately the use of air attack resources (water and retardant drops) to limit fire spread in Areas A and B.

- Fire in desert tortoise habitat will be fought to minimize the area burned. The IC will consider backfires/burnouts, off- road driving or heavy equipment to construct fire line that may have substantial impacts, but may be justified in order to minimize acres burned.

- The IC will stop all habitat damaging tactics when they are no longer required to prevent a larger or more severe fire and switch to MIST as soon as possible.

- Where water drops may affect watersheds or have the potential to introduce nonnative aquatic organisms into springs and wetlands, municipal water sources will be used for water drops [unless it results in a larger fire]. This will prevent spreading nonnative organisms by following the *Operational Guidelines for Aquatic Invasive Species Prevention and Equipment Cleaning*.

- To the extent practical, fire camps, staging areas, and helispots will be placed in previously disturbed areas outside of ACECs and designated CHUs.

- During Type I and Type II incidents all incoming fire personnel will be briefed on desert tortoises, their habitat, and impact minimize measures.

- Within 24 hours of containment, or when the IC determines it is safe, BLM will begin a post fire mortality and habitat damage assessment of fire suppression impacts.

- The ESR program will evaluate potential treatments in a manner favorable to the desert tortoise.

3.3.10 Hazardous Materials Measures

- Small hazmat sites of less than 0.25 ac in size will be cleaned up using hand tools, a Bobcat, or other heavy equipment.

- In non-emergency situations, if the site is suitable habitat for desert tortoise and it is located in the Las Vegas Valley, a tortoise survey will be done at the option of hazmat personnel. The individual or agency responsible for the incident will be required to pay appropriate fees. For those cases where the responsible party cannot be identified, payment of fees will be determined on a case-by-case basis. Tortoises injured or contaminated will be taken to a veterinarian for treatment.

- In non-emergency situations, on sites located outside of the Las Vegas Valley, all sites, access routes, staging areas, etc., will be cleared by an authorized biologist before the start of removal or remediation in accordance with protocols listed above.

- In emergency situations in any location, the following minimization measures will be implemented, provided that implementation of these measures will not delay containment, cause risks to human life, or cause substantial damage to property, or result in greater damage to natural resources:

- Vehicles will stay on existing roads to the extent practicable.
- An on-scene coordinator's representative will contact a BLM or Service biologist as soon as possible after notification of the event to obtain site-specific information and recommendations.
- Following containment, after the fact reports will be provided to the Service describing the situation and actions taken.
- If possible, overnight parking and storage of equipment and materials, including stockpiling, shall be in previously disturbed areas within the designated area, which will be clearly delineated. If not possible, a qualified desert tortoise biologist shall designate an area.

Section 4: Analytical Framework for the Service's Determinations

4.1 Jeopardy Determination

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

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

4.2 Adverse Modification Determination

Section 7(a)(2) of the Act also requires that Federal agencies ensure that any action they authorize, fund, or carry out does not result in the destruction or adverse modification of designated critical habitat.

The action area includes all or portions of the Mormon Mesa CHU, Gold Butte-Pakoon CHU, and Piute-Eldorado CHU for the desert tortoise; and critical habitat for the southwestern willow flycatcher (which is unaffected by the proposed rule to re-designate critical habitat for the species), Virgin River chub, woundfin, and all Ash Meadows species except the Amargosa niterwort and Warm Springs pupfish.

Section 5: Status of the Species and Critical Habitat – Rangewide

5.1 **Desert Tortoise**

Listing

On August 20, 1980, the Service published a final rule listing the Beaver Dam Slope population of the desert tortoise in Utah as threatened and designated 16,640 ac of BLM-administered land as critical habitat (45 *Federal Register* 55654). Major threats to the species identified in the rule included habitat destruction through development, overgrazing, and geothermal development, collection for pets, malicious killing, road kills, and competition with grazing or feral animals. In 1984, Defenders of Wildlife, Natural Resources Defense Council, and Environmental Defense Fund petitioned the Service to list the species as endangered. The following year, we determined that listing the desert tortoise as endangered was warranted, but higher priorities precluded any action.

In 1989, more information regarding threats to desert tortoises became available prompting the Service to publish an emergency rule listing the Mojave population (all desert tortoises north and west of the Colorado River) as endangered (54 *Federal Register* 32326). On April 2, 1990, the Service determined the Mojave population of the desert tortoise to be threatened (55 *Federal Register* 12178). Reasons for the determination included significant population declines, loss of habitat from construction projects such as roads, housing and energy developments, and conversion of native habitat to agriculture. Livestock grazing and OHV use were identified as factors causing degradation of additional habitat. Also cited as threatening the desert tortoise's continuing existence were: illegal collection by humans for pets or consumption; upper respiratory tract disease; predation on juvenile desert tortoises by common ravens, coyotes, and kit foxes; fire; and collisions with vehicles on paved and unpaved roads.

The species was listed as threatened under the California Endangered Species Act in 1989 and is considered a species at risk under California's Wildlife Action Plan (Bunn *et al.* 2007). California Department of Fish and Game manages over 48,000 ac of land for the conservation of the desert tortoise, and additional lands acquired as mitigation for projects that result in impacts to the species. The Mojave desert tortoise is protected by state regulations in Nevada, Arizona, and Utah.

Status and Distribution

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

The 5-year review 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 5-year review also describes its ecology, life history, spatial distribution, abundance, habitats, and the threats that led to its listing (*i.e.,* the 5-factor analysis required by section 4(a)(1) of the Act). The 5-year review concludes 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 1994a and 2011, respectively) do not qualify as distinct population segments under the Service's distinct population segment policy (61 *Federal Register* 4722; February 7, 1996). We reached this conclusion because individuals of the listed taxon occupy habitat that is relatively continuously distributed, exhibit genetic differentiation that is consistent with isolation-by-distance in a continuous-distribution model of gene flow, and likely vary in behavioral and physiological characteristics across the area they occupy as a result of the transitional nature of, or environmental gradations between, the described subdivisions of the Mojave and Colorado deserts.

The 5-year review summarizes information with regard to the desert tortoise's ecology and life history. Of key importance to assessing threats to the species and to developing and implementing a strategy for recovery is that desert tortoises are long-lived, requiring up to 20 years to reach sexual maturity, and having 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 5-year review discusses various means by which researchers have attempted to determine the abundance of desert tortoises and the strengths and weaknesses of those methods. The 5-year review provides a summary table of the results of rangewide monitoring that the Service initiated in 2001. This ongoing sampling effort is the first comprehensive attempt to determine the densities of desert tortoises across their range. Table 1 of the 5-year review provides a summary of data collected from 2001 through 2007; we summarize data from the 2008 through 2010 sampling efforts in subsequent reports. As the 5-year review notes, much of the difference in densities between years is due to variability in sampling; determining actual changes in densities will require many years of monitoring. Additionally, due to differences in area covered and especially to the non-representative nature of earlier sample sites, data gathered by the rangewide monitoring program cannot be reliably compared to information gathered through other means at this time.

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

To begin integrating anthropogenic activities and the variable risk levels they bring to different parts of the Mojave and Colorado deserts, the 5-year review contains an extensive review of the threats that were known to affect desert tortoises at the time of their listing and updates that information with more current findings. The review follows the format of the five-factor analysis required by section 4(a)(1) of the Act. The Service described these threats as part of the process of its listing (55 *Federal Register* 12178; April 2, 1990), further discussed them in the original recovery plan (Service 1994a), and reviewed them again in the revised recovery plan (Service 2011).

To better understand the relationship of threats to populations of desert tortoises and how to implement recovery actions most effectively, the Desert Tortoise Recovery Office is developing a spatial decision support system that models the interrelationships of threats to desert tortoises and how those threats affect population change. The spatial decision support system describes the numerous threats that desert tortoises face, explains how these threats interact to affect individual animals and habitat, and how these effects in turn bring about changes in populations. For example, we have long known that the construction of a transmission line can result in the death of desert tortoises and loss of habitat. We also have known that common ravens, known predators of desert tortoises, use the transmission line's pylons for nesting, roosting, and perching and that the access routes associated with transmission lines provide a vector for the introduction and spread of invasive weeds and increase human access into an area. Increases in 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 as a result of invasive weeds can compromise the physiological health of desert tortoises, making them more vulnerable to drought, disease, and predation. The spatial decision support system allows us to map threats across the range of the desert tortoise and model the intensity of stresses that these multiple and combined threats place on desert tortoise populations.

The Service described these threats as part of the process of its listing (55 *Federal Register* 12178; April 2, 1990), further discussed them in the original recovery plan (Service 1994a), and reviewed them again in the revised recovery plan (Service 2011). The threats described in these documents continue to affect the species. Some of the most apparent threats are those that result in mortality and permanent habitat loss across large areas, such as military operations and base expansion, urbanization, and large-scale renewable energy projects, and those that fragment and degrade habitats, such as proliferation of roads and highways, OHV vehicle activity, poor grazing management, and habitat invasion by nonnative invasive species. Indirect impacts to desert tortoise populations and habitat are also known to occur in accessible areas that interface with human activity. Most threats to the desert tortoise or its habitat are associated with human land uses; research since 1994 has clarified many mechanisms by which these threats act on desert tortoises. Increases in human access can accelerate illegal collection and release of desert tortoises and deliberate maiming and killing, as well as facilitate the spread of other threats associated with human presence, such as vehicle use, garbage and dumping, and invasive weeds. Some of the most apparent threats to the desert tortoise are those that result in mortality and permanent habitat loss across large areas, such as urbanization and large-scale renewable energy projects, and those that fragment and degrade habitats, such as proliferation of roads and highways, OHV activity, and habitat invasion by nonnative invasive plant species. However, we remain unable to adequately quantify how threats affect desert tortoise populations. The assessment of the original recovery plan emphasized the need for a better understanding of the implications of multiple, simultaneous threats facing desert tortoise populations and of the relative contribution of multiple threats on demographic factors (*i.e.,* birth rate, survivorship, fecundity, and death rate; Tracy *et al.* 2004).

Since the completion of the 5-year review, the Service has issued several biological opinions that affect large areas of desert tortoise habitat as a result of numerous proposals to develop renewable energy within its range. These biological opinions concluded that the proposed solar plants were not likely to jeopardize the continued existence of the desert tortoise primarily because they were located outside of critical habitat and DWMAs that contain most of the land base required for the recovery of species. The proposed actions also included numerous measures intended to protect desert tortoises during the construction of the projects, such as translocation of affected individuals. Desert tortoise translocation performed from 1997 to present in southern Nevada demonstrates that translocation can be an effective conservation tool. Additionally, BLM and California Energy Commission, the agencies permitting these facilities, have required the project proponents to fund numerous measures, such as land acquisition and the implementation of recovery actions that are intended to offset the adverse effects of the proposed actions. In aggregate, these projects resulted in an overall loss of approximately 26,111 ac of habitat of the desert tortoise; three of the projects (BrightSource Ivanpah, Stateline Nevada, and Desert Sunlight) constricted linkages between conservation areas that are important for the recovery of the desert tortoise. We also predicted that up to 1,444 desert tortoises would be translocated, injured, or killed as a result of these projects; we estimate that most of the individuals in these totals are juveniles. The mitigation required by BLM and the California Energy Commission will result in the acquisition of private land within critical habitat and

DWMAs and funding for the implementation of various actions that are intended to promote the recovery of the desert tortoise; at this time, we cannot assess the success of these measures.

Table 6 below summarizes information regarding the proposed solar projects that have undergone formal consultation.

Table 6. Approved solar projects in desert tortoise habitat on public and private land

Project	**Acres of Desert Tortoise Habitat**	**Recovery Unit (Service 2011)**
Ivanpah Solar Electric Generating System- CA	3,582	Eastern Mojave
Abengoa Mojave- CA	1,765	Western Mojave
Nevada Solar One- NV	400	Northeastern Mojave
Copper Mountain North, NV	1,400	Northeastern Mojave
Copper Mountain - NV	380	Northeastern Mojave
Silver State North- NV	2,966	Eastern Mojave
Genesis- CA	4,640	Colorado
Blythe- CA	7,025	Colorado
Blythe Energy II- CA	9,400	Colorado
Palen- CA	4,195	Colorado
Desert Sunlight- CA	4,165	Colorado
Amargosa Farm Road - NV	4,350	Eastern Mojave
Calico- CA	4,604	Western Mojave
Moapa KRoad Solar- NV	2,152	Northeastern Mojave

Population and habitat connectivity came to the fore as an important threat to the desert tortoise conservation as the Service analyzed the multitude of renewable energy projects proposed throughout the species' range. Quantifying the degree to which a landscape promotes or hinders movements among patches of habitat for a given species, hereafter referred to as "habitat connectivity" (Fischer and Lindenmayer 2007), has become increasingly important relative to desert tortoise recovery. As we evaluate utility-scale solar development and other land uses within the range of the species, it is essential that habitat linkages between and among populations are conserved. For gene flow to occur across the range, populations of desert tortoises need to be connected by areas of occupied habitat that support sustainable numbers of reproductive individuals. Recent research provides evidence that genetic differentiation within the Mojave population is consistent with isolation by distance in a continuous-distribution model of gene flow. Populations at the farthest extremes of the distribution are therefore the most differentiated and a gradient of genetic differentiation occurs between those populations, across the range of the species (Britten *et al*. 1997, Edwards *et al.* 2004a, Murphy *et al*. 2007, Hagerty and Tracy 2010). Genetic analyses also suggest that levels of gene flow among subpopulations of desert tortoises were likely high, corresponding to high levels of habitat connectivity (Murphy *et al.* 2007, Hagerty 2008). In essence, the Mojave population historically represents a series of continuous, overlapping home ranges within suitable habitats whose boundaries between divergent units may be validated by ecological or major topographic features, such as steep mountainous terrain or, even more significantly, the Colorado River (Germano *et al.* 1994, Nussear *et al*. 2009).

Individual desert tortoises can make long-distance movements through restricted habitats, which may contribute to gene flow (Berry 1986, Edwards *et al*. 2004b), though we do not know the extent to which individuals utilize narrow corridors of relatively intact habitat. The underpinning of the continuous-distribution model of gene flow described above, and the evidence from desert tortoise population genetic studies and distribution, is that individual desert tortoises breed with their neighbors, those desert tortoises breed with other neighbors, and so on. The movements that maintain the genetic diversity across populations occur over generations and not necessarily during the life span of a single desert tortoise. Therefore, for gene flow to happen reliably, populations need to be connected across the range by occupied areas of habitat linkages that support sustainable numbers of desert tortoises.

To define the area required to maintain resident populations within the linkages, we consider desert tortoise home range size and the magnitude of edge effects. The size of desert tortoise home ranges varies with respect to location and year (Berry 1986) and may serve as an indicator of resource availability and opportunity for reproduction and social interactions (O'Connor *et al.* 1994). Females have long-term home ranges that may be as little as or less than half that of the average male, which can range to 200 ac or more (Burge 1977, Berry 1986, Duda *et al*. 1999, Harless *et al*. 2009). Core areas used within the lifetime home range of desert tortoises depend on the number of burrows used within those areas (Harless *et al*. 2009). Over its lifetime, a desert tortoise may use more than 1.5 mi^2 of habitat and may make periodic forays of more than 7 mi at a time (Berry 1986). We therefore assess the viability of the linkages based on the ability of those linkages to maintain the lifetime home range of a desert tortoise or the ability of home ranges of this size to connect to one another absent any barriers. Because we expect lifetime home ranges to expand and contract over time, we can consider whether the linkage could remain viable in a year where decreased resource availability results in a smaller population of individuals that respond by expanding their home ranges.

In assessing lifetime home ranges, the Service (1994a) assumed a circular configuration of this area when using it in the population viability assessment. We based this assumption on the fidelity that desert tortoises exhibit towards an overwintering burrow year after year. Consequently, the overwintering burrow serves as an anchor point from which the lifetime utilization area radiates out. Using a circular lifetime home range of 1.5 mi^2 for a desert tortoise, we estimate that a linkage would need to be at least 1.4 mi wide to accommodate the width of a single home range. While the minimum width of a linkage should accommodate several home ranges (Service 1994a; Beier *et al.* 2008), we do not know the exact area or land configuration required to support sustainable numbers of resident desert tortoises within any particular linkage, which would be dependent upon several factors.

Based on the best available information, occupancy likely depends on many site-specific factors, including: 1) desert tortoise densities in the vicinity (*i.e.*, lower density sites require larger areas to reliably support sustainable numbers of desert tortoises); 2) length-to-width ratio of the linkage *(i.e.*, longer linkages may need to be wider to preserve the dynamic home ranges and interactions required for gene flow); and 3) potential edge effects and integrity of the ecosystem within and adjacent to the linkage. Another consideration is the extent to which slope and ruggedness of the terrain allows desert tortoise occupancy or passage. In addition, maintaining connectivity of desert tortoise habitats and populations should reflect results from the landscape genetic analyses of Hagerty (2008) and Hagerty *et al*. (2010). These analyses showed that desert tortoise gene flow generally occurred historically in a diffuse pattern across the landscape unless otherwise constrained to more narrow, concentrated pathways created by topographic barriers (*e.g*., around the Spring Mountains in western Nevada). As a result, it is evolutionarily imperative that conservation is focused on maintaining a series of redundant linkages between core populations and critical habitats.

The Service performed a landscape-scale modeling exercise to identify habitat linkages between and among CHUs and other conserved lands using data from the USGS desert tortoise habitat model (Nussear *et al*. 2009), desert tortoise landscape genetics analysis (Hagerty 2008, Hagerty and Tracy 2010, Hagerty *et al*. 2010), The Nature Conservancy's Mojave Desert Ecoregional Assessment (Randall *et al*. 2010), and lands designated as Wildlife Habitat Management Areas (WHMAs) that are important for desert tortoise connectivity and wildlife movement under the BLM's NECO Plan (BLM 2002). The intersection of these data sets established an initial rangewide linkage design for desert tortoise connectivity that the Service has recommended be maintained outside of designated desert tortoise conservation areas (*e.g.*, CHUs, DWMAs, wilderness areas, national parks and monuments, and conserved private lands). This linkage design, however, requires refinement on a local and regional scale to account for on-the-ground limitations to desert tortoise occupancy and movement opportunities.

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

Global climate change is also likely to affect the species' ability to recover. For example, estimates for the range of the Mojave desert tortoise suggest more frequent and/or prolonged droughts with an increase of the annual mean temperature by 3.5 to 4.0 degrees Celsius. The greatest increases will likely occur in summer (June-July-August mean increase of as much as 5 degrees Celsius [Christensen *et al.* 2007 in Service 2010a]). Precipitation will likely decrease by 5 to 15 percent annually in the region, with winter precipitation decreasing by up to 20 percent and summer precipitation increasing by 5 percent. Because germination of the desert tortoise's food plants is highly dependent on cool-season rains, the forage base could be reduced due to increasing temperatures and decreasing precipitation in winter. Although drought occurs fairly routinely in the Mojave Desert, extended periods of drought have the potential to affect desert tortoises and their habitats through physiological effects to individuals (*i.e.,* stress) and limited forage availability. To place the consequences of long-term drought in perspective, Longshore *et al.* (2003) demonstrated that even short-term drought can result in elevated levels of mortality of desert tortoises; therefore, long-term drought is likely to have even further reaching effects, particularly given that the current fragmented nature of desert tortoise habitat (*e.g.,* urban and agricultural development, highways, freeways, military training areas, etc.) will make recolonization of extirpated areas difficult.

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

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

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

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

Table 7 below depicts acreages of habitat (as modeled by Nussear *et al.* 2009) within various regions of the Mojave desert tortoise's range and of impervious surfaces as of 2006. Impervious surfaces include paved and developed areas and other disturbed areas that have zero probability of supporting desert tortoises.

Table 7. Acres of tortoise habitat and impervious surfaces by region[1]

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

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

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

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

5.2 **Desert Tortoise Critical Habitat**

Designation

On February 8, 1994, the Service designated approximately 6.45 million ac of critical habitat for the Mojave population of the desert tortoise in portions of California (4.75 million ac), Nevada (1.22 million ac), Arizona (339,000 ac), and Utah (129,000 ac) (59 *Federal Register* 5820-5846, also see corrections in 59 *Federal Register* 9032-9036), which became effective on March 10, 1994. CHUs were based on recommendations for DWMAs outlined in the *Draft Recovery Plan for the Desert Tortoise (Mojave Population)* (Service 1993). BLM incorporated critical habitat into the Las Vegas RMP in 1998 as ACECs. Boundaries were adjusted to remove developed areas from the ACECs and protect habitat in similar quantity as designated as critical habitat. Because the critical habitat boundaries were drawn to optimize reserve design, the CHU may contain both "suitable" and "unsuitable" habitat. Suitable habitat can be generally defined as areas that provide the physical and biological factors (*i.e.*, desert lands that are used or potentially used by the desert tortoise for nesting, sheltering, foraging, dispersal, or gene flow).

Status of Critical Habitat of the Desert Tortoise

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

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

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

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

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

Within each CHU, both natural and anthropogenic factors affect the function of the PCEs 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 PCEs are naturally absent because the substrate is extremely silty; desert tortoises do not normally reside in such areas. Comparing the model of desert tortoise habitat developed by Nussear *et al*. (2009) to the gross acreages of the CHUs demonstrates quantitatively that the entire area within the boundaries of critical habitat likely does not support the PCEs. As an example, Table 8 demonstrates this information; the acreage for modeled habitat is for the area in which the probability that desert tortoises are present is greater than 0.5. The acreages do not include loss of habitat due to human-caused impacts.

Table 8. Gross and modeled tortoise habitat by CHU

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 (NV and CA)	970,600	930,008
Ivanpah Valley	632,400	510,711
Chuckwalla	1,020,600	809,319
Chemehuevi	937,400	914,505
Gold Butte-Pakoon	488,300	418,189
Mormon Mesa	427,900	407,041
Beaver Dam Slope	204,600	202,499
Upper Virgin River	54,600	46,441
Totals	**6,446,200**	**5,792,986**

Condition of the Primary Constituent Elements of Critical Habitat

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

We have included the following paragraphs from the revised recovery plan for the desert tortoise to demonstrate that other anthropogenic factors affect the PCEs of critical habitat in more subtle ways. All references are in the revised recovery plan; we have omitted some information from the revised recovery plan where the level of detail was unnecessary for the current discussion.

Surface disturbance from OHV activity can cause erosion and large amounts of dust to be discharged into the air. Recent studies on surface dust impacts on gas exchanges in Mojave Desert shrubs showed that plants encrusted by dust have reduced photosynthesis and decreased water-use efficiency, which may decrease primary production during seasons when photosynthesis occurs (Sharifi *et al*. 1997). Sharifi *et al*. (1997) also showed reduction in maximum leaf conductance, transpiration, and water-use efficiency due to dust. Leaf and stem temperatures were also shown to be higher in plants with leaf-surface dust. These effects may also impact desert annuals, an important food source for [desert] tortoises.

OHV activity can also disturb fragile cyanobacterial-lichen soil crusts, a dominant source of nitrogen in desert ecosystems (Belnap 1996). Belnap (1996) showed that anthropogenic surface disturbances may have serious implications for nitrogen budgets in cold desert ecosystems, and this may also hold true for the hot deserts that [desert] tortoises occupy. Soil crusts also appear to be an important source of water for plants, as crusts were shown to have 53 percent greater volumetric water content than bare soils during the late fall when winter annuals are becoming established (DeFalco *et al*. 2001). DeFalco *et al*. (2001) found that nonnative plant species comprised greater shoot biomass on crusted soils than native species, which demonstrates their ability to exploit available nutrient and water resources. Once the soil crusts are disturbed, nonnative plants may colonize, become established, and out-compete native perennial and annual plant species (DeFalco *et al*. 2001, D'Antonio and Vitousek 1992). Invasion of nonnative plants can affect the quality and quantity of plant foods available to desert tortoises. Increased presence of invasive plants can also contribute to increased fire frequency.

Proliferation of invasive plants is increasing in the Mojave and Sonoran deserts and is recognized as a significant threat to desert tortoise habitat. Many species of nonnative plants from Europe and Asia have become common to abundant in some areas, particularly where disturbance has occurred and is ongoing. As nonnative plant species become established, native perennial and annual plant species may decrease, diminish, or die out (D'Antonio and Vitousek 1992).

Land managers and field scientists identified 116 species of nonnative plants in the Mojave and Colorado deserts (Brooks and Esque 2002).

Increased levels of atmospheric pollution and nitrogen deposition related to increased human presence and combustion of fossil fuels can cause increased levels of soil nitrogen, which in turn may result in significant changes in plant communities (Aber *et al*. 1989). Many of the nonnative annual plant taxa in the Mojave region evolved in more fertile Mediterranean regions and benefit from increased levels of soil nitrogen, which gives them a competitive edge over native annuals. Studies at three sites within the central, southern, and western Mojave Desert indicated that increased levels of soil nitrogen can increase the dominance of nonnative annual plants and promote the invasion of new species in desert regions. Furthermore, increased dominance by nonnative annuals may decrease the diversity of native annual plants, and increased biomass of nonnative annual grasses may increase fire frequency (Brooks 2003).

This summary from the revised recovery plan (Service 2011) demonstrates how the effects of human activities on habitat of the desert tortoise are interconnected. In general, surface disturbance causes increased rates of erosion and generation of dust. Increased erosion alters additional habitat outside of the area directly affected by altering the nature of the substrate, removing shrubs, and possibly destroying burrows and other shelter sites. Increased dust affects photosynthesis in the plants that provide cover and forage to desert tortoises. Disturbed substrates and increased atmospheric nitrogen enhance the likelihood that invasive species will become established and 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 PCEs are affected by the threats described in the revised recovery plan.

<u>Sufficient space to support viable populations within each of the five recovery units and to provide for movement, dispersal, and gene flow</u>. Urban and agricultural development, concentrated use by off-road vehicles, and other activities of this nature completely remove habitat. Although we are aware of local areas within the boundaries of critical habitat that have been heavily disturbed by such activities, we do not know of any areas that have been disturbed to the intensity and extent that this PCE has been compromised. To date, the largest losses of critical habitat are likely the result of the widening of existing freeways, major power and energy projects, and development (Coyote Springs). Despite these losses of critical habitat, which occur in a linear manner, the CHUs 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. Highways 58 and 395 in the Fremont-Kramer CHU, U.S Highway 95 in the Piute-Eldorado CHU, and Fort Irwin Road in the Superior-Cronese CHU are examples of large and heavily traveled 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 would eliminate this effect.

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

<u>Sufficient quality and quantity of forage species and the proper soil conditions to provide for the growth of these species</u>. This PCE addresses the ability of critical habitat to provide adequate nutrition to desert tortoises. As described in the revised recovery plan and 5-year review, grazing, historical fire, invasive plants, altered hydrology, drought, wildfire potential, fugitive dust, and climate change/temperature extremes contribute to the stress of "nutritional compromise." Paved and unpaved roads through critical habitat of the desert tortoise provide avenues by which invasive native species disperse; these legal routes also provide the means by which unauthorized use occurs over large areas of critical habitat. Nitrogen deposition from atmospheric pollution likely occurs throughout all of the CHUs and exacerbates the effects of the disturbance of substrates. Because paved and unpaved roads are so widespread through critical habitat, we expect that this threat has, to some degree, compromised the conservation value and function of critical habitat throughout the range of the desert tortoise.

<u>Suitable substrates for burrowing, nesting, and overwintering</u>. Surface disturbance, motor vehicles traveling off route, use of OHV management areas, OHV events, unpaved roads, grazing, historical fire, wildfire potential, altered hydrology, and climate change leading to shifts in habitat composition and location, storms, and flooding can alter substrates to the extent that they are no longer suitable for burrowing, nesting, and overwintering; erosion caused by these activities can alter washes to the extent that desert tortoise burrows placed along the edge of a wash, which is a preferred location for burrows, could be destroyed. We expect that the area

within critical habitat that is affected by off-road vehicle use to the extent that substrates are no longer suitable is relatively small in relation to the area that desert tortoises have available for burrowing, nesting, and overwintering; consequently, we expect that off-road vehicle use does not have a substantial effect on this PCE.

Most livestock allotments have been eliminated from within the boundaries of critical habitat. Additionally, we expect that 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. Although livestock grazing occurred over most of the range of the desert tortoise during the past century, current livestock grazing occurs over a relatively small portion of critical habitat. Affected substrates are recovering following removal of livestock and the substrates in most areas within the remaining active livestock allotments would not be substantially affected, we expect that suitable substrates for burrowing, nesting, and overwintering remain throughout most of the CHUs.

Burrows, caliche caves, and other shelter sites. We expect that 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, we expect that sufficient burrows, caliche caves, and other shelter sites remain throughout most of the CHUs.

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 wildfires increases.

In 2005, wildfires in Nevada, Utah, and Arizona burned extensive areas of critical habitat. Although different agencies report slightly different acreages, Table 9 below provides an indication of the scale of the fires.

Table 9. Tortoise habitat burned by 2005 wildfires

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

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

Habitat protected from disturbance and human-caused mortality. In general, the Federal agencies that manage lands within the boundaries of critical habitat have adopted land management plans that include implementation of some or all of the recommendations contained in the original recovery plan for the desert tortoise. 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 legal closure (and, in some cases, physical closure) of unauthorized routes. Numerous livestock allotments have been relinquished by the permittees and retired by BLM and the National Park Service. As a result of planning efforts, BLM's record of decision included direction to withdraw areas of critical habitat from mineral entry. As a result of actions on the part of various agencies, many miles of highways and other paved roads have been fenced to prevent desert tortoises from wandering into traffic and being killed. The Service and other agencies of the Desert Managers Group in California are implementing a plan to remove common ravens that prey on desert tortoises and to undertake other actions that would reduce subsidies (*i.e.*, food, water, sites for nesting, roosting, and perching, etc.) that facilitate their abundance in the California desert.

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

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

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

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

Summary of the Status of Critical Habitat of the Desert Tortoise

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

Invasive plants likely have already compromised the conservation value and function of critical habitat to some degree with regard to the second PCE (*i.e.*, sufficient quality and quantity of forage species and the proper soil conditions to provide for the growth of these species). These effects likely extend to the entirety of critical habitat, given the numerous routes by which invasive plants can access critical habitat and the large spatial extent that is subject to nitrogen from atmospheric pollution.

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

Although the remaining PCEs have been affected to some degree by human activities, we expect that these impacts have not, to date, substantially compromised the conservation value and function of the CHUs. We have reached this conclusion primarily because we expect the impacts to be more localized and thus not affect the conservation value and function over large areas of critical habitat.

Land managers have undertaken actions to improve the status of critical habitat. For example, as part of its efforts to offset the effects of the use of additional training maneuver lands at Fort Irwin, 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. Numerous other allotments have been retired through various means throughout the range of the desert tortoise. The retirement of allotments assists in the recovery of the species by eliminating disturbance to the PCEs of critical habitat by cattle and range improvements.

5.3 Southwestern Willow Flycatcher

Listing

The southwestern willow flycatcher was listed as endangered, without critical habitat, on February 27, 1995 (60 *Federal Register* 10694-10715). The Service approved a recovery plan for the flycatcher on August 30, 2002 (Service 2002).

Species Description

The southwestern willow flycatcher is a small grayish-green passerine bird (Family Tyrannidae) measuring approximately 5.75 in. The song is a sneezy "fitz-bew" or a "fit-a-bew," the call is a repeated "whitt." It is one of four currently recognized willow flycatcher subspecies (Phillips 1948, Unitt 1987, Browning 1993).

Habitat

The southwestern willow flycatcher breeds in dense riparian habitats from sea level in California to approximately 8,500 ft in Arizona and southwestern Colorado. Historical egg/nest collections and species' descriptions throughout its range describe the southwestern willow flycatcher's widespread use of willow (*Salix spp*.) for nesting (Phillips 1948, Phillips *et al.* 1964, Hubbard 1987, Unitt 1987, San Diego Natural History Museum 1995). Currently, flycatchers primarily use Geyer willow (*Salix geyeriana*), coyote willow (*Salix exigua*), Goodding's willow (*Salix gooddingii*), boxelder (*Acer negundo*), saltcedar (*Tamarix* sp.), Russian olive (*Elaeagnus angustifolia*), and live oak (*Quercus arifolia*) for nesting. Other plant species less commonly used for nesting include: buttonbush (*Cephalantha* sp.), black twinberry (*Lonicera involucrata*), cottonwood (*Populus* spp.), white alder (*Alnus rhombifolia*), blackberry (*Rubus ursinus*), and stinging nettle (*Urtica* spp.). Four basic vegetation communities provide flycatcher habitat: monotypic willow, monotypic exotic, native broadleaf dominated, and mixed native/exotic (Sogge *et al.* 1997).

Saltcedar (also known as tamarisk) is a significant component of the flycatcher's nesting, foraging, and migrating habitat throughout the bird's range. In 2006, 68 percent of known flycatcher nests in Arizona were built in a saltcedar tree (Graber *et al.* 2007). The value of saltcedar in providing quality flycatcher habitat is disputed in the scientific community. However, comparisons of flycatcher breeding in native versus nonnative vegetation show no significant differences in reproductive performance (Service 2002), prey populations (Drost *et al.* 2001), and physiological conditions (Owen and Sogge 2002; Sogge *et al.* 2005).

While breeding areas can vary in patch size and vegetation composition, age, and configuration, slow-moving or standing water or saturated soils must be present in or adjacent to all nesting sites at least at the beginning of the nesting season. Oftentimes, nests are located in plants rooted or overhanging standing water. Without this water component, the habitat cannot be considered suitable and will not be occupied by breeding flycatchers.

Southwestern willow flycatcher habitat is dynamic, can change rapidly, and can vary in suitability, location, use, and occupancy over time (Finch and Stoleson 2000). Formerly suitable nesting habitat can become unsuitable; saltcedar habitat can develop from seeds to suitability in 5 years; heavy runoff can remove/reduce habitat suitability in a single flood event; or river channels, floodplain width, location, and vegetation density may change over time. Flycatcher habitat use in different successional stages may also be dynamic. For example, over-mature or young habitat not suitable for nest placement can be occupied and used for foraging and shelter by migrating, breeding, dispersing, or non-territorial flycatchers (Cardinal and Paxton 2005, McLeod *et al.* 2005). That same habitat, as it changes through time, may subsequently provide suitable nesting sites.

Life History

Southwestern willow flycatchers typically reach their breeding grounds between early May and early June with males arriving first to establish territories (Service 2002). Flycatchers demonstrate strong fidelity to breeding areas although movement among sites within and between years has been documented (Service 2002). After a breeding territory is established, females take 4 to 7 days to build a small, open cup nest typically in a small-diameter fork of a tree. Average clutch sizes contain 3 to 4 eggs (Sogge 2010, SWCA 2012). Incubation takes 12 to 13 days, and chicks fledge from the nest between 12 to 15 days of age. Adults continue to care for fledglings for approximately 2 weeks post fledging (Sogge 2010). A second nest may be attempted following a successful nest or if a nest is lost or abandoned due to predation, parasitism, or disturbance. Nest and fledging success are highly variable between years and sites. The majority of nests are completed by mid-July. Flycatchers depart breeding areas from the end of July and August to migrate to southern Mexico, Central America, and northern South America for the winter.

Data from banding records of southwestern willow flycatchers indicate most flycatchers likely live 1 to 3 years, with many living 4 years, and some individuals surviving 5 to at least 8 years (E. Paxton and M. Whitfield, unpublished data in Service 2002). These estimates are similar to those documented in Nevada (SWCA 2012).

Estimates of survivorship are challenging because they assume all living flycatchers are detected in a given year, and individuals not detected are assumed to have died, unless detected elsewhere. SWCA (2012) estimated flycatcher survivorship along the Lower Colorado River and its tributaries from 2010 to 2011 to be 57 percent for adults and 13 percent for juveniles.

Southwestern willow flycatchers are insectivores, preying on small to large items, including flying ants, bees, wasps, beetles, butterflies, caterpillars, and dragonflies (Service 2002). Flycatchers employ various methods to catch their prey, including flying, hovering, gleaning, and "sit and wait" tactics (Prescott and Middleton 1988, Service 2002).

Predation of adult flycatchers is not well understood, but predation of eggs and nestlings has been documented. Predators include snakes, raptors, corvids, small mammals, and mesocarnivores. Brown-headed cowbirds also function as predators when they remove flycatcher eggs during parasitism. Parasitism rates of flycatcher nests by brown-headed cowbirds can vary annually and between sites and may result in nest failure or lowered fledging success.

Additional life history information is found in the revised Recovery Plan (Service 2002) and Sogge *et al.* (2010).

Status and Distribution

The southwestern willow flycatcher is a neotropical migrant that breeds in the southwestern U.S. and migrates to Mexico, Central America, and possibly northern South America during the non-breeding season (Phillips 1948, Stiles and Skutch 1989, Peterson 1990, Ridgely and Tudor 1994, Howell and Webb 1995). From 1993 to 2007, there were 288 known southwestern willow flycatcher breeding sites and an estimated 1,299 territories in California, Nevada, Arizona, Utah, New Mexico, and Colorado, where resident willow flycatchers were detected (Durst *et al*. 2008) (Table 10). A grand total of flycatcher territories cannot be determined because not all sites are surveyed annually. Numbers have increased since the bird was listed and some habitat remains un-surveyed; however, after nearly a decade of intense surveys, the existing numbers are just past the upper end of Unitt's (1987) estimate of 20 years ago (500-1,000 pairs). This increase in numbers may be due in part to increased survey efforts. Over 66 percent of the territories estimated throughout the subspecies' range are located within three drainages: (1) Gila River in Arizona and New Mexico [30.1 percent]; (2) Rio Grande River in New Mexico [23.3 percent]; and (3) San Pedro River in Arizona [13.2 percent] (Durst *et al*. 2008).

Table 10. Number of southwestern willow flycatcher breeding sites and territories by state[1]

State	Number of Sites	Percentage of Total Sites	Number of Territories[2]	Percentage of Total Territories
Arizona	124	43.1	459	35.3
California	96	33.3	172	13.2
Colorado	11	3.8	66	5.1
Nevada	13	4.5	76	5.9
New Mexico	41	14.2	519	40.0
Utah	3	1.0	7	0.5
Total	288	100	1,299	100

[1]Durst *et al.* 2008.

[2]The estimated number of territories (1,299) includes 930 detected during 2007 surveys plus 369 territories in sites that were last surveyed in 2006 or before.

The historical breeding range of the southwestern willow flycatcher included southern California, Arizona, New Mexico, western Texas, southwestern Colorado, southern Utah, southern Nevada, and northwestern Mexico (Sonora and Baja) (Unitt 1987). The current breeding range is similar to its historical range; however, the extent of habitat within this range has declined over time.

5.4 Southwestern Willow Flycatcher Critical Habitat

Regulatory Status of Critical Habitat

On July 22, 1997, we published a final critical habitat designation for the flycatcher along 599 river mi (964 river km) in Arizona, California, and New Mexico (62 *Federal Register* 39129). We published a correction notice on August 20, 1997, on the lateral extent of critical habitat (62 *Federal Register* 44228). As a result of a 1998 lawsuit from the New Mexico Cattlegrower's Association, we published a revised final flycatcher critical habitat rule on October 19, 2005, for portions of Arizona, California, New Mexico, Arizona, California, New Mexico, Nevada, and Utah, totaling approximately 737 mi (70 *Federal Register* 60886). River segments were designated as critical habitat in 15 of the 32 Management Units described in the recovery plan for the flycatcher (Service 2002).

The Service initiated revision to the 2005 critical habitat designation for the flycatcher in response to a 2010 lawsuit. On August 15, 2011, we published a proposed rule for the revised designation of critical habitat that included 2,090 mi of stream in Arizona, California, New Mexico, Arizona, California, New Mexico, Nevada, and Utah (76 *Federal Register* 50542). This proposed rule identified 112.3 mi of stream in Nevada for revised critical habitat designation but does not result in any changes to existing critical habitat in the action area. A final designation of critical habitat is scheduled to be published before the end of calendar year 2012.

Primary Constituent Elements of Critical Habitat

For inclusion in the designation of critical habitat for the southwestern willow flycatcher, the Service included those areas that contained the physical or biological features essential to the conservation of the species. The conservation roles of these areas to the flycatcher are to contribute to metapopulation stability, population connectivity, gene flow, and protection against catastrophic loss of populations. Based on our current knowledge of the life history, biology, and ecology of the subspecies and the requirements of the habitat to sustain the essential life history functions, we determined that the southwestern willow flycatcher's PCEs are:

Primary Constituent Element 1— *Riparian vegetation.*

Riparian habitat in a dynamic river or lakeside, natural or manmade successional environment (for nesting, foraging, migration, dispersal, and shelter) that is comprised of trees and shrubs (that can include Goodding's willow, coyote willow, Geyers willow, arroyo willow, red willow, yewleaf willow, pacific willow, boxelder, saltcedar, Russian olive, buttonbush, cottonwood, stinging nettle, alder, velvet ash (*Fraxinus velutina*), poison hemlock, blackberry, seep willow, oak (*Quercus* sp.), rose, sycamore, false indigo, Pacific poison ivy, grape, Virginia creeper, Siberian elm, and walnut) and some combination of:

1. Dense riparian vegetation with thickets of trees and shrubs that can range in height from 6 to 98 ft (2 to 30 m). Lower-stature thickets 6 to 13 ft tall are found at higher-elevation riparian forests and tall-stature thickets are found at middle- and lower-elevation riparian forests; and/or

2. Areas of dense riparian foliage at least from the ground level up to approximately 13 ft above ground or dense foliage only at the shrub level, or as a low, dense tree canopy; and/or

3. Sites for nesting that contain a dense (about 50 to 100 percent) tree or shrub (or both) canopy (the amount of cover provided by tree and shrub branches measured from the ground); and/or

4. Dense patches of riparian forests that are interspersed with small opening of open water or marsh or areas with shorter and sparser vegetation that creates a variety of habitat that is not uniformly dense. Patch size may be as small as 0.25 ac or as large as 175 ac.

Primary Constituent Element 2— *Insect prey populations.*

A variety of insect prey populations found within or adjacent to riparian floodplains or moist environments, including: flying ants, wasps, and bees (Hymenoptera); dragonflies (Odonata); flies (Diptera); true bugs (Hemiptera); beetles (Coleoptera); butterflies/moths and caterpillars (Lepidoptera); and spittlebugs (Homoptera).

5.5 Yuma Clapper Rail

Listing

The Yuma clapper rail was listed as an endangered species on March 11, 1967, under endangered species legislation enacted in 1966 (Public Law 89-669). Only populations found in the United States were listed as endangered; those in Mexico were not listed under the 1966 law or the subsequent Act of 1973. Critical habitat has not been designated for the Yuma clapper rail. The Yuma Clapper Rail Recovery Plan was issued in 1983 (Service 1983) and is currently under revision (Service 2010).

Species Description

The Yuma clapper rail is a 14 to 16 in long marsh bird with a long, down-curved beak. Both sexes are slate brown above, with light cinnamon underparts and barred flanks. The Yuma clapper rail is distinguished from other clapper rail subspecies using distributional data, plumage color, and wing configurations (Banks and Tomlinson 1974). The Yuma clapper rail is a secretive species and is not often seen in the wild. It has a series of distinctive calls that are used to identify birds in the field. Frequency of calls or responsiveness to taped calls varies seasonally.

Habitat

Habitat for the Yuma clapper rail is freshwater and brackish marshes with dense vegetation, dominated by cattails (*Typha* spp.) that include both mats of old material and more open stands. The most productive areas consist of uneven-aged stands of cattails interspersed with open water of variable depths (Conway *et al.* 1993). Other important factors in the suitability of habitat include the presence of vegetated edges between marshes and shrubby riparian vegetation (Eddleman 1989), and the amount and rate of water level fluctuations within the habitat. Water flow in the open channels within the marsh is desirable (Todd 1971; Tomlinson and Todd 1973). Yuma clapper rails will use quiet backwater ponds, flowing stream or riverside areas, irrigation canals and drainage ditches, reservoirs and small lakes, or other small marshlands where cattail habitat is available. Natural and artificially constructed marshes can provide suitable habitat.

Life History

The breeding season for the Yuma clapper rail runs from February through early July (Eddleman 1989). Nests are constructed in marsh vegetation or low-growing riparian plants at the edge of the water. Nonnative (introduced) crayfish (*Procambarus clarki*) form the primary prey base for Yuma clapper rails today (Todd 1986). Prior to the introduction of crayfish, isopods, aquatic and terrestrial insects, clams, plant seeds, and small fish dominated the diet. Once believed to be highly migratory (with most birds thought to spend the winter in Mexico), telemetry data shows that most rails do not migrate (Eddleman 1989). Very little is known about the dispersal of adult or juvenile birds, but evidence of populations expanding northward along the lower Colorado River, Salton Sea, and central Arizona over the last 80 years indicates that Yuma clapper rails can effectively disperse to new habitats provided that habitat corridors exist between the old and new sites (Rosenberg *et al.* 1991).

Recently developed information that may affect the life history of the Yuma clapper rail involves selenium levels in the crayfish, the primary prey species. Levels of selenium in crayfish from Yuma clapper rail habitats were high enough to cause concern for potential reproductive effects (Roberts 1996, King *et al.* 2000). No adverse effects from selenium have been observed; however, due to the clapper rails' secretive nature, nests are very difficult to find and young birds hard to observe. Additional monitoring is under consideration at this time.

Additional life history information is found in the revised Recovery Plan (Service 2010), Todd (1986), Eddleman (1989), and Rosenberg *et al.* (1991).

Status and Distribution

The Yuma clapper rail has two major population centers in the United States; the Salton Sea and surrounding wetlands in California, and the lower Colorado River marshes from the border with Mexico to Havasu NWR. Smaller numbers of rails are found along the lower Gila River in Yuma County, the Phoenix metropolitan area (including portions of the Gila, Salt, and Verde rivers) in Maricopa County, Roosevelt Lake in Gila County, Picacho Reservoir in Pinal County, and the Bill Williams River in La Paz County, Arizona (Service annual survey data). Yuma clapper rails have also been documented from southern Nevada in Clark County (McKernan and Braden 2000; Tomlinson and Micone 2000) and the Virgin River in Washington County, Utah and Mohave County, Arizona (McKernan and Braden 2000).

Survey data compiled by the Service for the period 1990 through 2009 documented between 464 and 1,076 rails observed annually (via calls or visual observation). Surveys in 2009 documented 639 birds. These figures are of actual birds detected and are not extrapolated to provide a population estimate. The unlisted Yuma clapper rail population in Mexico was estimated to contain 6,300 birds (Hinojosa-Huerta *et al.* 2000), and the amount of movement between the two populations is unknown.

Declines in actual numbers heard or seen on survey transects since the early 1990s have not been positively connected to any event on the lower Colorado River or Salton Sea; however, changes in habitat quality caused by overgrown marsh vegetation is suspected of influencing rail numbers in those areas. Habitat restoration through mowing or burning over-age cattail stands is under evaluation in several locations to determine future management needs.

Threats to the Species

Threats to the Yuma clapper rail and its habitat are interrelated and are primarily a result of the alteration of rivers in the southwest. Specific threats include development for industrial, agricultural, and urban uses; construction of dams and reservoirs; diversions and groundwater pumping; channelization and bank stabilization; and environmental contaminants. The ultimate effect of these threats is increased loss, modification, and degradation of marsh habitat due to the direct removal of marsh vegetation and the alteration of river and stream hydrology, water availability, and water table levels.

Further information on the status of this species is summarized on the internet at: http://www.fws.gov/southwest/es/arizona/Yuma_Rail.htm. If you do not have access to the internet or cannot otherwise access the information, please contact the Nevada Fish and Wildlife Office.

5.6 Virgin River Chub

Listing

The Virgin River chub was proposed for listing as endangered, with critical habitat, on August 23, 1978 (43 *Federal Register* 37668). On September 30, 1980, the proposal was withdrawn because the 1978 amendments to the Act required that all proposals pending for more than 2 years be withdrawn (45 *Federal Register* 64853). The Virgin River chub was re-proposed as endangered, with critical habitat, on June 24, 1986 (51 *Federal Register* 22949). On August 24, 1989, the Virgin River chub was listed as endangered (54 *Federal Register* 35305) throughout its entire range (50 CFR 17.11) but critical habitat was not designated at that time. When the Virgin River chub was listed it was considered a subspecies of roundtail chub (*Gila robusta*) and its taxonomic classification was *Gila robusta seminuda*. DeMarais *et al.* (1992) asserted that full species status was warranted for the Virgin River chub and reclassified it as *Gila seminuda*. On July 24, 1995, a proposed rule was published (60 *Federal Register* 37866) proposing a change in rank from subspecies to species as the Virgin River chub, and proposing a change in the status of the Virgin River population of Virgin River chub from a subspecies to a vertebrate population segment. The latter action was necessary because DeMarais' work concluded that the Muddy (=Moapa) River Virgin River chub was the same species as the Virgin River chub in the Virgin River, and only the Virgin River population was included for listing in the final rule. That proposed rule has not been finalized.

Species Description

The Virgin River chub is most often associated with deep runs or pool habitats of slow to moderate velocities with large boulders or instream cover, such as root snags. Adults and juveniles are often associated together within these habitats; however, the larger adults are collected most often in the deeper pool habitats within the river. Hardy *et al.* (1989) determined that Virgin River chubs were most often collected in depths ranging from 0.6 ft to 3.0 ft in velocities ranging from 0.0 to 2.5 cubic ft per sec (cfs) and associated with sand substrates with boulders or instream cover. Schumann (1978) and Deacon *et al.* (1987) found that the final adult thermal preference was approximately 75 °F. The Virgin River chub is omnivorous, showing considerable dietary shifts with age. Young fish feed almost entirely on macro-invertebrates while adults feed almost exclusively on algae and debris. Spawning is known to occur in the spring, and ripe females have been reported during the months of April, May, and June (Hickman 1987). Hickman (1987) also noted that good spawning years coincided with good spawning years for woundfin. Virgin River chub likely live for many years, perhaps for decades, but they mature rapidly and probably spawn in their second or third year of life (Williams and Deacon 1998).

Status and Distribution

The historical range of the listed population of Virgin River chub encompassed the Virgin River in Arizona, Nevada, and Utah. The species remains extant throughout its historical range although in reduced numbers. The abundance and distribution of Virgin River chub have declined significantly due to impacts from water diversions and the introduction of nonnative species, particularly red shiner (*Cyprinella lutrensis*) and large predaceous nonnative species such as catfish and bass species. Virgin River chub remain extant in the Virgin River in Arizona, particularly in the lower Gorge and the river upstream of Littlefield. The section of Virgin River most negatively impacted by the invasion of red shiner is from Lake Mead in Nevada upstream to the Washington Fields Diversion in Utah. Prior to invasion by red shiner, the fish population in this reach was composed almost exclusively of native fish. For example, at one of the standard Recovery Team monitoring sites within this reach, Atkinville Wash in Utah, fish composition in September 1984, just prior to discovery of the first red shiner, was woundfin (57 percent), desert sucker (27 percent), speckled dace (10 percent), Virgin River chub (4 percent), and flannelmouth sucker (2 percent). Since 1999, Virgin River chub have been nearly absent from samples taken at this and other sample sites between the Gorge and the Washington Fields Diversion. In 1988, attempts to chemically eradicate red shiner from the reach of the river between the Gorge and the Washington Fields Diversion began with the treatment of the reach between the Washington Fields and Johnson diversions. Successive treatments have focused on treating additional reaches in each year. Prior to all treatments, an extensive salvage operation is conducted, with native fish moved to habitat above the Washington Fields Diversion.

As a result of the treatments, the red shiner has been eliminated from the Atkinville Wash and Twin Bridges sites down to the Stateline Fish Barrier has been eliminated. However, the numbers of Virgin River chub are also low due to the previous overwhelming numbers of red shiner previous to salvage efforts, inadvertent mortality during treatment, and fish kills resulting from flood events with poor water quality. Above the Washington Fields Diversion, populations of Virgin River chub have not been impacted by red shiner (red shiner were noted in 2002 within the reach, but not since) and the fish community is composed primarily of native fish (Fridell and Morvilius 2005). Virgin River chub populations in this reach declined in 2002 and 2003 due to low flow, low turbidity, and high water temperatures. Populations rebounded dramatically in 2005 due to higher flow levels and lower water temperatures. A return to persistent long-term drought conditions in 2006 and 2007 lowered all native fish populations, including Virgin River chub, back to critical levels. Lethal dissolved oxygen levels were noted throughout most of the upper portion of critical habitat for Virgin River chub (above Washington Fields Diversion) during two back-to-back flood events in late July and early August 2007. Close to 90 percent of the remaining native fish population, including Virgin River chub were lost from La Verkin Creek to Washington Fields Diversion. Sampling from within this reach by UDWR in autumn 2007 and spring 2008 indicates that the populations of native fish within this reach were extremely low. Recently, Virgin River chub and other native species have been reintroduced from upstream and off channel areas, as well as hatcheries in the hopes of reestablishing a larger, more stable native fish population in this reach. Full pass sampling results from April 5 to 8, 2010, in the Pah Tempe Springs to Washington Fields Diversion documented 880 Virgin River chub; 731 adults and 149 young-of-the-year in the reach. Surveys below Washington Fields Diversions in 2009 have documented low numbers of Virgin River chub present down to the Stateline Fish Barrier (Fridell 2009).

The preservation of Virgin River chub in the lower Gorge and in the Littlefield reach in Arizona is very important to ensure the species' survival into the future in the event of another loss of Virgin River chub in Utah. Preservation of the chub population in this reach is also important in the event of a situation where Virgin River chubs currently held at Dexter National Fish Hatchery and Technology Center (Dexter) were lost or, due to disease or invasive species concerns, were barred from stocking in the Virgin River in the future. The 2010 documentation of largemouth bass virus at Dexter is an example of a situation where stocking actions can be affected in this way. Due to increasing concerns about the spread of quagga mussels in the Colorado River drainage including the Virgin River, after this salvage event, Dexter will not transfer any additional Virgin River fish to that facility to avoid the risk of contamination.

In Arizona, Virgin River chub are found through the Gorge and downstream to Nevada, although most are found in areas upstream of the Arizona-Nevada boundary. Nonnative fish species including red shiner, largemouth bass, tilapia, and channel catfish are present and have effects on Virgin River chub through predation and competition. Predatory nonnative fish are an important threat to the species that enter the Virgin River from Lake Mead. Streamflows through the Gorge vary seasonally, while the flows from springs in the lower Gorge and at Littlefield maintain a higher baseflow in the river at least to the first significant water diversion at Mesquite. Below the Mesquite Diversion, there are other diversions and return flows which affect the amount of water present to support Virgin River chub and nonnative fish populations are very high.

5.7 Virgin River Chub and Woundfin Critical Habitat

On January 26, 2000, (65 *Federal Register* 4140), 87.5 mi of the Virgin River and its associated 100-year floodplain was federally designated as critical habitat for the Virgin River chub and woundfin (50 CFR §17.95). This area extends from the confluence of LaVerkin Creek, Utah, downstream to Halfway Wash, Nevada.

The physical and biological factors of critical habitat determined necessary for the conservation of the woundfin and Virgin River chub are water, physical habitat, and biological environment (65 *Federal Register* 4140). The desired conditions for each of these elements are further detailed below and in the final rule designating critical habitat.

> *Water* - A sufficient quantity and quality of water (*i.e.*, temperature, dissolved oxygen, contaminants, nutrients, turbidity, etc.) that is delivered to a specific location in accordance with a hydrologic regime that is identified for the particular life stage for each species. This includes the following:
>
> 1) Water quality characterized by natural seasonally variable temperature, turbidity, and conductivity.
> 2) Hydrologic regime characterized by the duration, magnitude, and frequency of flow events capable of forming and maintaining channel and instream habitat necessary for particular life stages at certain times of the year.
> 3) Flood events inundating the floodplain necessary to provide the organic matter that provides or supports the nutrient and food sources for the listed fishes.
>
> *Physical habitat* - Areas of the Virgin River that are inhabited or potentially habitable by a particular life stage for each species, for use in spawning, nursing, feeding, and rearing, or corridors between such areas:
>
> ***Woundfin***
>
> - River channels, side channels, secondary channels, backwaters, springs, and other areas that provide access to these habitats.
> - Areas inhabited by adult and juvenile woundfin include runs and pools adjacent to riffles that have sand and sand/gravel substrates.
> - Areas inhabited by juvenile woundfin are generally deeper and slower. When turbidity is low, adults also tend to occupy deeper and slower habitats.
> - Areas inhabited by woundfin larvae include shoreline margins and backwater habitats associated with filamentous algae.
>
> ***Virgin River Chub***
>
> - River channels, side channels, secondary channels, backwaters, and springs, and other areas which provide access to these habitats.
> - Areas with slow to moderate velocities, within deep runs or pools, with predominately sand substrates, particularly habitats which contain boulders or other instream cover.

Biological environment - Food supply, predation, and competition are important elements of the biological environment and are considered components of this PCE. Food supply is a function of nutrient supply, productivity, and availability to each life stage of the species. Predation and competition, although considered normal components of this environment, are out of balance due to nonnative fish species in many areas. Fourteen introduced species compete with or prey upon the woundfin. Of these, the red shiner is the most numerous and has been the most problematic for the listed fishes. Components of this PCE include the following:

- Seasonally flooded areas that contribute to the biological productivity of the river system by producing allochthonous (humus, silt, organic detritus, colloidal matter, and plants and animals produced outside the river and brought into the river) organic matter which provides and supports much of the food base of the listed fishes.
- Few or no predatory or competitive nonnative species in occupied Virgin River fishes' habitats or potential reestablishment sites.

Designated critical habitat has been significantly altered due to dam construction, and irrigation diversions which have resulted in decreased flows and thus available physical habitat for both species throughout the Virgin River. Altered flow regimes both above and below major irrigation diversions at Washington Fields, Mesquite, and Riverside have resulted in loss of habitat due to complete dewatering of the river during low flow periods.

5.8 **Woundfin**

Listing

The woundfin was federally listed as endangered on October 13, 1970, (35 *Federal Register* 16047).

Species Description

The woundfin is a small (maximum 3 in) streamlined silvery minnow with a flattened head and belly, and a conspicuous, sharp dorsal spine, from which its common name was derived. The woundfin is the most silvery of all American minnows (Miller and Hubbs 1960), reflecting blue in bright sunlight. The species rarely achieves a standard length of more than 3 in. Woundfin are omnivorous, feeding on aquatic insects, algae, and detritus. Ripe females have been collected from March to May, with spawning occurring from April to August, and larvae present in May through August. Spawning occurs during April to July, depending on the timing of the snow melt runoff. Late summer spawning in August has also been observed (Hickman 1987, Hardy *et al.* 1989). The reproductive cycle of the woundfin appears to be initiated by some combination of increasing water temperatures, lengthening daylight, and declining spring runoff (Service 1994b).

Status and Distribution

In addition to their presence in the Virgin River, woundfin historically occurred from near the junction of the Salt and Verde rivers at Tempe, Arizona, to the mouth of the Gila River at Yuma, Arizona (Gilbert and Scofield 1898). Woundfin also likely occurred in the mainstream of the Colorado River from Yuma (Jordan and Evermann 1896, Meek 1904) upstream to the Virgin

River in Nevada, Arizona, and Utah, and into La Verkin Creek, a tributary to the Virgin River in Utah (Gilbert and Scofield 1898, Snyder 1915, Miller and Hubbs 1960, Cross 1975). Historically, woundfin may have occurred further upstream on the Verde, Salt, and Gila rivers in Arizona (Service 1994b).

Woundfin have been extirpated from almost all of their historical range except the mainstem of the Virgin River. Predatory nonnative fish are an important threat to the species that enter the Virgin River from Lake Mead. The present range now occurs from Pah Tempe Springs on the mainstream of the Virgin River and the lower portion of La Verkin Creek in Utah, downstream to Lake Mead (Service 1994b). A single specimen was taken from the middle Muddy (= Moapa) River, Clark County, Nevada, in the late 1960s (Deacon and Bradley 1972) but none have been collected since, and the species is extirpated from this river.

Woundfin occupy turbid runs and quiet waters adjacent to riffles, usually with sand or small gravel substrates. Larvae and juveniles are found in shallow backwaters or slow moving water along the stream margin. It has been reported that when water temperatures approach 86° F, the woundfin leave shallow water areas and congregate to deeper, cooler portions of the stream (Service 1994b). Deacon *et al.* (1987) reported that the preferred water temperature for adults was approximately 64° F. Woundfin have adapted to survive in a highly dynamic and turbid system.

5.9 **Moapa Dace**

Listing

The Moapa dace was federally listed as endangered under the Endangered Species Preservation Act of 1966 on March 11, 1967 (32 *Federal Register* 4001), and has been protected under the Act since its inception in 1973. Critical habitat has not been designated for the Moapa dace.

Species Description

The Moapa dace was first collected in 1938 and was described by Hubbs and Miller (1948). Key identification characteristics are a black spot at the base of the tail and small, embedded scales, which create a smooth leathery appearance. Coloration is olive-yellow above with indistinct blotches on the sides, with a white belly. A diffuse, golden-brown stripe is also present. Maximum size is approximately 4.7 in fork length. The oldest known specimen on record is over 4 years old (Scoppettone *et al.* 1992).

The Moapa dace is a member of the North American minnow family, *Cyprinidae*. The genus *Moapa* is regarded as being most closely related to the dace genera *Rhinichthys* (speckled dace) and *Agosia* (longfin dace) (Coburn and Cavender 1992). These three dace genera, along with the genera *Gila* (chub), *Lepidomeda* (spinedace), *Meda* (spikedace), and *Plagopterus* (woundfin), developed from a single ancestral type (monophyletic) and are only associated with the Colorado River Basin (Service 1996).

The Moapa dace typically occur in waters ranging from 78.8 to 89.6° F (Hubbs and Miller 1948); however, one individual was collected in water temperatures of 67.1°F (Ono *et al.* 1983). Although Rinne and Minckley (1991) rarely found the species below 86º F, Deacon and Bradley (1972) indicated that the species reaches its greatest abundance at warmer temperatures between 82.4 and 86.0º F.

Reproduction occurs year-round and is confined to the upper, spring-fed tributaries where the water temperatures vary from 84.2 to 89.9° F and dissolved oxygen concentrations vary between 4.1 and 6.2 parts per million (Scoppettone *et al.* 1992). Juveniles occur almost exclusively in the spring-fed tributaries, whereas adults occur in the mainstem of the Muddy River (Scoppettone *et al.* 1992). Adults show the greatest tolerance to cooler water temperatures, which appears to be 78.8° F (Scoppettone 1993). Given the species temperature tolerances and cooling pattern of the river (in a downstream direction), its range appears to be restricted to the warmer waters of the upper springs and tributaries of the Warm Springs area (Deacon and Bradley 1972, Cross 1976, Scoppettone *et al.* 1992).

Status and Distribution

In 1983, the Service prepared a recovery plan for Moapa dace which was updated in 1996, and identified various tasks to guide recovery (Service 1996). The Service assigned the Moapa dace the highest recovery priority because: it is the only species within the genus *Moapa*; the high degree of threat to its continued existence; and the high potential for its recovery (Service 1996). A final recovery plan was approved by the Service in 1996 (Service 1996). The plan addresses the current status, threats, and recovery needs of seven other endemic aquatic species. These include three fishes: the Virgin River chub (*Gila seminuda*) [this species is currently listed as endangered in the Virgin River and is under review for listing in the Muddy River], Moapa speckled dace (*Rhinichthys osculus moapae*), Moapa White River springfish (*Crenichthys baileyi moapae*); Moapa pebblesnail (*Fluminicola avernalis*), grated tyronia (*Tryonia clathrata*), Moapa Warm Springs riffle beetle (*Stenelmis moapa*); and the Amargosa naucorid (*Pelocoris shoshone shoshone*) that co-exist with the Moapa dace in the Muddy River ecosystem.

Threats to Moapa dace habitat include nonnative fishes (*e.g.,* tilapia and mollies) and parasites; habitat loss from water diversions and impoundments; increased threat of fire due to encroachment of nonnative plant species such as palm trees; and reductions to surface spring-flows resulting from groundwater development, which reduces spawning, nursery habitats, and the food base for the species. The Moapa dace is more vulnerable to catastrophic events due to its limited distribution in conjunction with these threats.

The Warm Springs Natural Area and the Moapa Valley NWR encompass about 20 springs that form the headwaters of the Muddy River. The springs and their outflows onto the Warm Springs Natural Area are home to the majority of the Moapa dace population. BLM land surrounds the distribution of the species.

In September 2007, the Southern Nevada Water Authority (SNWA) purchased 1,179 ac of private property that encompasses several springs in the Muddy River headwaters area, including the former Warm Springs Ranch. The property includes 3.8 mi of the mainstream Muddy River.

The Warms Springs Natural Area is managed as a nature preserve for protection of Moapa dace; and restoration and management of the areas as an ecological reserve.

The Moapa dace is thermophilic and endemic to the headwaters of the Warm Springs area. Moapa dace surveys have been conducted throughout the upper Muddy River system. The 2007 survey data indicate that there were approximately 1,172 fish in the population that occurred throughout 5.6 mi of habitat in the upper Muddy River system. Approximately 97 percent of the total population occurred within one major tributary that included 1.78 mi of spring complexes that emanate from the Pedersen, Plummer, and Apcar spring complexes on the Moapa Valley NWR and their tributaries (upstream of the gabion barrier). Approximately 48 percent of the population was located on the Moapa Valley NWR and 48 percent occupied the Ash Meadows NWR Stream supplied by the Pederson-Plummer springs. The highest densities of Moapa dace occurred on the Plummer and Pedersen units within the Moapa Valley NWR.

In 2008, the number of Moapa dace declined approximately 60 percent, from 1,172 fish in 2007 to 459 in 2008. Most of this decline is due to large changes in the numbers of dace in the Pederson, Plummer, and Ash Meadows NWR Stream areas which supported more than 92 percent of the population in 2007. The cause of the population decline is currently unknown, although beavers have recently changed stream characteristics in the Ash Meadows NWR Stream and vegetation management occurred along the Pederson Unit. In addition, habitat restoration projects have been implemented over the past few years in the Pederson and Plummer units of the Moapa Valley NWR, restoring the streams to a more natural state. Moapa dace counts from February 2008 through February 2012 ranged from 462 to 697 fish. Count data for August 2011 (713 fish) and August 2012 (1,181 fish) indicate an increasing population trend (Figure 21).

Restored areas continued to show increasing or stable numbers of Moapa dace (upper Apcar, lower Pederson, Goodchild [Little] Spring). The largest concentration of Moapa dace continued to be on the upper Plummer springbrooks on the Moapa Valley NWR which supported about 29 percent of all Moapa dace observed in August 2011. An unusual concentration of Moapa dace observed in the upper Plummer springbrook about a month after the July 2010 wildfire was not observed in 2011. The number of Moapa dace observed in 2011 is similar to all other estimates observed in the area over the past decade. Moapa Valley NWR continued to support about 53 percent of the Moapa dace observed in August 2011. Recent small-scale habitat improvements in the lower Apcar area may have begun a resurgence of Moapa dace in the area. Moapa dace continued to be absent from most of the areas previously occupied by tilapia (reaches 11-16) with the exception of a single Moapa dace that was observed in Muddy Creek (reach 14). Tilapia appeared to be absent from most of the tilapia-infested area (reaches 10-15) due to chemical eradication efforts in late 2010 and early 2011. Seventeen tilapia of different sizes were found in reach 16 (South Fork) both above (n=15) and below (n=2) the gabion barrier. All reaches that have been free of tilapia for many years supported dace in August 2012. Efforts to control and monitor tilapia are currently underway.

<u>Memorandum of Agreement</u>

On July 14, 2005, a Memorandum of Agreement (MOA) was signed by SNWA, Meadow Valley Water District (MVWD), CSI, Tribe, and the Service, regarding groundwater withdrawal of 16,100 afy from the regional carbonate aquifer in Coyote Spring Valley and California Wash Basins that included conservation measures for the Moapa dace. The MOA outlined specific conservation actions that each party would complete in order to minimize potential impacts to the Moapa dace should water levels decline in the Muddy River system as a result of the cumulative withdrawal of 16,100 afy of groundwater from two basins within the regional carbonate aquifer system. The MOA include the following conservation measures:

1. Provide funding toward restoration of Moapa dace habitat on the Apcar Unit of the Moapa Valley NWR;

2. Develop a Recovery Implementation Program which will be used to effectuate the goals of the MOA by implementing measures necessary to accomplish the protection and promote the recovery of the Moapa dace, as well as, outline the development of regional water facilities and include additional parties as appropriate. The Recovery Program will be developed for the purposes of continuing to identify the key conservation actions that, when implemented, would continue to contribute to off-set any pumping impacts that may result from groundwater pumping;

3. Assist in developing an ecological model to investigate the effects of habitat change on the ecology of the Moapa dace;

4. Construct fish barriers in order to prevent additional nonnative fishes from migrating into Moapa dace habitat;

5. Eradicate nonnative fish, such as tilapia from the historic range of Moapa dace;

6. Restore habitat necessary for the Moapa dace, and take other steps to protect and recover the dace;

7. Provide the use of the Tribal greenhouse to cultivate native plants for restoration actions in the Muddy River area;

8. Provide access to Tribal lands for the construction and maintenance of at least one fish barrier;

9. Dedicate the existing Jones Spring water right (MVWD) with a flow rate of 1.0 cfs towards establishing and maintaining in-stream flows in the Apcar tributary system that empties into the Muddy River; and

10. Dedicate 460 afy of CSI appropriated water rights to the survival and recovery of the Moapa dace, in perpetuity through a conservation easement to the Nevada State Engineer.

11. Establish a Hydrologic Review Team to develop and coordinate regional monitoring efforts of the groundwater pumping proposed under the MOA. Team members discuss and

perform analyses of groundwater pumping effects and natural climatic variation on the Muddy River and Muddy Springs.

12. Develop the Muddy River Recovery Implementation Program to provide a comprehensive program for water resource management in the Coyote Spring Valley, Warm Springs, and Muddy River areas, while working toward recovery of the Moapa dace.

On January 30, 2006, the Service issued a non-jeopardy intra-Service PBO for the Proposed Muddy River MOA (File No. 1-5-05-FW-536). The Service estimated the incidental take of Moapa dace at the programmatic level for the cumulative actions of parties to the MOA to be a 22 percent loss in riffle habitat and 16 percent loss in pool habitat. Should flows at the Warm Springs West gage decline to a flow below 2.78 cfs, the amount of incidental take for any project-specific action under the MOA would be exceeded for the Moapa dace.

Five projects have been proposed under the PBO, four of which have moved forward and have been tiered to the PBO: 1) Tier 1- issuance of a Section 404 permit under the Clean Water Act of 1972, as amended, for the CSI residential development project; 2) Tier 2- for a ROW to SNWA to construct a water conveyance pipeline, 3) Tier 4- construction of a water pipeline from an existing well on the Moapa River Indian Reservation to the Moapa Valley of Fire Travel Plaza requiring 7 afy of groundwater; and 4) Tier 5- a lease approved by the Bureau of Indian Affairs for construction and operation of the KRoad Moapa Solar Energy Project on the Moapa River Indian Reservation. Tier 3 was the proposed cement plant which was withdrawal without a biological opinion being issued. Tiers 1, 2, and 5 are major projects and are discussed in detail below.

Tier 1: CSI proposes to withdraw their 4,600 afy of state-appropriated water from two well locations in Coyote Spring Valley in order to help meet the water demands of its proposed residential community. Monitoring of surface flows and groundwater levels is required by the State Engineer as a condition of CSI's groundwater permits in Coyote Spring Valley. This monitoring will provide necessary information to assess long-term impacts to the aquifer and down-gradient flows (Resource Concepts Incorporated 2005). Currently, SNWA monitors eight carbonate wells in the Coyote Spring Valley hydrographic basin on a continuous basis, and one carbonate well and four alluvial wells on a monthly basis.

Tier 2: This consultation involves a BLM ROW for SNWA to construct a pipeline to convey groundwater withdrawals from potentially three carbonate wells located in the Coyote Spring Valley. SNWA participates in a regional carbonate aquifer system study ordered by the Nevada State Engineer (Order 1169) to evaluate how groundwater withdrawals in the Coyote Spring Valley will impact the carbonate aquifer system and adjacent Muddy River ecosystem. The Order requires pumping at least 8,150 afy, from the Coyote Spring Valley for two consecutive years. In order to meet the requirements of the Order, SNWA is pumping 9,000 afy of groundwater from the regional carbonate system. Any unused water will empty into the Reed Bowman Reservoir. Should the reservoir reach full capacity, flows will continue into the lower Muddy River. Upon completion of the study, the pipeline system would convey permitted water rights to beneficial uses. Should the results of the study indicate that water rights in the Coyote Spring Valley are fully allocated then SNWA would use the proposed pipeline to transfer their permitted water rights from other areas outside of Coyote Spring Valley. The project would also provide a means to convey 724 afy of SNWA's permitted Coyote Spring groundwater rights to MVWD. This would facilitate the dedication by MVWD of its existing 1.0 cfs Jones Spring water right for the purpose of providing in-stream flows that will be beneficial to the Moapa dace.

Tier 5: The Moapa Band of Paiutes and KRoad propose to construct, maintain, and operate a 350-megawatt solar project on the Moapa River Indian Reservation. The proposed project would require approximately 380 ac-ft of groundwater during the proposed 5-year construction phase (72 afy for 5 years) and up to 40 afy for operation and maintenance after construction.

The Service reviewed the updated monitoring information including instream flow criteria established in the MOA. The minimum instream flow criteria measured at the Warm Springs West Flume determine thresholds that would trigger certain conservation actions including reductions in groundwater pumping. The first instream flow to trigger an automatic groundwater reduction is 3.0 cfs. According to monitoring data, the current instream flow at the Warm Springs West Flume is 3.5 cfs. The 3.5 cfs is a reduction of 0.1 cfs from before pumping was initiated. Therefore, based on the monitoring information provided, we have not reached any instream flow trigger points analyzed in the biological opinion. If instream flows reach 3.2 cfs at the Warm Springs West Flume, the signatories to the MOA will meet to discuss, compare, and evaluate the hydrology data.

As predicted in the PBO, higher elevation springs (*e.g*., Pederson and Pederson East Springs) would be impacted first. Flows in these two springs have been reduced by 35 to 40 percent. This reduction in flow has occurred despite withdrawal of groundwater below allowable levels. In addition, groundwater withdrawals have not been consistent since the testing period started on November 15, 2010. The variance between modeled and actual results will be evaluated further as pumping tests continue. The reduction in flows at these two springs could affect Moapa Dace which was not anticipated fully through the modeling efforts used in the PBO (Chad Mellison, Service, Reno, Nevada pers. comm.).

Habitat Acquisition

In February 2006, the Secretary of the Interior approved funding through the Southern Nevada Public Lands Management Act for SNWA to purchase 1,218 ac of land historically known as the Warm Springs Ranch, located in the Moapa Valley. In 2007, the SNWA completed the purchase and committed to protect and preserve the property as a natural area. By purchasing the property, the SNWA was able to protect the majority of the Moapa dace population and its habitat, and prevent the property from being developed for residential purposes.

Habitat Improvement Projects and Predator Control

On July 17, 2008, the Service issued a biological opinion (File No. 84320-2008-F-0417) to the U.S. Army Corps of Engineers for their proposed issuance of a permit to SNWA for habitat restoration, establishment, and enhancement activities in the Lower Pederson Stream of the Warm Springs Natural Area. The permit would allow SNWA to restore part of the lower Pederson channel to a pre-modified alignment and construct an artificial channel connecting the stream to the channel. Incidental take of all Moapa dace occurring in the project area may be harassed during the course of activities, which is estimated to be approximately 100 fish. An additional 20 Moapa dace may be harmed (wounded or killed) during the course of salvage activities. An unknown number of Moapa dace eggs and/or larvae may be harmed during the course of activities due to desiccation of approximately 3,229 ft^2 of sheet flow.

Wildfires

Since the PBO was issued in 2006, a major wildfire occurred on July 1, 2010, affecting the Moapa dace. According to population survey data, up to 60 percent of the existing Moapa dace occurred within the action area at the time the fire started. Post-fire survey data indicate that most dace within the affected area quickly moved to safer areas in response to the fire. Although the number of dace that were lost during the fire is unknown, the Service estimates that less than 50 individuals were lost during the event and in the immediate aftermath.

5.10 **Ash Meadows Species**

The Ash Meadows species occur entirely or mostly within the Ash Meadows NWR. Ash Meadows NWR encompasses over 23,000 ac of spring-fed wetlands and alkaline desert uplands. The Ash Meadows NWR is a major discharge point for a vast underground carbonate aquifer system stretching 100 mi. The carbonate aquifer system is hydrologically connected to the Amargosa Desert Hydrographic Basin, covering an area of 2,593 mi^2, which is part of the Death Valley Hydrographic Region.

Most of the springs are created by groundwater discharge from the carbonate aquifer system along the Ash Meadows fault system (Denny and Drewes 1965). Other seeps and springs discharge from saturated valley-fill sediments which overlie and are supplied by the carbonate aquifer system (Belcher 2004). The total annual discharge of Ash Meadows seeps and springs is an estimated 17,000 afy (Walker and Eakin 1963, Laczniak *et al.* 1999).

Devils Hole is a collapsed depression (opening) to the same carbonate aquifer system which supplies springs on Ash Meadows NWR within a 40-ac detached unit of Death Valley National Park located within Ash Meadows NWR. Devils Hole was established in 1952 and added to the then Death Valley National Monument by presidential proclamation, in which it was recognized for its uniqueness, scientific value, and for the endemic pupfish living within it (17 *Federal Register* 691). BLM determined that no proposed action would result in effects to the Devils Hole pupfish

Since the early 1950s, extensive investigations have been conducted to evaluate the water resources potential of the Death Valley Hydrographic Region, which include the impacts of groundwater pumping, information on groundwater recharge from wash infiltration, evaluation and characterization of regional groundwater flow and other water resources in the area. A series of extensive hydrological monitoring infrastructure has resulted in the accumulation of over 40 years of water level monitoring and water chemistry analysis in the region.

From 1969 to 1977, water pumping in the vicinity of Ash Meadows NWR reduced water levels in Devils Hole (Bedinger and Harrill 2006). In 1973, groundwater pumping in the vicinity of Ash Meadows NWR and Devils Hole was limited by an injunction issued by the U.S. District

Court in Nevada to restore the water level of the pool in Devils Hole to 3 ft below a reference point on the rock wall to protect the Devils Hole pupfish living in the pool. This decision eventually led to the U.S. Supreme Court's decision in *Cappaert v. United States* (426 U.S. 128 1976), which held that the 1952 proclamation establishing Devils Hole as part of Death Valley National Monument reserved that amount of water necessary to preserve the scientific interests associated with the pool. The consequence of this decision is that groundwater pumping is now limited and a minimum water level of 32.4 in below the reference point was established with the goal of protecting the endangered Devils Hole pupfish. The water level rebounded from a historic low in 1972, with the maximum level in 1988 (USGS 2010). However, from 1988 to 2004 Devils Hole water level measurements declined approximately 1.2 in (NPS 2010, USGS 2010).

From 1983 to 1988, Ash Meadows NWR, spring discharge declined 0.3 cfs at Fairbank Spring (USGS 2010). However, discharge records for Ash Meadows NWR springs are inconsistent due to operational changes related to restoration activities. For instance, Five Springs well, the only monitoring well at the Ash Meadows NWR completely in the carbonate aquifer (the source of the Ash Meadows NWR springs), declined 0.06 m (2.4 in) from 1992 to 2004 (USGS 2010); however, the record is incomplete prior to 1992. From late 1980s to 2004, water levels also declined in two carbonate monitoring wells located between the Ash Meadows NWR and Army 1 WW. Army 1 WW is located 18 mi to the northeast of Devils Hole within Hydrographic Basin 230 (Amargosa Desert).

Bedinger and Harrill (2006) used multiple regression analyses to examine these changes in water level in Devils Hole between 1963 and 2002 and concluded that the declines were due to pumping, not climatic factors (reductions in precipitation and groundwater recharge). They suggested that the water level declines in Devils Hole were primarily due to pumping that occurred between 1969 to 1977 at Ash Meadows and Amargosa Farms area. Secondarily, declines were a result of pumping that began in the 1950s and 1960s at a Department of Energy water supply well located at the south end of the Nevada Test Site (Army 1 WW, USGS site 363530116021401).

Since 2005, the water level in Devils Hole has increased approximately 4.32 in. It is unclear if this upward trend is due to reduced pumping in the basin or increased recharge from rain events. It is also unclear if this upward trend will be maintained or revert to a decline. As of May 2010, the water level in Devils Hole is 10.95 in above the minimum mandated water level (NPS 2010).

At this time, it is difficult to predict local climate change impacts to the Ash Meadows species. Information indicates that climate change has the potential to affect and threaten the Ash Meadows ecosystem in the long-term, but there is much uncertainty regarding the attributes that could be affected and their timing, magnitude, and rate of change. Environmental changes including increased temperatures and decreased precipitation may result in lowered groundwater levels and increased evapotranspiration rates. Such environmental changes may result in loss of individual plants or populations.

The status of each Ash Meadows species is described in below.

5.11 **Spring-loving Centaury**

Listing

The spring-loving centaury was listed as threatened with critical habitat on May 20, 1985 (50 *Federal Register* 20777) and critically endangered by the State of Nevada in 1982. The spring-loving centaury is also protected under NRS 527.260-300.

Species description

Reveal, Broome, and Beatley described the spring-loving centaury in 1973, although Coville and Funston had collected it as early as 1891 (Reveal *et al.* 1973). A member of Gentianaceae (gentian family), the spring-loving centaury is an upright, glabrous, annual forb that measures 17.5 in tall with many branches that bear flowers measuring approximately 0.3 to 0.5 in diameter (Reveal *et al.* 1973; Mozingo and Williams 1980). The flower is tubular with 0.2 to 0.3 in long petals (Reveal *et al.* 1973; Mozingo and Williams 1980). Petals are deep rose-pink with a yellowish throat and five dark purple spots below the point at which the adjacent petals attach to the body of the flower (Reveal *et al.* 1973). The stamens are conspicuously exerted, and after pollen release, the yellow anthers become twisted (Reveal *et al.* 1973). The spring-loving centaury flowers from June to September with flowers developing into narrow, linear seed capsules (Reveal *et al.* 1973; Pavlik and Moore 2010). The range of spring-loving centaury encompasses the Ash Meadows NWR, the adjacent BLM ACEC, and private lands.

Studies have been conducted on phenology, breeding system, and seed biology (seed output, germination) of 71 spring-loving centaury plants (Pavlik and Moore 2010). Inflorescences that developed earlier in the season produced significantly heavier seed than those that originated later in the season (Pavlik and Moore 2010). Plants produced approximately 27.2 floral buds that each yielded approximately 23 seeds (Pavlik and Moore 2010). The spring-loving centaury has a facultative autogamous breeding system: it is capable of self-fertilization, but probably benefits from outcross pollen and increased pollen loads provided by insect pollinators (Pavlik and Moore 2010).

There is no data on germination events for the spring-loving centaury. Monitoring capable of providing insight into population trend and demographic structure has not been conducted. The seed bank buffers against environmental stochasticity and extinction in desert plants; nothing is known about the longevity of spring-loving centaury seeds in the seed bank. Germination trials of spring-loving centaury seeds have not been conducted due to the robust nature of this species reproduction (*i.e.,* large number of seeds per bud, buds per plant) and the extremely small size of the seeds (Pavlik and Moore 2010). Transplanting and translocation studies have not been conducted.

The spring-loving centaury grows between 2,070 and 2,320 ft above mean sea level and is widespread across the Ash Meadows NWR in seeps, wet meadows, and spring channel banks (Morefield 2001b; BIO-WEST 2011). The species is adapted to alkaline clay soils of the Ash Meadows area and it appears that any location on the Ash Meadows NWR that contains surface or near-surface water at any time during the year would produce a spring-loving centaury community (BIO-WEST 2011). The wet meadow ecosystem occupied by spring-loving centaury is typically dominated by saltgrass (*Distichlis spicata*) with scattered velvet ash (*Fraxinus velutina* Torr.) and screwbean mesquite (*Prosopis pubescens* Benth). Other associates of saltgrass meadows include Yerba mansa (*Anemopsis californica*) and Ash Meadows gumplant. On drier sites, common associates include Tecopa bird's beak *(Cordylanthus tecopensis* Munz & Roos) and Ash Meadows ivesia (Reveal *et al*. 1973; Morefield 2001b).

At the time of listing, a population estimate of spring-loving centaury was unknown. Knight and Clemmer (1987) reviewed the available data on the rare plants of Ash Meadows and identified general areas from which spring-loving centaury had been reported. In 1998, surveys were targeted on the seven general areas identified by Knight and Clemmer (1987) and the total population was estimated to be about 175,000 plants on 522 ac (BLM and Service 2000). Results from the 2008-2009 Ash Meadows NWR-wide rare plant surveys (BIO-WEST 2011) estimate that 4,593,971 individuals are present on the Ash Meadows NWR in 33 minimum scale occurrences (0.1 mi separation distance) or 2 maximum scale occurrences (0.1 mi separation distance) on a total of 527.2 ac. Estimates of spring-loving centaury individuals on the BLM ACEC and private lands within the Ash Meadows NWR boundary do not exist.

Status and Distribution

The primary threats to spring-loving centaury included in the final listing rule were groundwater withdrawal; road construction; trampling and overgrazing by cattle and wild and free-roaming horses; and inadequate regulatory mechanisms. Threats identified since listing include nonnative plant species, wildfire, and surface mining. Endemism and limited geographic distribution will continue to threaten spring-loving centaury due to the vulnerability of small populations to a range of environmental, demographic, and stochastic factors.

Establishment of the Ash Meadows NWR in 1984 secured the land for listed plant species by removing threats from agriculture, wild and free-roaming horses, livestock and ranching, and residential development. The creation of the BLM ACEC in 1998 added additional protections to species whose range extends past the Ash Meadows NWR boundary. Habitat for the spring-loving centaury is almost entirely protected from development (except on private inholdings) and new mineral entry (for 20 years) within the Ash Meadows NWR and BLM ACEC. Private inholdings still exist within the Ash Meadows NWR boundaries. OHV activity is periodically a threat to spring-loving centaury within the Ash Meadows NWR boundary, due to downed sections of fencing and lack of law enforcement presence (Baldino, pers. comm. 2012). In addition, though OHV activity is confined to existing trails, roads and dry washes within the BLM ACEC, there are no signs and fences that would inform the OHV community of its special designation. Nonnative plant species could spread in spring-loving centaury habitat, increase fire frequency, or both and threaten natural vegetation corridors needed for gene flow and dispersal in this species.

Recent comprehensive baseline surveys on public land have added new known populations; there are now 33 occurrences (0.1 mi [0.16 km] minimum scales) made up of 4,593,971 individuals on 527.2 ac within Ash Meadows NWR boundaries. Trend data for demographic structure and recruitment events is nonexistent and nothing is known about the longevity of spring-loving centaury seeds in the seed bank. The Amargosa Desert Hydrographic Basin is over-appropriated. The hydrologic impacts to Ash Meadows from future development are unknown, but fluctuations in water levels in the Amargosa Desert Hydrographic Basin have been tied directly to groundwater pumping (Bedinger and Harrill 2006). Since spring-loving centaury is adapted to the wetter environments of the Ash Meadows NWR, more information is needed on the effects of changes in spring discharge, groundwater levels, water temperature, and water and soil chemistry to gene flow and dispersal in the spring-loving centaury.

5.12 **Spring-loving Centaury Critical Habitat**

Critical habitat for spring-loving centaury was designated on Federal and private land on May 20, 1985, in three township and range units totaling 1,840 ac. The physical and biological factors for these areas are moist to wet clay soils along banks of streams or seepage areas *(50 Federal Register 20777)*. Critical habitat areas are as follows:

- Township 17 South, Range 50 East
  - SW ¼ NE ¼, SE ¼ NW ¼, E ½ SW ¼, and W ½ SE ¼, Section 21
  - W ½ NW ¼, Section 23
  - NW ¼ NE ¼ and NE ¼ NW ¼, Section 28
  - SE ¼ SE ¼, Section 34
  - SW ¼ SW ¼ and E ½ SW ¼, Section 35
- Township 18 South, Range 50 East
  - SW ½, Section 1
  - NE ¼ NW ¼ and W ½ NW ¼, Section 2
  - E ½ NE ¼, Section 3
  - NE ¼, Section 7
  - SE ¼ SE ¼, Section 23
  - SE ¼ SW ¼, Section 24
- Township 18 South, Range 51 East
  - NW ¼ SE ¼, Section 7
  - S ½ NW ¼ and SW ¼, Section 18
  - NW ¼ and NE ¼ SE ¼, Section 19
  - E ½ SW ¼, Section 20
  - N ½ NW ¼, Section 29
  - NE ¼ NW ¼, Section 30

The portion of critical habitat located in Township 18 south, Range 50 east, NE ¼ Section 7 occurs outside of the Ash Meadows NWR within the BLM ACEC and private inholdings and has not been surveyed. It is unknown if this habitat is occupied. The portions of critical habitat located in Township 17 south, Range 50 east, W ½ NW ¼, Section 23 and NW ¼ NE ¼ and NE ¼ NW ¼, Section 28 and Township 18 south, Range 51 east, E ½ SW ¼, Section 20 and N ½ NW ¼, Section 29 are not occupied. All other portions of critical habitat are occupied.

5.13 Ash Meadows Sunray

Listing

The Ash Meadows sunray was listed as threatened with critical habitat on May 20, 1985 (50 *Federal Register* 20777) and critically endangered by the State of Nevada in 1987. The Ash Meadows sunray is also protected under NRS 527.260-300.

Species Description

The Ash Meadows sunray was first collected in 1966 by Arthur Cronquist (1972). It is a perennial forb in Asteraceae (sunflower family) that forms clumps 3.9 to 15.7 in high that rise from a stout, woody root-stock (Mozingo and Williams 1980). The varietal name *corrugata* refers to leaf margins that are strongly ruffled-corrugate, especially towards the margins (Cronquist 1972; Mozingo and Williams 1980). The ray flowers are yellow and number 11 to 23 per inflorescence. Inflorescence buds begin developing in February and flowers open from late March to late May (Mozingo and Williams 1980; Pavlik and Moore 2010). The Ash Meadows sunray is endemic to the Ash Meadows area of Nye County, Nevada. The Ash Meadows sunray range encompasses the Ash Meadows NWR, adjacent areas within the BLM ACEC, and private lands.

Studies on phenology, breeding system, and seed biology (seed output, germination) of 60 Ash Meadows sunray plants have been conducted (Pavlik and Moore 2010). In this study, inflorescences that developed earlier in the season produced significantly more seeds than those developing later (Pavlik and Moore 2010). Plants produced 17.4 mature seeds per bud (Pavlik and Moore 2010). An examination of the seed-to-ovule ratio of mature fruits suggests that this taxon's breeding system exemplifies facultative xenogamy (*i.e.*, predominantly outcrosses, but selfing is possible) (Pavlik and Moore 2010). Ash Meadows sunray flowers can attract at least 21 floral visitors, 19 which are bee taxa (BIO-WEST 2009). Ash Meadows sunray is important to the nectiferous insect community at the Ash Meadows NWR because it provides pollen and nectar early in the growing season (BIO-WEST 2009).

There are no data on germination events nor have seedlings been observed in the Ash Meadows sunray. Monitoring that could provide insight into population trend and demographic structure has not been conducted. The seed bank buffers against environmental stochasticity and extinction in desert plants; nothing is known about the longevity of Ash Meadows sunray seeds in the seed bank. Attempts to germinate 120 Ash Meadows sunray seeds with and without scarification were unsuccessful, with only two seeds breaking dormancy and then failing to survive when transferred to native soil (Pavlik and Moore 2010). Transplanting and translocation studies have not been conducted.

The Ash Meadows sunray occurs between 2,200 and 2,360 ft above mean sea level and occurs across a broad range of habitats including open, hard, whitish alkaline soils often on or near calcareous outcrops, occasionally moist alkaline soils, spring and seep areas, and dry desert washes (Morefield 2001b; BIO-WEST 2011). Based on superficial observation of its habitat, it was assumed initially that the Ash Meadows sunray was a xerophyte, adapted to hard, alkaline soils of upland topography (Knight and Clemmer 1987; Service 1990). However, this characterization may be misleading because it is based on observations made during summer months (S. Jensen, White Horse Associates, pers. comm. 2010). During winter months, landtypes considered "upland" (*i.e.* hard, whitish, and alkaline soil areas not directly affiliated with a spring system) are saturated at or near the surface (Jensen, pers. comm. 2010). Further, about 14 percent of Ash Meadows sunray populations occur on a landtype with a hydric character (hydric marl/sandstone and moderately-deep (hydric) alluvium from marl/clay) that is saturated to the surface by groundwater during the winter months of average precipitation years (Jensen, pers. comm. 2010; White Horse Associates 2010). Other plant species associated with Ash Meadows sunray include: desert bearpoppy (*Arctomecon merriamii*), Ash Meadows milkvetch, shadscale (*Atriplex confertifolia*), basin yellow cryptantha (*Cryptantha confertifolia*), alkali goldenbush (*Isocoma acradenia*), and Ash Meadows blazingstar (*Mentzelia leucophylla*) (Mozingo and Williams 1980; Knight and Clemmer 1987).

At the time of listing, a population estimate of the Ash Meadows sunray was unknown (50 *Federal Register* 20777). In 2001, the Ash Meadows sunray population on the Ash Meadows NWR was estimated at 1,849 individuals in 15 minimum scale occurrences (0.1 mi separation distance) or 11 maximum scale occurrences (0.6 mi separation distance) (Morefield 2001b). Results from the 2008-2010 Ash Meadows NWR-wide rare plant survey (BIO-WEST 2011) estimate that 79,508 individuals are present on the Ash Meadows NWR in 30 minimum scale occurrences (0.1 mi separation distance) or 1 maximum scale occurrence (0.6 mi distance) on a total of 216.1 ac. The largest occurrences of Ash Meadows sunray on the Ash Meadows NWR are at Jackrabbit Spring Road, Collins Ranch, Warm Springs, and Cold Spring. Estimates of Ash Meadows sunray individuals on the BLM ACEC and private lands within the Ash Meadows NWR boundary do not exist.

Status and Distribution

The primary threats to the Ash Meadows sunray included in the final listing rule were groundwater withdrawal, road construction, OHV activity, trampling by wild and free-roaming horses, inadequate regulatory mechanisms, and trampling by cattle and feral horses. Threats identified since listing include nonnative plant species, wildfire, surface mining, and predation and herbivory. Nonnative species are known to alter fire regimes and are a threat to biodiversity in the Mojave Desert (Brooks *et al.* 2004). In Ash Meadows sunray habitat, red brome has the potential to colonize previously undisturbed habitat and facilitate the spread of fire by increasing fuel loads where previously there was mostly bare ground.

Endemism and limited geographic distribution will continue to threaten the Ash Meadows sunray due to the vulnerability of small populations to a range of environmental, demographic, and stochastic factors. Climate change may result in effects to the species as discussed previously for all Ash Meadows species.

Establishment of the Ash Meadows NWR in 1984 secured the land for federally-listed plant species by removing threats from agriculture, wild and free-roaming horses, livestock and ranching, and residential development. The creation of the BLM ACEC in 1998 added additional protections to species whose range extended past the Ash Meadows NWR boundary.

Habitat for the Ash Meadows sunray is almost entirely protected from development (except on private inholdings) and new mineral entry (for 20 years) within the Ash Meadows NWR and BLM ACEC. Private inholdings still exist within the Ash Meadows NWR boundaries. OHV activity is periodically a threat to the Ash Meadows sunray within the Ash Meadows NWR boundary, due to downed sections of fencing and lack of law enforcement presence (Baldino, pers. comm. 2012). In addition, though OHV activity is confined to existing trails, roads and dry washes within the BLM ACEC, there are no signs and fences that would inform the OHV community of its special designation. Nonnative plant species could spread into Ash Meadows sunray habitat, increase fire frequency, or both, any or all of which would threaten the natural vegetation corridors needed for gene flow and dispersal in this taxon.

Recent, comprehensive, baseline surveys on public land have added new known populations; there are now 30 occurrences (0.1 mi [0.16 km] minimum scale) made up of 79,508 individuals on 216.1 ac within Ash Meadows NWR boundaries. Trend data for demographic structure and recruitment events is nonexistent and nothing is known about the longevity of Ash Meadows sunray seeds in the seed bank. Recent observations of herbivory and predation upon Ash Meadows sunray could negatively affect gene flow and dispersal by disrupting reproduction and seed bank recharge. The hydrologic impacts to Ash Meadows from development are unknown, but fluctuations in water levels in the Amargosa Desert Hydrographic Basin have been tied directly to groundwater pumping (Bedinger and Harrill 2006). Exploration into detailed hydrologic habitat requirements of the Ash Meadows sunray has begun (Jensen, pers. comm. 2010; White Horse Associates 2010; BIO-WEST 2011). More information is needed on the potential effects of changes in spring discharge, groundwater levels, water temperature, and water and soil chemistry upon patterns of gene flow and dispersal in the Ash Meadows sunray.

5.14 Ash Meadows Sunray Critical Habitat

Critical habitat for the Ash Meadows sunray was designated on Federal and private land on May 20, 1985, in four township and range units. The physical and biological factors for these areas are dry washes or whitish saline soil associated with outcrops of pale whitish limestone (50 *Federal Register* 20777). Critical habitat areas are as follows:

- Township 17 South, Range 50 East
    - SW ¼ SE ¼, Section 15
    - SW ¼ NE ¼ and W ½ SE ¼, Section 21
    - SW ¼ NE ¼, Section 22
    - E ½ SE ¼, Section 34
    - SW ¼ NE ¼, S ½ NW ¼, SW ¼, and W ½ SE ¼, Section 35
- Township 17 South, Range 51 East
    - SE ¼, Section 20
- Township 18 South, Range 50 East
    - NW ¼, SW ¼ and W ½ SE ¼, Section 1
    - E ½ SE ¼, Section 2
    - NE ¼ NW ¼, Section 12
    - E ½ SW ¼ and W ½ SE ¼, Section 13

- Township 18 South, Range 51 East
  - SW ¼ SE ¼, Section 7
  - NW ¼ NE ¼ and SE ¼ SW ¼, Section 18

The portion of critical habitat located in Township 18 south, Range 51 east, SE ¼ Section 20 occurs outside of the Ash Meadows NWR, within the BLM ACEC and has not been surveyed. It is unknown if this habitat is occupied. The portions of critical habitat located in Township 17 south, Range 50 east, SW ¼ SE ¼, Section 15 and SW ¼ NE ¼, Section 22 are not occupied. All other portions of critical habitat are occupied.

5.15 **Ash Meadows Milkvetch**

Listing

The Ash Meadows milkvetch was listed as threatened with critical habitat on May 20, 1985 (50 *Federal Register* 20777) and critically endangered by the State of Nevada in 1979. The Ash Meadows milkvetch is also protected under NRS 527.260-300.

Species Description

Rupert Barneby formally described the Ash Meadows milkvetch in 1970, although partial specimens were collected as early as 1898 by Carl Anton Purpus (Barneby 1970). The Ash Meadows milkvetch is a long-lived, perennial forb in Fabaceae (pea family) that develops into low, spreading mounds that can reach 5.5 in high and 19.5 in diameter (Reveal 1978a). The specific name, *phoenix*, refers to being born of ashes and is descriptive of the plant's dense, ashen mound of leaves partly covered over with fine, white soil (Mozingo and Williams 1980). One to three, 0.5 to 1.0 in pink-purple, pea-like flowers are borne on tiny erect stems from February to early May (Reveal 1978a; Pavlik and Moore 2010). Dense, grayish white hairs cover the finely divided (pinnately compound), 0.5 to 1.5 in long leaves and 0.25 in pea-pod-like fruits (Reveal 1978a). Ash Meadows milkvetch is endemic to the Ash Meadows area of Nye County, Nevada. The range of the species encompasses the Ash Meadows NWR, adjacent areas within the BLM ACEC, and private lands.

Studies on phenology, breeding system, and seed biology (seed output, germination) of 60 Ash Meadows milkvetch plants have been conducted (Pavlik and Moore 2010). The Ash Meadows milkvetch is the first rare taxa at the Ash Meadows NWR to develop floral buds, which can develop as early as February (Pavlik and Moore 2010). Severe herbivory by lagomorphs has been previously documented and can cause an 80 to 90 percent reduction in Ash Meadows milkvetch reproductive output (Pavlik *et al*. 2006; Pavlik and Stanton 2008). In this study, Ash Meadows milkvetch plants were caged so that study objectives could be met. Caged plants bore 50 to several 100 flowers each whereas un-caged plants averaged 13 flowers. An examination of the seed-to-ovule ratio of mature fruits suggests that this taxon has a xenogamous, nearly obligate breeding system (*i.e.,* requires cross-pollination) (Pavlik and Moore 2010). The Ash Meadows milkvetch attracts one floral visitor, *Anthophora porterae*, a bee which is a known milkvetch specialist (BIO-WEST 2009). It appears that *A. porterae* more than compensates for the lack of other floral visitors due to tenacious and aggressive pollen and nectar collection behaviors. It is likely that *A. porterae* is a vital pollinator of the Ash Meadows milkvetch (BIO-WEST 2009).

Germination events and seedling observations of Ash Meadows milkvetch are rare (Reveal 1978a, Pavlik *et al.* 2006). Pavlik *et al*. (2006) did not observe germination or seedlings in five subpopulations during a year with 162 percent above average precipitation. Pavlik *et al.* (2006) hypothesized that either the soil seed bank was depleted or that the species was dependent on the most extreme and infrequent precipitation events. In a demographic analysis, Pavlik *et al.* (2006) determined only two out of five subpopulations studied had "recent" germination and establishment events, perhaps during the 1997-1998 growing season which had 211 percent of average precipitation. They determined that small plants, (*i.e.,* those less than 7.7 in^2 in diameter), were completely absent from one subpopulation and comprised less than 5 percent of the sampled plants at all populations (Pavlik *et al.* 2006). In addition, attempts to germinate 170 *A. phoenix* seeds with and without scarification were successful, with scarification doubling the germination response, but no seedlings survived when transplanted into any medium (Pavlik and Moore 2010). Transplanting and translocation studies have not been conducted. This strongly suggests that establishment of Ash Meadows milkvetch is sporadic and unlikely in most years, and that population persistence depends heavily on the longevity of individual plants which must, therefore, tolerate unpredictable environmental variations through time (Pavlik *et al.* 2006).

The lifespan of individual Ash Meadows milkvetch plants is not known, but we believe that they are relatively long-lived, with the largest plants, which can form mounds up to 20 in across, likely exceeding 10 years or more in age. Studies using caged and un-caged plants have shown that some plants can grow in diameter by as much as 1.6 in and 0.8 in per year, respectively (Pavlik and Stanton 2008). Although the relationship between growth rate and diameter is unlikely to be linear, this suggests that a plant could reach 20 in within as little as 12.5 years if growth is not hindered by herbivory. The actual growth rate, especially in the presence of herbivory, is likely to be much slower and individual plants could take decades to reach their maximum size.

Status and Distribution

The primary threats to the Ash Meadows milkvetch included in the final listing rule were groundwater withdrawal, road construction, surface mining, trampling by wild and free-roaming horses, inadequate regulatory mechanisms, and trampling by cattle and feral horses. Threats identified since listing include nonnative plant species, wildfire, OHV activity, and predation and herbivory. Endemism and limited geographic distribution will continue to threaten Ash Meadows milkvetch due to the vulnerability of small populations to a range of environmental, demographic, and stochastic factors. Climate change may result in effects to the species as discussed previously for all Ash Meadows species, but there is much uncertainty regarding the attributes that could be affected and their timing, magnitude, and rate of change.

Establishment of the Ash Meadows NWR in 1984 secured the land for federally-listed plant species by removing threats from agriculture, wild and free-roaming horses, livestock and ranching, and residential development. The creation of the BLM ACEC in 1998 added additional protections to species whose range extended past the Ash Meadows NWR boundary. Habitat for Ash Meadows milkvetch is almost entirely protected from development (except on private inholdings) and new mineral entry for 20 years (*i.e.,* until 2029) within the Ash Meadows NWR and BLM ACEC. Private inholdings still exist within the Ash Meadows NWR boundaries. OHV activity is periodically a threat to Ash Meadows milkvetch within the Ash Meadows NWR boundary, due to downed sections of fencing and lack of law enforcement presence (C.Baldino, Ash Meadows NWR, pers. comm. 2012). In addition, though OHV activity is confined to existing trails, roads and dry washes within the BLM ACEC, there are no signs and fences that would inform the OHV community of its special designation. Nonnative plant species could spread into Ash Meadows milkvetch habitat, increase fire frequency, or both, any or all of which would threaten the natural vegetation corridors needed for gene flow and dispersal in this taxon.

Recent, comprehensive, baseline surveys on public land have added new known populations; there are now 12 occurrences (0.1 mi minimum scale) made up of 15,606 individuals on 73 ac within Ash Meadows NWR boundaries. The little trend data that is available suggests that establishment of Ash Meadows milkvetch is sporadic and unlikely in most years, and that population persistence depends heavily on the longevity of individual plants which must, therefore, tolerate unpredictable environmental variations through time. Nothing is known about the longevity of Ash Meadows milkvetch seeds in the seed bank. Recent observations of herbivory and predation suggest that the intensity of herbivory on Ash Meadows milkvetch is unacceptably high and is disrupting reproduction and seed bank recharge (Pavlik and Moore 2010). Exploration into detailed hydrologic habitat requirements of Ash Meadows milkvetch has begun (White Horse Associates 2010). More information is needed on the potential effects of changes in spring discharge, groundwater levels, water temperature, and water and soil chemistry upon patterns of gene flow and dispersal in Ash Meadows milkvetch.

The Ash Meadows milkvetch occurs between 2,200 and 2,350 ft above mean sea level and occurs in areas with sparse herbaceous cover within alkali shrub-scrub and alkali meadow habitats that often have depressional areas with mesic conditions where water might collect following rain (Morefield 2001a; BIO-WEST 2011). Based on superficial observation of its habitat, it was assumed initially that *A. phoenix* was a xerophyte, adapted to hard, dry, alkaline soils of upland topography (Knight and Clemmer 1987; Service 1990). However, Pavlik (2006) suggests that this characterization may be misleading and based on observations made during low rainfall years. During a high precipitation year, Pavlik (2006) observed the species growing directly in channels with running and slow moving water. Further, about 16 percent of *A. phoenix* populations occur on a landtype with a hydric character (hydric marl/sandstone) that is saturated to the surface by groundwater during the winter months of average precipitation years (White Horse Associates 2010). Other plant species associated with the Ash Meadows milkvetch include: shadscale, saltgrass, Ash Meadows sunray, alkali goldenbush, and Ash Meadows blazingstar.

At the time of listing, Ash Meadows milkvetch was known only from four sites on the Ash Meadows NWR and was estimated to be made up of 1,000 individuals (Reveal 1978a). Knight and Clemmer (1987) reviewed the available data on the rare plants of the Ash Meadows area and identified six general areas (Rogers Spring, Cold Spring, South of Longstreet Spring, Collins

Ranch, Jackrabbit Spring, and Spring Meadows Road South) from which Ash Meadows milkvetch had been reported. In 2001, the Ash Meadows milkvetch population was estimated to be about 1,943 individuals in 13 minimum scale occurrences (0.1 mi (0.16 km) separation distance) or 10 maximum scale occurrences (0.6 mi separation distance) on 9.1 ac (Morefield 2001a). Results from the 2008-2010 Ash Meadows NWR-wide rare plant survey (BIO-WEST 2011) estimate that 15,606 individuals are present on the Ash Meadows NWR in 12 minimum scale occurrences (0.1 mi separation distance) or 2 maximum scale occurrence (0.6 mi distance) on a total of 73 ac. The largest occurrences of Ash Meadows milkvetch on the Ash Meadows NWR are at Spring Meadows road south, Jackrabbit Spring road, Cold Spring, and Collins Ranch south. Estimates of Ash Meadows milkvetch individuals on the BLM ACEC and private lands within the Ash Meadows NWR boundary do not exist.

5.16 **Ash Meadows Milkvetch Critical Habitat**

Critical habitat for the Ash Meadows milkvetch was designated on Federal and private land on May 20, 1985, in three township and range units (50 *Federal Register* 20777). The critical habitat designation includes 1,200 ac (485.6 ha) of dry, hard, white, barren, saline, clay flats, knolls, and slope at Ash Meadows NWR, BLM Area of Critical Environmental Concern (ACEC), and private inholdings. Critical habitat areas are as follows:

- Township 17 South, Range 50 East
  - W ½ NW ¼ and SW ¼ SW ¼, Section 14
  - SW ¼ NE ¼ and W ½ SE ¼, Section 21
  - NE ¼ SE ¼, Section 22
  - NW ¼, Section 26
- Township 18 South, Range 50 East
  - SW ¼ and W ½ SE ¼, Section 1
  - NW ¼ NE ¼ and N ½ NW ¼, Section 12
  - SW ¼ SW ¼, Section 13
  - W ½ NW ¼, Section 24
- Township 18 South, Range 51 East
  - SE ¼ SW ¼ and SW ¼ SE ¼, Section 7
  - N ½ NW ¼ and E ½ SW ¼, Section 18
  - NE ¼ NW ¼, Section 19

The portion of critical habitat located in Township 17 south, Range 50 east, NW ¼, Section 26 occurs outside of the Ash Meadows NWR on the BLM ACEC and private land and has not been surveyed. It is unknown if this habitat is occupied. The portion of critical habitat in Township 17 south, Range 50 east, NE ¼ SE ¼, Section 22 occurs on a private inholding within the Ash Meadows NWR and has not been surveyed. It is unknown if this habitat is occupied. The portion of critical habitat located in Township 17 south, Range 50 east, SW ¼ SW ¼, Section 14 is not occupied. All other portions of critical habitat are occupied.

The physical and biological factors of designated critical habitat consist of the biological and physical attributes essential to the species' conservation within those areas. For the Ash Meadows milkvetch, physical and biological factors described in the final listing rule include dry, hard, white, barren, saline, clay flats, knolls, and slopes. The distribution and ecological requirements of the Ash Meadows milkvetch were poorly understood when the Service designated critical habitat; consequently, some areas of designated critical habitat may no longer provide suitable habitat for the species due to changes in soil structure as a result of past agricultural activities, and some designated areas may not have supported the species to begin with. While a considerable amount of information has been gained over the past few years, many aspects of the species ecological requirements, especially with respect to its hydrological requirements and watershed processes, remain unknown.

5.17 **Ash Meadows Ivesia**

Listing

The Ash Meadows ivesia was listed as threatened with critical habitat on May 20, 1985 *(50 Federal Register 20777)*. The Ash Meadows ivesia also was listed as critically endangered by the State of Nevada in 1987 and is also protected under NRS 527.260-300.

Species Description

The Ash Meadows ivesia was first described by Coville and Funston in 1891 (Knight and Clemmer 1987). It is a prostrate perennial forb in Rosaceae (rose family) that grows between 7.5 to 15 in tall from an erect, thick, woody root that bears a basal tuft of grayish, pubescent leaves that can reach a length of 5.2 in (13 cm) (Mozingo and Williams 1980; Knight and Clemmer 1987). Each pinnately (*i.e.,* leaflets arranged on opposite sides of an elongated axis) compound leaf bear up to 60 pairs of 0.08 to 0.1 in wide leaflets (Mozingo and Williams 1980). The inflorescence is a cyme that bears a few, small, five petaled white flowers (Mozingo and Williams 1980; Knight and Clemmer 1987). Plants bud, flower, and fruit continuously from June to October (Pavlik and Moore 2010). The Ash Meadows ivesia is endemic to the Ash Meadows area of Nye County, Nevada. The range of Ash Meadows ivesia encompasses the Ash Meadows NWR, adjacent areas within the BLM ACEC, and private lands.

Studies on phenology, breeding system, and seed biology (seed output, germination) of 60 Ash Meadows ivesia plants have been conducted (Pavlik and Moore 2010). The average individual bears 6.3 inflorescences, but since flowering and seed dispersal is so rapid, it is impossible to estimate the number of successful flowers produced by each inflorescence (Pavlik and Moore 2010). Due to rapid development and dispersal, the seed-to-ovule ratio of mature fruits was not calculated for the Ash Meadows ivesia. However, inflorescences that were excluded from pollinators still produced fully formed seeds with weights equal to those from non-excluded inflorescences, which strongly suggests that Ash Meadows ivesia has an autogamous (*i.e.,* self-fertilizing) breeding system (Pavlik and Moore 2010). Further supporting its autogamous breeding system, Ash Meadows ivesia infrequently attracts floral visitors (BIO-WEST 2009).

There are no data on germination events nor have seedlings been observed in Ash Meadows ivesia. Monitoring that could provide insight into population trend and demographic structure has not been conducted. The seed bank buffers against environmental stochasticity and extinction in desert plants; nothing is known about the longevity of Ash Meadows ivesia seeds in the seed bank. Germination trials of 60 Ash Meadows ivesia seeds that developed with and without pollinator exclusion showed similar results with only 30 percent germinating. Seeds that germinated were readily grown in native soil under greenhouse conditions (Pavlik and Moore 2010). Transplanting and translocation studies have not been conducted.

The Ash Meadows ivesia occurs between 2,150 and 2,350 ft above mean sea level and occurs on mesic, intermittently flooded to saturated alkali seeps, wet meadows, alkali meadows, and the edges of alkali shrub-scrub. Soils are saturated to moist clay with an alkali crust (Morefield 2001d, BIO-WEST 2011). The Ash Meadows ivesia populations are often located in areas with shallow groundwater or saturated soils such as topographic contour breaks and depressional areas where groundwater seeps to the surface. These habitats are sparsely vegetated due to the high level of soil alkalinity (BIO-WEST 2011). Other plant species associated with Ash Meadows ivesia include: shadscale, saltgrass, alkali goldenbush, Baltic rush (*Juncus balticus*), cordgrass (*Spartina*), and spring-loving centuary (Mozingo and Williams 1980; Morefield 2001d).

At the time of listing, a population estimate of Ash Meadows ivesia was unknown (50 *Federal Register* 20777). Knight and Clemmer (1987) reviewed the available data on the rare plants of Ash Meadows and identified general areas from which Ash Meadows ivesia had been reported. In 2001, the Ash Meadows ivesia population on the Ash Meadows NWR was estimated at 3,862 individuals in 9 minimum scale occurrences (0.1 mi separation distance) or 8 maximum scale occurrences (0.6 mi separation distance) (Morefield 2001d). Results from the 2008-2010 Ash Meadows NWR-wide rare plant survey (BIO-WEST 2011) estimate that 510,744 individuals are present on the Ash Meadows NWR in 19 minimum scale occurrences (0.1 mi separation distance) or 2 maximum scale occurrence (0.6 mi distance) on a total of 116.14 ac. The largest occurrences of Ash Meadows ivesia on the Ash Meadows NWR are at Spring Meadows road, Collins Ranch south, Marsh Spring, Crystal Reservoir east, and Lower Crystal marsh. Estimates of Ash Meadows ivesia individuals on the BLM ACEC and private lands within the Ash Meadows NWR boundary do not exist.

Status and Distribution

The primary threats to Ash Meadows ivesia included in the final listing rule were groundwater withdrawal, agricultural development, road construction, grazing by cattle and feral horses (predation), inadequate regulatory mechanisms, and trampling by cattle and feral horses. Threats identified since listing include nonnative plant species, wildfire, surface mining, and OHV activity. Endemism and limited geographic distribution will continue to threaten Ash Meadows ivesia due to the vulnerability of small populations to a range of environmental, demographic, and stochastic factors. Climate change may result in effects to the species as discussed previously for all Ash Meadows species, but there is much uncertainty regarding the attributes that could be affected and their timing, magnitude, and rate of change.

Establishment of the Ash Meadows NWR in 1984 secured the land for federally listed plant species by removing threats from agriculture, wild and feral horses, livestock and ranching, and residential development. The creation of the BLM ACEC in 1998 added additional protections to species whose range extended past the Ash Meadows NWR boundary. Habitat for Ash Meadows ivesia is almost entirely protected from development (except on private inholdings) and 20-year new mineral entry within the Ash Meadows NWR and BLM ACEC. Private inholdings still exist within the Ash Meadows NWR boundaries. OHV activity is periodically a threat to Ash Meadows ivesia within the Ash Meadows NWR boundary, due to downed sections of fencing and lack of law enforcement presence. In addition, though OHV activity is confined to existing trails, roads and dry washes within the BLM ACEC, there are no signs and fences that would inform the OHV community of its special designation (Baldino, pers. comm. 2012). Nonnative plant species could spread into Ash Meadows ivesia habitat, increase fire frequency, or both, any or all of which would threaten the natural vegetation corridors needed for gene flow and dispersal in this taxon.

Recent, comprehensive, baseline surveys on public land have added new known populations; there are now 19 occurrences (0.1 mi minimum scale) made up of 510,744 individuals on 116.14 ac within Ash Meadows NWR boundaries. Nothing is known about the longevity of Ash Meadows ivesia seeds in the seed bank. Predation pressure from cattle and feral horses has been removed, but insect seed predation has recently been observed on Ash Meadows ivesia, which could negatively affect gene flow and dispersal by disrupting reproduction and seed bank recharge (Pavlik and Moore 2010). Increasing the demand for already limited water resources can have severe direct and indirect consequences on the persistence of Ash Meadows ivesia. More information is needed on the potential effects of changes in spring discharge, groundwater levels, water temperature, and water and soil chemistry upon patterns of gene flow and dispersal in Ash Meadows ivesia.

5.18 **Ash Meadows Ivesia Critical Habitat**

Critical habitat for the Ash Meadows ivesia was designated on Federal and private lands on May 20, 1985, in two township and range units (Township 17 south, Range 50 east and Township 18 south, Range 50 east) totaling 880 ac (356.1 ha). The physical and biological factors for these areas are saline seep areas of light colored clay uplands (50 *Federal Register* 20777). Critical habitat areas are as follows:

- Township 17 South, Range 50 East
  - SW ¼ NE ¼ and W ½ SE ¼, Section 21
  - S ½ SW ¼ and SW ¼ SE ¼, Section 35
- Township 18 South, Range 50 East
  - SW ¼, Section 1
  - N ½ NW ¼ and SW ¼ SW ¼, Section 2
  - NE ¼ NE ¼, Section 3
  - NW ¼ NE ¼, Section 12
  - N ½ NE ¼ and SE ¼ NE ¼, Section 23
  - N ½ NW ¼, SW ¼ NW ¼, and NW ¼ SW ¼, Section 24

The portions of critical habitat located Township 17 south, Range 50 east, SW ¼ NE ¼ and W ½ SE ¼, Section 21 and Township 18 south, Range 50 east, NW ¼ NE ¼, Section 12 are not occupied. All other portions of critical habitat are occupied.

5.19 **Ash Meadows Gumplant**

Listing

The Ash Meadows gumplant was listed as threatened with critical habitat on May 20, 1985 (50 *Federal Register* 20777). The Ash Meadows gumplant was listed as critically endangered by the State of Nevada in 1982 and is also protected under NRS 527.260-300. Although the species is not listed by the State of California, it is on the California Native Plant Society's "List 1B," this designation indicates the species qualifies for state listing and must be considered during review of proposed projects under the California Environmental Quality Act (CEQA).

Species Description

Reveal and Beatley described the Ash Meadows gumplant in 1971, although Beatley had collected it as early as 1965 (Reveal and Beatley 1971). The Ash Meadows gumplant is an erect biennial or more commonly a perennial forb in Asteraceae (sunflower family) reaching 25 to 40 in (63.5 to 101.6 cm) in height with 1 to 3 stems arising from a woody root stock (Mozingo and Williams 1980). The stems are glaboruous and contain leathery, dark green leaves that are dotted with resinous glands. The inflorescence is open with individual, resinous heads measuring 0.31 to 0.39 in (8 to 10 mm) across. Ray flowers number 13 per head, are golden to lemon yellow, and are 0.12 to 0.16 in (3 to 4 mm) long; the disk flowers are golden yellow and 0.16 to 0.2 in (4 to 5 mm) long (Mozingo and Williams 1980). *The* Ash Meadows gumplant flowers from June to October (Mozingo and Williams 1980; Pavlik and Moore 2010). The Ash Meadows gumplant is endemic to Nye County, Nevada and Inyo County, California. The range of Ash Meadows gumplant in Nevada is the Ash Meadows NWR, adjacent areas within the BLM ACEC, and on private lands, and in California it is found approximately 1 mi past the California/Nevada state line on BLM land.

Studies on phenology, breeding system, and seed biology (seed output, germination) of 60 Ash Meadows gumplant plants have been conducted (Pavlik and Moore 2010). In this study, plants averaged 57.8 inflorescences on 2.9 main stems. Seeds that were produced in the early to mid-growing season were significantly heavier than those produced later in the season. In addition, pollinator exclusion significantly reduced seed count, but did not affect seed weight (Pavlik and Moore 2010). An examination of the seed-to-ovule ratio of mature fruits suggests that this taxon's breeding system exemplifies facultative xenogamy (*i.e.*, predominantly outcrosses, but selfing is possible) (Pavlik and Moore 2010). The Ash Meadows gumplant flowers attract at least five floral visitors, but visits are made so rapidly, making insect collections and observations is difficult (BIO-WEST 2009).

There are no data on germination events nor have seedlings been observed in Ash Meadows gumplant. Monitoring that could provide insight into population trend and demographic structure has not been conducted in Nevada. In 2003, transects were used to develop a population estimate for the California population (see below). The seed bank buffers against environmental stochasticity and extinction in desert plants; nothing is known about the longevity of Ash Meadows gumplant seeds in the seed bank. Attempts to germinate 160 Ash Meadows gumplant seeds collected in 2008 under three different germination trials were low, with only

13 to 20 percent germinating. Stratification of seeds improved the germination response, but not significantly. No seedlings survived more than 2 weeks after transplantation to any medium (Pavlik and Moore 2010). Transplanting and translocation studies have not been conducted.

The Ash Meadows gumplant occurs between 2,070 and 2,320 ft above mean sea level and occurs in seasonally flooded to mesic alkali meadows and wet meadows with moist clay soils that are sometimes dark in color (Morefield 2001c; BIO-WEST 2011). Ash Meadows gumplant populations are also located in additional habitats such as the edges of Ash communities, in alkali shrub-scrub, and in some alkali seeps (BIO-WEST 2011). On the basis of isotopic analysis, Hasselquiest and Allen (2009) found that Ash Meadows gumplant uses surface water or soil moisture near the soil surface in early spring, but switches to utilizing groundwater during the drier summer months likely due to its dimorphic root system. Other plant species associated with the Ash Meadows gumplant in its wet meadow habitat include: yerba mansa, shadscale, Emory's Baccharis (*Baccharis emoryi), saltgrass*, alkali goldenbush (*Isocoma acradenia*), alkali sacaton (*Sporobolus* airoides), saltcedar, and spring-loving centaury (Mozingo and Williams 1980; Morefield 2001c).

At the time of listing, the Ash Meadows gumplant was known from 13 occurrences and was estimated to be made up of 10,000 to 13,000 individuals (Cochrane 1981). Knight and Clemmer (1987) reviewed the available data on the rare plants of the Ash Meadows area and identified nine general areas that contained Ash Meadows gumplants. In 2001, Ash Meadows gumplant population was estimated to be about 13,000 individuals in 16 minimum scale occurrences (0.1 mi separation distance) or 14 maximum scale occurrences [0.6 mi separation distance) 15.1 ac (Morefield 2001c). Results from the 2008-2010 Ash Meadows NWR-wide rare plant survey estimate that 656,890 individuals are present on the Ash Meadows NWR in 23 minimum scale occurrences [0.1 mi (0.16 km] separation distance) or one maximum scale occurrence [0.6 mi distance) on a total of 136.3 ac (BIO-WEST 2011). The largest occurrences of Ash Meadows gumplant on the Ash Meadows NWR are at Spring Meadows road, Ash Meadows road, northeast of Crystal Reservoir and in between Crystal Reservoir and Lower Crystal Marsh (BIO-WEST 2011). Estimates of individual Ash Meadows gumplants on the BLM ACEC and private lands within the Ash Meadows NWR boundary do not exist.

Based on a 2003 survey on the California population, which used transects to develop a population estimate, there are 241,514 (± 69,660 within 95 percent confidence interval) Ash Meadows gumplant plants within 88.3 ac (Johnston and Zink 2004). Although sampling occurred in an area of fairly uniform distribution, large portions of the area were still devoid of plants. The highly dependent nature of the plant to water made for dense occurrence along slough channels followed by gaps between channels that were essentially devoid or sparsely populated. The gradient distribution of plant numbers in relation to the waterways of the slough may account for the high standard deviation (Johnston and Zink 2004).

Status and Distribution

The primary threats to Ash Meadows gumplant included in the final listing rule were groundwater withdrawal, surface mining, road construction, trampling and grazing by wild and free-roaming horses, agricultural development, inadequate regulatory mechanisms, and trampling by cattle and feral horses. Threats identified since listing include nonnative plant species, wildfire, OHV activity, and herbivory. Endemism and limited geographic distribution will continue to threaten Ash Meadows gumplant due to the vulnerability of small populations to a range of environmental, demographic, and stochastic factors. Climate change may result in effects to the species as discussed previously for all Ash Meadows species, but there is much uncertainty regarding the attributes that could be affected and their timing, magnitude, and rate of change.

Establishment of the Ash Meadows NWR in 1984 secured the land for federally-listed plant species by removing threats from agriculture, wild and feral horses, livestock and ranching, and residential development. The creation of the BLM ACEC in 1998 added additional protections to species whose range extended past the Ash Meadows NWR boundary. Habitat for Ash Meadows gumplant is almost entirely protected from development (except on private inholdings) and new mineral entry (for 20 years) within the Ash Meadows NWR and BLM ACEC. Private inholdings still exist within the Ash Meadows NWR boundaries. OHV activity is periodically a threat to Ash Meadows gumplant within the Ash Meadows NWR boundary, due to downed sections of fencing and lack of law enforcement presence. In addition, increased OHV activity has been reported in the Carson Slough (Baldino, pers. comm. 2012). Nonnative plant species could spread into Ash Meadows gumplant habitat, increase fire frequency, or both, any or all of which would threaten the natural vegetation corridors needed for gene flow and dispersal in this taxon.

Recent, comprehensive, baseline surveys on public land have added new known populations; there are now 23 occurrences (0.1 mi minimum scale) made up of 656,890 individuals on 136.3 ac within Ash Meadows NWR boundaries. In addition, there is an estimated 241,514 ± 69,660 plants on 88.3 ac in California. Nothing is known about the longevity of Ash Meadows gumplant seeds in the seed bank. Predation pressure from cattle and feral horses has been removed, but recent observation of herbivory (*i.e.,* lagomorphs – likely black-tailed jackrabbits) and insect seed predation upon Ash Meadows gumplants could negatively affect gene flow and dispersal by disrupting reproduction and seed bank recharge (Pavlik and Moore 2010).

Demand for already limited water resources can have severe direct and indirect consequences on the persistence of Ash Meadows gumplants. Increasing groundwater pumping will lower the water table and directly prevent Ash Meadows gumplants from accessing a reliable water source during dry months. More information is needed on the potential effects of changes in spring discharge, groundwater levels, water temperature, and water and soil chemistry upon patterns of gene flow and dispersal in Ash Meadows gumplant.

5.20 **Ash Meadows Gumplant Critical Habitat**

The critical habitat designation includes 1,968 ac of saltgrass meadows along streams and pools or drier areas with alkali clay soils.

Critical habitat for the Ash Meadows gumplant was designated on Federal and private land on May 20, 1985, in four township range units totaling 1,986 ac. The physical and biological factors for these areas are saltgrass meadows along streams and pools or drier areas with alkali clay soils *(50 Federal Register 20777)*. Critical habitat areas are as follows:

Inyo County, California

- Township 26 North, Range 6 East
    - NE ¼, E ½ NW ¼, SW ¼ NW ¼, N ½ SW ¼, and NW ¼ SE ¼, Section 30

Nye County, Nevada

- Township 17 South, Range 50 East
    - SE ¼ NW ¼, Section 26
    - W ½ SW ¼ NE ¼ and W ½ NW ¼ SE ¼, Section 33
    - W ½ NW ¼, SW ¼ SW ¼, E ½ SE ¼, and W ½ SE ¼, Section 35
- Township 18 South, Range 50 East
    - N ½ SW ¼, Section 1
    - N ½ NW ¼, Section 2
    - NE ¼ NE ¼ and NW ¼ NW ¼, Section 3
    - SW ¼ NE ¼, SE ¼ NW ¼, NE ¼ SW ¼, and NW ¼ SE ¼, Section 4
    - W ½ NE ¼ and NW ¼ SE ¼, Section 5
    - N ½ NE ¼, Section 7
    - NE ¼ SE ¼, Section 10
    - W ½ NW ¼ and NW ¼ SW ¼, Section 11
    - SW ¼ NE ¼ and E ½ SE ¼, Section 14
    - SW ¼ NW ¼, SW ¼ SE ¼, W ½ SW ¼, and SE ¼ SW ¼, Section 20 northeast of the Nevada-California boundary
    - E ½ NE ¼ and E ½ SE ¼, Section 23
    - W ½ SW ¼, Section 24
    - NW ¼ NE ¼, Section 29 northeast of the Nevada-California boundary
- Township 18 South, Range 51 East
    - SW ¼ NW ¼ and NW ¼ SW ¼, Section 18

The portion of critical habitat located in Township 18 south, Range 50 east, W ½ NE ¼ and NW ¼ SE ¼, Section 5; SW ¼ NW ¼, SW ¼ SE ¼, W ½ SW ¼, and SE ¼ SW ¼, Section 20; and NW ¼ NE ¼, Section 29 occur outside of the Ash Meadows NWR, within the BLM ACEC and have not been surveyed. The portion of critical habitat located in Township 18 south, Range 50 east, N ½ NE ¼, Section 7 occurs outside of the Ash Meadows NWR on private land and has not been surveyed. It is unknown if these habitats are occupied. The portions of critical habitat located in Township 17 south, Range 50 east, SE ¼ NW ¼, Section 26; W ½ SW ¼ NE ¼ and W ½ NW ¼ SE ¼, Section 33; and W ½ NW ¼, Section 35 are not occupied. In addition, the portions of critical habitat located in Township 18 south, Range 50 east, NE ¼ NE ¼ and NW ¼ NW ¼, Section3; SW ¼ NE ¼, SE ¼ NW ¼, NE ¼ SW ¼, and NW ¼ SE ¼, Section 4; and SW ¼ NE ¼, Section 14 are not occupied. All other portions of critical habitat are occupied.

5.21 **Amargosa Niterwort**

Listing

The Amargosa niterwort was listed as endangered with critical habitat on May 20, 1985 *(50 Federal Register 20777)*. The Amargosa niterwort was listed as critically endangered by the State of Nevada in 1986 and is also protected under NRS 527.260-300. In 1979 the species was also listed as endangered under the California Endangered Species Act.

Species Description

The Amargosa niterwort was first collected in 1954 by Philip Munz and John Roos in open flats of the Amargosa Desert in Inyo County, California and discovered in 1984 on the Ash Meadows NWR in Nevada (Knight and Clemmer 1987). The Amargosa niterwort is an erect, perennial forb in Amaranthaceae (Amaranth; formally in the Chenopodiaceae (goosefoot family)) that grows up to 4 in tall (Knight and Clemmer 1987; Wetherwax *et al*. 2012). Vegetative growth of shoots from ramets (rhizomes) is probably the principle mean of colonization and persistence. Flowers are small, less than 0.2 in (4 mm) in diameter, perfect, and cluster in groups of 1 to 3 in the upper leaf axils. The sepals are rose-colored when fresh, but turn tan or whitish and somewhat papery when dry. There is one, round, shiny black seed per fruit (Knight and Clemmer 1987; Pavlik and Moore 2010). The Amargosa niterwort flowers from late April to July, with fruiting starting in June and lasting into September (Pavlik and Moore 2010). The Ash Meadows niterwort is endemic to the Carson Slough area in Nevada and adjacent Inyo County, California. The range of the Amargosa niterwort encompasses in Nevada is the Ash Meadows NWR, adjacent areas within the BLM ACEC, and on private lands, and on adjacent BLM and private lands in Inyo County, California near Death Valley Junction and Tecopa Hot Springs. Studies on phrenology, breeding system, and seed biology (seed output, germination) of 90 Amargosa niterwort plants have been conducted (Pavlik and Moore 2010). The Amargosa niterwort was studied on the Ash Meadows NWR at Crystal Reservoir and Soda Springs. Ramets at Fairbanks were, on average, half as tall as those at Crystal Reservoir (20.6 mm versus 46.7 mm) and produced fewer sexual reproductive structures (1.9 sexual reproductive structures/mm verses 2.5 sexual reproductive structures/mm) (Pavlik and Moore 2010). The seed-to-ovule ratio of mature fruits was not calculated for the Amargosa niterwort because treatments were conducted on whole ramets and it was not possible to assess the number of seeds produced per ramet due to rapid seed dispersal (Pavlik and Moore 2010). Pollinator exclusion studies were conducted, though ants were occasionally seen entering cages and climbing ramets, and the Amargosa niterwort was still able to produce seeds suggesting an autogamous (*i.e.,* self-fertilization) breeding system, though this does not rule out the possibility that this species is cleistogamous (*i.e.,* a flower that doesn't open and is self-fertilized in the bud) (BIO-WEST 2009; Pavlik and Moore 2010).

There are no data on germination events in the Amargosa niterwort. Monitoring that could provide insight into population trend and demographic structure has not been conducted in Nevada. In 2003, 2010, and 2011 at the Death Valley Junction populations in California, transects were used to develop a population estimate (see below). The seed bank buffers against environmental stochasticity and extinction in desert plants; nothing is known about the longevity of Ash Meadows niterwort seeds in the seed bank. Attempts to germinate 60 Amargosa niterwort seeds were unsuccessful and no seeds germinated; after 4 weeks exposure to dark, moist, and warm conditions; the seed coat remained largely intact (Pavlik and Moore 2010). Transplanting and translocation studies have not been conducted.

Status and Distribution

The Amargosa niterwort occurs between 2,100 and 2,160 ft above mean sea level and occurs most commonly in alkali seep and alkali meadow habitat in open areas with saturated or moist to clay to gravelly/sandy soils and a prominent alkali crust (Morefield 2001f; BIO-WEST 2011). In a few instances, Amargosa niterwort individuals were observed occupying intermittent drainages with remnant alkali crust between upland mesic to mesic alkali shrub-scrub habitat (BIO-WEST 2011). On the basis of isotopic analysis, Hasselquiest and Allen (2009) found that the Amargosa niterwort uses surface water and soil moisture near the soil surface (depths 1 ft from the ground surface). Soil moisture below Amargosa niterwort was two times greater than below Ash Meadows gumplant, which is also affiliated with wetter environments, especially near the soil surface. Higher soil moisture below Amargosa niterwort may in part be explained by groundwater upwelling or the movement of deep groundwater upward in the soil profile (Hasselquiest and Allen 2009). But at the Crystal Reservoir population of Amargosa niterwort, ramets were found about 0.3 to 0.5 ft below ground and roots were developed and growing to depths greater than 0.3 to 1 ft, suggesting that this species may also be able to utilize groundwater (Willoughby 2011). Other plant species associated with the Amargosa niterwort in its alkali seep and meadow habitat include: shadscale, shortstalk stinkweed (*Cleomella brevipes*), and saltgrass (Knight and Clemmer 1987; Morefield 2001f).

At the time of listing, the Amargosa niterwort was only known from one location, the south end of the Carson Slough on both sides of the Nevada/California border. Knight and Clemmer (1987) reviewed the available data on the rare plants of the Ash Meadows area and identified two general areas that contained Amargosa niterwort: Central Carson Slough in Nevada and South Carson Slough in California. In 2001, three occurrences of Amargosa niterwort were mapped and the population was estimated to be 13,000 individuals on approximately 229 ac (Morefield 2001f). Results from the 2008-2010 Ash Meadows NWR-wide rare plant survey estimate that 58,292 aboveground ramets are present on the Ash Meadows NWR in 11 minimum scale occurrences (0.1 mi separation distance) or 2 maximum scale occurrence (0.6 mi distance) on a total of 21.4 ac (BIO-WEST 2011). The largest occurrences of Amargosa niterwort on the Ash Meadows NWR are concentrated around Crystal Reservoir, Horseshoe Marsh, and Soda Spring (BIO-WEST 2011). Estimates of NIMO ramets on the BLM ACEC and private lands do not exist.

There are three occurrences of the Amargosa niterwort in California: two occurrences in critical habitat near Death Valley junction that occur on BLM land and one occurrence at Tecopa Hot Springs that occurs on BLM and private land. In 2003, the two occurrences near Death Valley junction were surveyed using transects and macroplots to develop a population estimate.

It was estimated that Occurrence 1 contains 243,478 ± 69.337 ramets (± 95 percent confidence interval) within 10 ac (4.08 ha) and Occurrence 2 contains 28,951 ± 20,372 ramets (± 95 percent confidence interval) within 418.5 ac (Johnston and Zink 2004). In 2010-2011, Occurrence 1 in

California was re-surveyed using transects and five macroplots in an effort to establish a permanent monitoring protocol for *N. mohavensis*. The estimates for the number of rooted stems in the combined area of the macroplots in Occurrence 1 were 59,540 ± 24,782 in 2010 and 58,431 ± 21,541 in 2011 (± 95 percent confidence interval) (Willoughby 2011). The slightly lower estimate for 2011 was not statistically significant. Because of problems inherent in accurately counting rooted stems (*i.e.,* where stems were solitary or few there was no problem counting rooted stems but, where stems were very clumped it was impossible to accurately count rooted stems without damaging plants), these numbers are not considered to accurately track Ash Meadows niterwort abundance between years. Rooted stems will be dropped as a measured attribute in future years and clump estimates will be used instead. Both the estimated number of clumps (*i.e.,* single plants or groups of plants separated by at least 0.8 in from each other from the place they are rooted) and frequency were greater in 2011 than in 2010. Clump numbers were estimated to be 33,309 ± 12,895 in 2011, about twice as many as 16,712 ± 5,938 estimated for 2010, a difference that was statistically significant. The 2011 frequency of 0.088 (± 0.027) was significantly greater than the 2010 frequency of 0.061 (± 0.015) (Willoughby 2011). Total growing season precipitation was about the same for the 2 years, the higher Amargosa niterwort abundance observed in 2011 appears to have resulted from a better distribution of precipitation during the hotter months, which is supported by groundwater levels measured in a piezometer immediately adjacent to the Amargosa niterwort at Lower Carson Slough (Willoughby 2011). Occurrence 3, on BLM lands near Tecopa Hot Springs, was surveyed in 2005 and was estimated to contain 1,000s of individuals (Caicco 2005). An estimate of Amargosa niterwort ramets on the private land near Tecopa Hot Springs does not exist.

The primary threats to the Amargosa niterwort included in the final listing rule were groundwater withdrawal, OHV activity, surface mining, inadequate regulatory mechanism, and trampling by cattle and feral horses. Threats identified since listing include nonnative plant species and wildfire. Endemism and limited geographic distribution will continue to threaten the Amargosa niterwort due to the vulnerability of small populations to a range of environmental, demographic, and stochastic factors. Climate change may result in effects to the species as discussed previously for all Ash Meadows species, but there is much uncertainty regarding the attributes that could be affected and their timing, magnitude, and rate of change.

Establishment of the Ash Meadows NWR in 1984 secured the land for federally listed plant species by removing threats from agriculture, wild and feral horses, livestock and ranching, and residential development. The creation of the BLM ACEC in 1998 added additional protections to species whose range extended past the Ash Meadows NWR boundary. Habitat for the Amargosa niterwort is almost entirely protected from development (except on private inholdings) and new mineral entry within the Ash Meadows NWR and BLM ACEC. Private inholdings still exist within the Ash Meadows NWR boundaries. OHV activity is periodically a threat to the Amargosa niterwort within the Ash Meadows NWR boundary, due to downed sections of fencing and lack of law enforcement presence. In addition, increased OHV activity has been reported in the Carson Slough (Baldino, pers. comm. 2012). Nonnative plant species could spread into Ash Meadows niterwort habitat, increase fire frequency, or both, any or all of which would threaten the natural vegetation corridors needed for gene flow and dispersal in this taxon.

Recent, comprehensive, baseline surveys on public land have added new known populations; there are now 11 occurrences (0.1 mi minimum scale) made up of 58,292 above ground ramets on 21.4 ac (8.7 ha) within Ash Meadows NWR boundaries. In addition, there is an estimated 33,309 ± 12,895 clumps in Occurrence 1 in California as of 2011(Willoughby 2011) and 28,951 ± 20,372 ramets in Occurrence 2 in California as of 2003 (Johnston and Zink 2004). Occurrence 3, on BLM lands near Tecopa Hot Springs was estimated to contain 1,000s of individuals (Caicco 2005). An estimate of Amargosa niterwort ramets on the private land near Tecopa Hot Springs does not exist. Nothing is known about the longevity of Amargosa niterwort seeds in the seed bank.

Increasing the demand for already limited water resources can have severe direct and indirect consequences on the persistence of the Amargosa niterwort. Increasing groundwater pumping will lower the water table and indirectly affect the amount of groundwater being forced to the surface, which may affect the growing conditions of the Amargosa niterwort. More information is needed on the potential effects of changes in spring discharge, groundwater levels, water temperature, and water and soil chemistry upon patterns of gene flow and dispersal in the Amargosa niterwort.

5.22 **Ash Meadows Naucorid**

On May 20, 1985, the Service determined the Ash Meadows naucorid (naucorid) to be threatened and concurrently designated critical habitat (50 *Federal Register* 20777). The naucorid is an Ash Meadows-endemic aquatic insect (Hemiptera:Naucoridae) that occurs within thermal springs of the Point of Rocks area of Ash Meadows NWR. This species was listed in part due to severe habitat destruction within its historic range. The naucorid is a small, flattened, ovate aquatic insect which ranges in size from a mode of 0.07 in (nymphal instar I) to 0.19 in (nymphal instar V), with adults averaging 0.24 in. It is univoltine (one generation per year), and produces a few (probably seven) large eggs per year. Eggs are stalked and laid on a variety of substrates, with the exception of fines and substrate larger than small cobble (Parker *et al.* 2000). Eggs hatch within approximately 1 month and juveniles mature to adulthood in approximately 2 months (Polhemus 1994). Naucorids are active ambush predators with main prey being amphipods (*Hyalella azteca*).

The populations of naucorids in the Point of Rocks area were surveyed by Southern Oregon University and USGS during 1997 and 1998, and were determined to fluctuate in abundance depending on the season; however, they were at relatively low abundance due to restricted and poor habitat. A total of 39 individuals were transferred to the restored King's Spring outflow during the late summer and fall of 1997, where they increased exponentially (figuratively) in numbers (10,000+). Incidental surveys during 2003 and 2004 of the King's outflow suggested that this large population was subsequently lost due to an unknown reason, potentially the increase of cattails within the system and crayfish predation.

Numbers of naucorids were significantly greater in suitable substrate and flows, preferring pebbles and fast current velocity (Parker *et al.* 2000). From previous investigations regarding the naucorid, it has been suggested that habitat for this species has gradually degraded due to habitat disturbance and water diversion. Generally, the lack of natural maintenance flows through the habitat has prevented proper substrate from occurring. Habitat where the naucorid was most numerous was determined to be gravel-pebble substrate (size which averaged between 0.78 and 1.6 in), as well as submerged roots of vegetation. They also occur on larger substrate, but this does not provide as much surface area for prey species. During habitat restoration activities at Point of Rocks, habitat where the naucorid was historically present was observed to be overgrown by grasses and other vegetation. In addition, the spring that contained the known bulk of the species was impacted by public use and water diversion to supply the Point of Rocks Devils Hole pupfish refugium which is no longer used. This resulted in reduced water flow since the refugia's inception as well as vegetation encroachment and a continual source of disturbance to the substrates. This problem was described by Polhemus in 1994 correspondence (Polhemus 1994), who stated that the species was in a period of decline due to altered habitat, an issue which potentially dates back to the early 1980s.

5.23 Ash Meadows Naucorid Critical Habitat

Critical habitat for the Ash Meadows naucorid was designated on May 20, 1985, (50 *Federal Register* 20777). In determining which areas to designate as critical habitat, the Service considers those physical and biological features that are essential to the conservation of the species and that may require special management considerations or protection, which includes identifying and discussing physical and biological factors. Physical and biological factors for the Ash Meadows naucorid are flowing warm water over rock and gravel substrate. The critical habitat of this species is currently being manipulated for restoration purposes, and existing habitat quality is excellent throughout its range. Future restoration may improve suitability of the critical habitat immediately under or adjacent to the boardwalk.

5.24 Ash Meadows Amargosa Pupfish

Listing

The Ash Meadows Amargosa pupfish was listed as endangered with critical habitat on September 2, 1983 (48 *Federal Register* 40178). The species is considered threatened by the State of Nevada and is protected under NAC 503.065.

Species Description

The Ash Meadows Amargosa pupfish (Eigenmann and Eigenmann) was first described in 1889 and belongs to the Family Cyprinodontidae. The Ash Meadows Amargosa pupfish is the most morphologically variable species of pupfish, but can be defined by the following combination of characters: scale surface deeply reticulate, circuli without obvious spine-like projections; scales large, usually 25 to 26 in lateral series; central cusp of tricuspid teeth narrower than outer cusps; and breeding color of males deep blue and without yellow color (Miller 1948; Moyle 1976). The Ash Meadows Amargosa pupfish subspecies differs by scale and finray counts lower than average for the species; a reduced body size; a short, deep, and slab-sided body with a greatly arched and compressed predorsal profile; and a very long head and opercle. Generally, the pupfish is less than 2 in long.

Status and Distribution

The Ash Meadows Amargosa pupfish is endemic to the Ash Meadows area in Nye County, Nevada. The range of the Ash Meadows Amargosa pupfish is entirely within the Ash Meadows NWR and adjacent BLM lands, occupying seven major spring systems, their outflows, and their tributaries.

The Ash Meadows Amargosa pupfish is fairly widespread occurring in suitable springs and their outflows and marsh areas at Ash Meadows NWR (Scoppettone *et al.* 1995). Population estimates have been problematic and only springheads have been effectively measured, which contain an unknown but likely small proportion of the population. A substantial portion of the population occurs within marsh or shallow water habitats, and has never been effectively sampled. Given these issues, population size cannot be determined using historic survey methods and existing data. These data can only be interpreted as an index to population change.

Soltz and Naiman (1978) indicate that most pupfish occur downstream in outflow and marsh habitats; sites that have not been surveyed. Observations throughout the Ash Meadows NWR suggest that in fact *C. nevadensis* ssp. are frequently very abundant in outflows and flooded sites (Scoppettone *et al.* 1995), which cannot be effectively censused using conventional methods. For example, Crystal Spring harbored the highest population estimate (11,971; p=0.95) for the endangered Ash Meadows Amargosa pupfish based on a 2007 native fish survey. However, trapping in Crystal Spring during the native fish survey only occurred from the spring orifice down to the start of the concrete channel behind headquarters; therefore, the actual population size is likely larger than estimated. This does not account for the abundant fish that occur in marsh habitats or seasonal overflow of channels, which likely would substantially increase the population estimate, nor does it account for juvenile fish that are not surveyed due to limitations in methodology, which would also add to the estimate. It is likely that these existing data of populations in spring habitats are useful as indices of population trend since mark-recapture census methods have remained the same, especially relevant to isolated populations separated by barriers, or when sampled from contiguous outflows such as at Crystal Spring. Due to the variable nature of populations in outflows, attempts to characterize data should be used with caution. Additional information regarding Ash Meadows NWR-wide abundance is being collected by the USGS.

Several other factors affect abundance and variability. Pupfish in lotic habitats, as opposed to lentic (predominantly spring pool) fish, are highly variable in population size, changing 10 to 20 times magnitude over the course of a year. Population abundance may also be affected by behavior and habitat use (Soltz and Naiman 1978). Pupfish change habitat use depending on time-of-day, and may migrate to cooler waters during the hotter portions of the day. This behavior may be localized at extreme conditions at sites such as with other subspecies, such as *C. nevadensis* at Tecopa.

Spawning peaks in the spring, but occurs from April to October, and the size of each population fluctuates throughout the course of a year (Soltz and Naiman 1978), which also adds a variable to population estimates. Although significantly regulated by diel light cycles and partially by water temperature, spawning likely occurs year-round, especially in warmer habitat. Pupfish reproduce in waters of 77 to 88 ° F [Gerkin and Lee 1983]). The individuals in the springs and stable habitats likely have a different reproductive strategy than at the spring outflows with harsher, variable conditions or in ephemeral habitats, where population numbers likely fluctuate greatly depending on conditions. Population stability is also relative to predation, and presence of nonnative predatory fish has been demonstrated to nearly extirpate populations.

The primary threats to the Ash Meadows Amargosa pupfish included in the 1983 proposed rule and 1985 final rule are: agricultural and municipal development of habitat (groundwater use); the introduction of exotic fish and other aquatic prey species that compete with or prey upon native fishes; inadequacy of existing regulatory mechanisms; and the extremely small range and habitat requirements which makes the species vulnerable to stochastic (demographic and environmental) threats. Of these threats, nonnative fishes and prey species is the most serious remaining threat to the Ash Meadows Amargosa pupfish as it is likely the nonnatives suppress the overall population size of the pupfish.

Recently, fire within riparian habitat has been identified as a threat to the species when riparian habitat is dominated by nonnative species. Native plants may be adapted to frequent, low-intensity fire. In 2005, the Jackrabbit Fire burned within occupied habitat. The fire was high-intensity with high fuel loads of saltcedar. The heat of the fire raised the water temperature above the thermal tolerance of the species. As a result, in some stretches of the Jackrabbit Spring outflow there was 100 percent mortality of all native fishes.

Establishment of the Ash Meadows NWR and the subsequent purchase of water rights and private lands containing habitat, removed many of the threats facing the Ash Meadows Amargosa pupfish. After groundwater pumping was ceased on the Refuge, it began to increase in the Amargosa Valley, located about 10 mi northwest of the Ash Meadows NWR. In 1987, groundwater pumping in the Amargosa Valley was estimated to be 5,670 afy (USGS 2005). In 2003, groundwater pumping was estimated to have increased to 13,518 afy (USGS 2005). Most groundwater monitoring wells in the Amargosa Valley have shown a significant decline in water levels since 1992 (USGS 2003), and groundwater pumping is currently occurring in some areas of the basin at about twice the rate predicted to be sustainable (USGS 2005).

Disruptions to the surface and subsurface hydrology are particularly important threats to the species, and all known populations of the pupfish face this threat. Habitat restoration and invasive species management also have improved overall population numbers; however, many local populations are at risk of extirpation due to the unlawful introduction of game fish such as largemouth bass by the public. The current rangewide trend for the species is generally thought to be stable.

5.25 **Ash Meadows Amargosa Pupfish Critical Habitat**

Critical habitat for the Ash Meadows Amargosa pupfish was designated on September 2, 1983 (48 *Federal Register* 40178-40186). Designated critical habitat for the Ash Meadows Amargosa pupfish is each of the following springs and outflows plus surrounding land areas for a distance of 164 ft from these springs and outflows: (1) Fairbanks Spring and its outflow to the boundary between Sections 9 and 10, T17S, R50E; (2) Rogers Spring and its outflows to the boundary between Sections 15 and 16, T17S, R50E; (3) Longstreet Spring and its outflow to the boundary between Sections 15 and 22, T17S, R50E; (4) three unnamed springs (currently named "Five

Springs") in the northwest corner of Section 23, T17S, R50E and each of their outflows for a distance of 246 ft from the spring; (5) Crystal Pool and its outflow for a distance of 1,312 ft from the pool; (6) Bradford Springs in Section 11, T18S, R50E, and their outflows for a distance of 984 ft from the springs; (7) Jackrabbit Spring and its outflow flowing southwest to the boundary between Section 24 in T18S, R50E and Section 19, T18S, R51E; (8) Big Spring and its outflow to the boundary between Section 19 T18S, R51E and Section 24, T18S, R50E; and (9) Point of Rocks Springs and their entire outflows within Section 7, T18S, R51E.

The designation of critical habitat for the Ash Meadows Amargosa pupfish occurred prior to the requirement for identification of physical and biological factors that are essential for the conservation of the listed species; therefore, the best available scientific and commercial data is utilized to determine these habitat qualities. These habitat qualities of critical habitat determined necessary for conservation of the pupfish are water, physical habitat, and biological environment. The desired conditions for each of these elements are summarized below.

- Water – a sufficient quantity and quality of water (*i.e.,* temperature, dissolved oxygen, contaminants, nutrients, turbidity, etc.) that is delivered to a specific location in accordance with a hydrologic regime that is identified for the particular life stage for the pupfish.

- Physical habitat – areas of the springs and their outflows that are inhabited or are potentially habitable by a particular life stage of the pupfish, for use in spawning, feeding, and rearing, or corridors between such areas.

- Biological environment – food supply, predation, and competition are important elements of the biological environment and are considered components of this constituent element. Food supply is a function of nutrient supply, productivity, and availability to each life stage of the pupfish. Predation and competition, although considered normal components of this environment, are out of balance due to nonnative fish species in many areas.

5.26 Ash Meadows Speckled Dace

Listing

The Ash Meadows speckled dace was listed as endangered with critical habitat on September 2, 1983, (48 *Federal Register* 40178).

Species Description

Speckled dace are members of the minnow family of fishes (Cyprinidae); various forms of speckled dace occur in river basins throughout western North America (Minckley 1973, Moyle 1976, Lee *et al.* 1980). The original description and diagnosis of this subspecies of speckled dace is described by Gilbert (1893) (summarized by La Rivers 1962). Typically the body is fusiform, albeit more robust than other dace and with a broad, large head. Scales are irregular and difficult to enumerate. Body coloration varies widely within a population. Generally, the dorsum is olive-gray blending ventrally to golden. Black spots frequently cover the body and there may be one or two distinct, black lateral stripes. It reaches a maximum length of approximately 3.9 in and may live as long as 4 years (John 1964). Intestines are short, approximately half the body length (La Rivers 1994), suggesting a carnivorous diet.

Speckled dace generally prefer flowing streams where they feed on drifting insects (Moyle 1976). Spawning occurs primarily during the spring and summer over stream riffles (Mueller 1984). Body coloration is olive-gray dorsally blending to golden ventrally often with black spots throughout and there may be one or two distinct, black, lateral stripes (Hubbs *et al.* 1974). Speckled dace reach a maximum length of approximately 4 inches and may live as long as 4 years (John 1964).

Status and Distribution

Hydrographically isolated basins that speckled dace occupy in southern Nevada include the Amargosa River, White River, Meadow Valley Wash, Moapa River, and Colorado River (Miller 1984).

Population estimates of Ash Meadows speckled dace in Bradford Spring from field surveys were 175 in 2008, 407 in 2007, and 493 in 2005 (NDOW 2005, 2007, 2008). At Jackrabbit Spring, population estimates for the spring pool and about 325 ft downstream were 118 in 2007 and 117 in 2005 (NDOW 2005, 2007). Several hundred young of year speckled dace were introduced into the combined outflow of the Point of Rocks springs in 2004 and 2005, and into Forest Spring in 2006. Current status of these populations is not known, but recent surveys by the USGS have captured few fish indicating that the populations in these systems are minimal (USGS 2008). Loss of faster-flowing, cool water due to habitat alteration, and introduced nonnativeaquatic species, has prevented the reintroduction of the Ash Meadows speckled dace into most of its historical habitat.

Threats to Ash Meadows speckled dace include its limited distribution and the presence of introduced predatory and competing species (La Rivers 1962, Williams and Sada 1985, Service 1990). Collection records show that the speckled dace once shared many of the same springs and outflows that the Ash Meadows pupfish inhabits, but they now only occur in three springs (Bradford, Jackrabbit, and Fairbanks) in stable populations.

5.27 Ash Meadows Speckled Dace Critical Habitat

Designated critical habitat for the Ash Meadows speckled dace includes the following springs and outflows plus surrounding land areas for a distance of 164 ft (50 m) from these springs and outflows: (1) Bradford Springs in Section 11, T18S, R50E, and their outflows for a distance of 984 ft (300 m) from the springs; (2) Jackrabbit Spring and its outflow flowing southwest to the boundary between Section 24 in T18S, R50E and Section 19, T18S, R51E; (3) Big Spring and its outflow to the boundary between Section 19 T18S, R51E and Section 24, T18S, R50E.

The designation of critical habitat for the Ash Meadows speckled dace occurred prior to the requirement for identification of physical and biological factors that are essential for the conservation of the listed species; therefore, the best available scientific and commercial data is utilized to determine these habitat qualities. The habitat qualities of critical habitat determined necessary for conservation of speckled dace are water, physical habitat, and biological environment. The desired conditions for each of these elements are summarized below.

- Water – a sufficient quantity and quality of water (*i.e.,* temperature, dissolved oxygen, contaminants, nutrients, turbidity, etc.) that is delivered to a specific location in accordance with a hydrologic regime that is identified for the particular life stage for the speckled dace.

- Physical habitat – areas of the springs and their outflows that are inhabited or are potentially habitable by a particular life stage of the speckled dace, for use in spawning, feeding, and rearing, or corridors between such areas.

- Biological environment – food supply, predation, and competition are important elements of the biological environment and are considered components of this constituent element. Food supply is a function of nutrient supply, productivity, and availability to each life stage of the speckled dace. Predation and competition, although considered normal components of this environment, are out of balance due to the presence of nonnative fish species in many areas.

5.28 **Warm Springs Pupfish**

Listing

The Warm Springs pupfish was listed as endangered on October 13, 1970 (35 *Federal Register* 16047). No critical habitat has been designated for the species; however, essential habitat was identified during the listing. The species is considered endangered by the State of Nevada and is protected under NAC 503.065.

Species Description

The Warm Springs pupfish is the most morphologically variable species of pupfish, but can be defined by several morphological features of the scales and teeth (Miller 1943; Moyle 1976). The Warm Springs pupfish is the smallest of the *Cyprinodon nevadensis* subspecies and can be distinguished from the other forms by its shorter, deeper body and more numerous pectoral fin rays (La Rivers 1962). Albeit variable based on habitat conditions, breeding males are similar to the Ash Meadows Amargosa pupfish (*C. n. amargosae*), but with a pronounced yellow tint on the nape (Soltz and Naiman 1978).

Minimal life history information has been gathered for the Warm Springs pupfish; however, a significant body of literature exists on *Cyprinodon* physical tolerances in general due to the harshness of the habitats in which they live. Genetic work has been completed on this genus in part to understand intraspecific relationships, habitat tolerance, principles of speciation due to biogeography, and to ascertain pathways of aquatic species movement over geologic time.

Given the nature of the existing body of literature, generalizations must be used by comparing the Warm Springs pupfish to other subspecies or closely related pupfish such as the Ash Meadows Amargosa pupfish.

Cyprinodon nevadensis is highly eurythermal (McCauley and Thomson 1988; Brown and Feldmuth 1971; Otto and Gerking 1973), *i.e.,* the species can tolerate a wide variety of temperatures ranging from 35.6 to 111.2 ° F (Feldmeth 1981). In the laboratory, Hirshfield *et al.* (1980) determined Ash Meadows Amargosa pupfish taken from the Big Springs pool and acclimatized to standard temperature and oxygen levels to have a thermal minimum of approximately 36.8˚ F and a maximum of approximately 107.0˚ F which was significantly less variable than the Amargosa River pupfish which is adapted to a more variable habitat. These thermal limits are the extremes for survival that were developed in a closed tank, and tolerances for oogenesis and egg development are much narrower (Shrode and Gerking 1977). Also, activities such as feeding or breeding would likely not occur at the extreme temperatures. Hirshfield *et al.* (1980) report critical oxygen minima to be 1.66 parts per million; however these fish were also acclimatized, originated from the stable Big Spring pool, and the minima is likely higher relevant to development and other activities such as sustained feeding or breeding.

Most of the spring systems within the Mojave Desert are alkaline, and pupfish are susceptible to low pHs. Lee and Gerking (1980) determined critical minima and effects of low pH on the Ash Meadows Amargosa pupfish. Lee and Gerking also found that larvae were less tolerant to pH stress than were adults. Pupfish in general have a very wide tolerance to salinity, and pupfish from within the Colorado River/Death Valley system have been maintained and reproduced in water ranging from distilled water to a salinity 2.5 times saltier than seawater (with some fish surviving in water up to 3.7 times saltier) (Soltz and Naiman 1978). This is due to their unique ability to rapidly adjust serum osmotic concentration of ions, preventing water loss.

Pupfish are relatively short-lived species, with a life span estimated to be 2 to 4 years (Scoppettone *et al.* 1995). Soltz and Naiman (1978) provide a summary of life history and growth traits of pupfish, including *C. nevadensis*. Longevity is relative to water temperature, and is a function of metabolism. Typically pupfish living in the warm waters reach maturity at 2 to 4 months, and then live 6 to 9 months as an adult. In colder waters, such as spring outflow tailwaters or marshes, pupfish may go dormant during winter, ultimately extending their lives to approximately 3 years. As with most species, pupfish in harsher environments have more drastic survivorship curves for juveniles than fish in stable environments. The highest death rate occurs during juvenile and early adolescent life stages in unstable, harsh environments, and for juvenile and adults in a stable environment. Pupfish mature very quickly, and grow about 9 percent of their body mass per day as opposed to 1 percent for adults, depending upon available resources and physical habitat. Growth is highly dependent on environmental temperature, and fish in constant warm water grow year-round whereas fish in variable cooler waters grow at lower rates.

All pupfish have similar diets, essentially being omnivores and detritivores (Soltz and Naiman 1978). The primary food for the pupfish is periphyton and algae, but they also consume invertebrates, detritus, and diatoms (Moyle 1976; Naiman 1979; Scoppettone *et al.* 1995).

Status and Distribution

The Warm Springs pupfish is an endemic species restricted to six springs and their outflows in a 0.77- mi^2 area within the Ash Meadows NWR. All of these springs are small (discharge less than 1.7 gallons (6.4 liters) per second (Dudley and Larson 1976)), and some have no source pool. Physiology of the fish allows for a wide range of suitable habitats, and fish may occur in nearly all habitats present within the Warm Springs; however, some fish may be limited by upper thermal constraints, especially during spawning. This discourages use of extreme upper portions of the springs, especially during times with high air temperatures and increased solar inputs. Gravel substrate is critical for establishment of endemic invertebrates, which form an important forage resource for the pupfish.

All of the springs have been altered by diversion into earthen channels, impoundment, livestock trampling, drying due to pumping of local groundwater, and/or elimination of desirable native riparian vegetation. School Springs and North and South Indian springs have been restored and crayfish and nonnative fish have been eradicated. Crayfish are absent from Marsh Spring and North Indian Spring.

Warm Springs pupfish occur in areas of limited water volume; consequently their numbers are relatively few (Scoppettone *et al.* 1995). Population estimates have been problematic, and only springheads have been effectively measured. A substantial portion of the population occurred within marsh habitats, and was not effectively sampled. For example, a portion of the marsh below Marsh Spring was cleared of vegetation to allow for trapping in 2006. A majority of the fish seen was small and able to go through the trap mesh, but catch rate was still high at 9.9 catch per unit effort. This suggests there were likely several thousand individuals in the population, whereas previous estimates for Marsh Spring were consistently below 100. Notes on reports also indicated a large population of fish, possibly in the thousands, occurred in the North Scruggs stream which was not included in population estimates. In addition, population estimates previous to 1994 were likely estimates from observation and not directly comparable to the later mark-recapture methodologies.

Like other members of *Cyprinodon nevadensis,* the Warm Springs pupfish spawn throughout the year with a peak in the spring. Local environmental conditions also influence fecundity, life history, and mortality, subsequently the population fluctuates throughout the course of a year. The number of individuals in the population likely peaks in fall, but dies back in the winter. Recent efforts to develop a standardized survey protocol would allow for use of historic data as indices of stability.

The 1990 recovery plan describes the primary threats to the species as its small population vulnerability to alteration and the presence of predatory and/or competing species such as mosquito fish (*Gambusia affinis*), crayfish, and bullfrogs (*Lithobates catesbeiana*).

Crayfish appear to currently occur only in the South Scruggs system, but due to the proximity of all of the springs in the Warm Springs Complex, the chance of the other systems being invaded or re-invaded is extremely high. Aquifer depletion and global warming have recently been suggested as causes for declining amount of habitat. Genetic bottlenecks and recent isolation of populations due to shrinking habitat are also threats that are currently being investigated.

Since the species was listed, populations have improved. In 1984 the Ash Meadows NWR was established to protect threatened and endangered species in the area. Establishment of the Ash Meadows NWR and the subsequent purchase of water rights reduced some of the threats facing the Warm Springs pupfish. Several populations are at risk of extirpation due to the presence of mosquitofish and crayfish, and habitat degradation from unstable hydrology. Habitat restoration activities have been completed at School, North Indian, and South Indian springs. Overall trends for this species indicate the population to be slightly declining as discussed above (Service 2000).

Section 6: Environmental Baseline

The action area is defined as all areas to be affected directly or indirectly by the Federal action, including interrelated and interdependent actions, and not merely the immediate area involved in the action (50 CFR § 402.02). Subsequent analyses of the environmental baseline, effects of the action, cumulative effects, and levels of incidental take are based upon the action area as determined by the Service. Regulations implementing the Act define the environmental baseline as the past and present effects of all Federal, State, or private actions and other human activities in the action area (50 CFR § 402.02). Also included in the environmental baseline are the anticipated effects of all proposed Federal projects in the action area that have undergone section 7 consultation, and the effects of state and private actions that are contemporaneous with the consultation in progress.

6.1 Description of the Action Area

The action area includes all land managed by the SNDO and other lands if a nexus to a BLM action is established with BLM oversight. The action area is located in southern Nevada and is bordered on the north by Lincoln County, Nevada; on the east by Mohave County, Arizona; and on the west and southwest by San Bernardino and Inyo counties, California. Elevations within Clark County range from 450 ft above mean sea level along the Colorado River to 11,900 ft at Charleston Peak. Ash Meadows NWR is included in the action are because many Ash Meadows species may be directly or indirectly affected by BLM actions that may occur as a result of ROWs, surface water or groundwater use, or various fire and resources-related activities.

Much of the district remains remote and rural, with the human population distributed over large areas or clustered in small communities. Public uses of these resources involve scenic, recreational, mineral, archeological, wilderness, wildlife, and vegetative activities. Communities and developments such as Laughlin are expanding along the Colorado River, providing jobs and recreational opportunities in previously undeveloped areas.

The Las Vegas Valley portion of the district is a major topographic feature, trending north-south through the middle of the planning area. This valley has a burgeoning metropolitan area, consisting of the cities of Las Vegas, North Las Vegas, Henderson, and Boulder City. Las Vegas

Valley is home to the majority of the state's population (68 percent in 2007). In 2010, the city of Mesquite had a population of 15,276 which is a 62.7 percent increase since 2000.

The 2011 population of Clark County was 1,969,975 with approximately 247 persons per mi². The majority of that county's population resides within Las Vegas Valley. Except for the Las Vegas Valley, Boulder City, and Mesquite, the remainder of the county is sparsely populated and similar in character to the rural southern portion.

Nye County, located in south central Nevada, is the largest county in Nevada and one of the largest in the U.S. with over 11 million ac. It is bordered by eight other Nevada counties and California. Southern Nye County is dominated by the Nevada Test and Training Range. Nye County is predominately rural and sparsely populated. U.S. Highway 95 crosses through southern Nye County. Local trucking companies move much of the freight through Nye County, and there is no railroad access. There are two airplane runways located in the action area within Nye County at Beatty and Pahrump. None of these are commercial airports.

With an estimated population of 43,351 in 2011 and a total area of 18,147.2 mi² population density for Nye County is about 2.4 persons per mi². Federal ownership of land within Nye County totals 8,560,733 ac, or nearly 74 percent of the land base. Approximately 700,000 ac are managed by the SNDO. An estimated 36,441 persons lived in Pahrump in 2010, a primarily residential rural community. Population data provided by the U.S. Census Bureau website: http://quickfacts.census.gov/qfd/states/32/32023.html

The service industries are the single most important employers and income producers for the two counties, with Federal and State government providing the second largest source of income for Clark County, and the third most important source for Nye County. The high incidence of mining in Nye County makes mineral production that county's second most important source of income, and its third most important employer. The predominance of service industries is explained primarily by gaming employment in Clark County. In Nye County, it is attributed to civilian employment of private firms providing contractual services to the U.S. military facilities. Approximately 38,928,708 visitors came to Las Vegas in 2011 (Las Vegas Convention and Visitors Authority).

The Nye County economy is based on Federal employment (*e.g.,* Nevada National Security Site), mining, recreation, tourist highway travelers, and retiree income (BLM 1998). The service industry is the number one employer and income producer in both Pahrump and Amargosa Valley. In Pahrump, the service industry is followed by the retail trade and manufacturing industries in producing income and employment. Due to its reputation as a retirement center and its close proximity to Las Vegas, Pahrump is expected to continue attracting new residents. In Amargosa Valley, the service industry is followed by mining, retail trade, and agriculture in producing income and employment (BLM 1998).

6.1.1 **Biological Opinion for the Mesquite Land Act**

On July 3, 2002, the Service issued a biological opinion to the BLM Las Vegas Field Office on their proposed sale of 10,620 ac of BLM land to the City of Mesquite, Nevada. The proposed land sale would adversely affect the woundfin and its critical habitat, Virgin River chub and it critical habitat, southwestern willow flycatcher, Yuma clapper rail, and desert tortoise. The BLM committed to the following conservation measure in the biological opinion:

- BLM will ensure the City's ordinance number 270 will be in place prior to issuance of the land patent to the City. The ordinance will include specific conservation measures designed to protect federally-listed species, including the City's participation in a hydrologic monitoring and mitigation plan and pursuing an amendment of the MSHCP to cover the Virgin River Species. If that amendment is denied, the City will develop and apply for an individual HCP to cover the identified federally-listed species not currently covered under the MSHCP.

- BLM will actively participate on the Virgin River Recovery Implementation Team. This team is responsible for development and implementation of the Lower Virgin River Recovery and Implementation Program. The goal of this plan is to develop a strategy and secure funding for the long-term conservation and eventual recovery of listed species within the Virgin River flood plain by focusing on elimination of threats and restoration of habitat.

- BLM will commit to participating in the development and implementation of the Hydrologic Monitoring and Mitigation Plan for the Lower Virgin River Basin, as it relates to actions authorized or taken on public lands, and will employ best efforts to achieve the goals of the Lower Virgin River Recovery and Implementation Program.

- BLM will continue to participate with the Service, The Nature Conservancy, and Clark County, in developing and implementing the Mormon Mesa and Gold Butte Conservation Management Plans.

6.2 Desert Tortoise Environmental Baseline

6.2.1 Status of the Desert Tortoise in the Action Area

Portions of the Northeastern and Eastern Mojave and Colorado Desert recovery units occur within the action area and are described in the revised desert tortoise recovery plan (Service 2011). Desert tortoise surveys were not conducted in support of this PBO; therefore, project-level analysis will include relevant survey data when projects are proposed to occur under this PBO. The status of the desert tortoise in the action area for this PBO is based on a landscape-level assessment and existing data as described below.

6.2.1.1 <u>Conservation Needs of the Desert Tortoise in the Action Area</u>

Desert tortoise populations in the action area require genetic variability and ecological heterogeneity to allow tortoises to adapt to environmental changes over time such as climate change. The action area should provide sufficient areas with soils that are friable enough for digging of burrows and nests, but firm enough so that burrows do not collapse. Tortoises require a high diversity of perennial plants and high production of ephemerals (annuals).

The desert tortoise requires the PCEs of critical habitat that function and provide those physical and biological elements necessary for the long-term survival of the species as described in Section 5.2.

High survivorship of adult desert tortoises is critical to the species' persistence in the action area, and the slow growth rate of populations can leave them susceptible to extirpation events in areas where adult survivorship has been reduced. Because desert tortoises occupy large home ranges, the long-term persistence of extensive, unfragmented habitats is essential for the survival of the species. The loss or degradation of these habitats places the desert tortoise at increased risk of extirpation of local populations. The quantity of desert tortoise habitat within each desert tortoise conservation area must be maintained with no net loss. Unavoidable habitat effects should be balanced with habitat acquisition and restoration of degraded habitat. Native vegetation should be re-established in burned areas and nonnative plants should be managed or controlled. Large-scale disturbances (*e.g.,* solar energy projects) should be located outside desert tortoise habitat or in degraded or low quality habitat.

Tortoise conservation areas (*e.g.* critical habitat, ACECs, etc.) should be connected to compensate for the current limitations to the conservation network due to suboptimal size and shape and large-scale disturbances. The Service mapped these connections or linkages as "least-cost" corridors (Beier *et al.* 2008) between pairs of conservation areas which are provided in Figure 20. Large blocks of habitat outside existing conservation areas may be important if on-the-ground information indicates that particular linkages are already compromised. Such blocks of habitat may provide secondary conservation priority with additional security against population declines (*e.g.*, through stochastic events) within conservation areas, especially given limitations in the existing reserve architecture and projected climate change. Preserving connectivity between tortoise conservation areas will help maintain genetic variability through long-term gene flow between populations and provide the means to establish and maintain proper sex and age ratios, reproduction and recruitment rates, and dispersal opportunities. Successfully recovering the Mojave desert tortoise will entail managing the habitat "matrix" between reserves as conservation areas (Wiens 2006).

Desert tortoise research in the Mojave Desert has identified nutritional constraints that may limit utilization of potential food plants. The kidney structure of the desert tortoise cannot concentrate electrolytes such as potassium as does the mammalian kidney (Maloiy 1979). Thus, the desert tortoise must rely on urine to excrete potassium resulting in more water loss in urine than it obtains in its food (Oftedal 2002). Tortoises produce uric acid as a normal end product of protein metabolism. However, when tortoises ingest high levels of potassium without an increase in protein intake, both the amounts of urate precipitated in the bladder and the concentration of potassium in these precipitates increase (Oftedal 2003). Because urates contain approximately 30 percent nitrogen, a critical side effect of urate production is the removal of nitrogen from the body.

The amount of nitrogen excreted in urates increase dramatically as dietary potassium levels increase, with the net effect that animals on high potassium intake cannot retain nitrogen for growth even though the protein level is high. The amount of potassium that could potentially be excreted, potassium excretion potential (PEP), can be estimated based on the amount of water and nitrogen in the food, compared with the amount of potassium in the food (Oftedal 2002). A positive PEP index indicates there is more water and nitrogen in the food than is needed to excrete potassium whereas a negative PEP index indicates there is insufficient water and nitrogen in the food to excrete the potassium. Physiological responses of desert plants to low soil moisture appear to result in plants with a low PEP index that are poor food for tortoises. If high PEP index plants only germinate and grow in wet years, selective foraging by desert tortoises during these times may provide the greatest nutrition. Thus, nutritional status of wild tortoises may depend more on availability of plant species of high nutritional quality than on overall amounts of annual vegetation (Oftedal 2002).

Although desert tortoises eat nonnative plants, they generally prefer native forbs when available (Jennings 1993, Avery 1998). The Mojave Desert is relatively rich in winter annuals which serve as an important food source for the desert tortoise. Consumption of nonnative plants may place them at a nitrogen and water deficit (Henen 1997). In drought years, the ability of tortoises to drink while surface water is available following rains may be crucial for survival (Nagy and Medica 1986). Droughts frequently occur in the desert, resulting in extended periods of low water availability. Periods of extended drought place tortoises at even greater water and nitrogen deficit than during moderate or high rainfall years (Peterson 1996, Henen 1997). During a drought, more nitrogen than normal is required to excrete nitrogenous wastes, thus more rapidly depleting nitrogen stored in body tissues. Plants also play important roles in stabilizing soil and providing cover for protection from predators and heat.

Tortoises primarily eat annual herbs in the spring and switch to grasses, perennial succulents (cacti), and dried annuals later in spring and early summer (Avery 1998). Succulent green forage of spring is essential to the growth, reproduction, and survivorship of the desert tortoise. Growth of individual tortoises is directly correlated to the amount and quality of forage available in any given spring. The size and number of egg clutches correlates with the quality and quantity of the spring diet. If spring forage is not available, the opportunity for the tortoise to meet its nutritional needs cannot be met until the next year.

The desert tortoise requires a landscape with minimal human trash and debris. As humans have become more prevalent in the desert, other associated impacts have increased, such as the presence of ravens and feral dogs, use of OHVs, construction of roads and fences, and dumping of garbage and litter (Boarman 2002). Effects of garbage and litter on reptiles are poorly understood mainly because of the rarity of observing primarily chance encounters. Snakes and lizards have died, received severe lacerations, or experienced reduced mobility from entanglement with litter (Groves and Groves 1972, Herrington 1985, and Dean *et al.* 2005 cited in Walde *et al.* 2007).

Desert tortoises are known to eat certain types of trash particularly if brightly colored. Walde *et al.* (2007) observed that a radio-tracked desert tortoise had ingested a 43-in ribbon from a balloon. Researchers then began recording numbers of balloons encountered during daily work at the study site. A total of 178 new balloons arrived at the study site between March 2005 and November 2005. Burge (1989) documented a desert tortoise losing its leg after catching it in the string of a balloon. The same author documented the presence of foil and glass chips in tortoise scats and noted that tortoises do eat foreign objects that can cause obstructions.

Desert tortoise threats should be managed or controlled to minimize unnatural mortality of tortoises. In addition to the conservation needs described above, appropriate management includes controlling factors that contribute to disease, habitat degradation, increased predation, mortality or take of tortoises on roads which may require road closure or construction of tortoise exclusionary fencing along roads, increased wildfire risk, and increased exposure to humans and their activities (*e.g.,* OHV use, dumping harmful materials that may be ingested by tortoises, and collection for pets).

Due to appreciable declines of tortoise populations across the range, in conjunction with multi-faceted interacting threats, plans are underway to augment tortoise populations which will likely include sites within the action area. Augmentation will be approached experimentally, in terms of both the continued development and evaluation of techniques and through the use of augmentation to help assess specific threats and recovery actions (Service 2011). Population augmentation in conjunction with threats management and restoration activities, as well as research designed to investigate the effectiveness of these actions is a means to gain insights into causes of declines and to increase the rate at which depleted populations could be revived. It is important to realize that if the causes of tortoise population declines are not addressed, simply increasing population numbers in the wild through augmentation will not result in recovery.

6.2.1.2 Population Monitoring Data in the Action Area

In 1999 the Desert Tortoise Management Oversight Group endorsed the use of line distance sampling (Buckland *et al.*, 2001) as the most appropriate method for estimating rangewide desert tortoise density. Fifteen monitoring strata were established which approximate the boundaries of the CHUs.

Desert tortoise population monitoring began rangewide in 2001. Long-term monitoring of desert tortoise population growth and distribution, habitat quality and quantity, and the presence and intensity of threats to the desert tortoise are recovery actions identified in the revised recovery plan (Service 2011).

Desert tortoise density estimates are generated separately for each monitoring stratum, then weighted by stratum area to arrive at average density in the monitored area of each recovery unit. When the annual estimates are imprecise, it should not be expected that there will be a close match from one year to the next. Over a period of many years, however, any underlying trend in the number of tortoises should be obvious.

Service (2010b) desert tortoise monitoring data included all or a portion of five strata in the action area, Beaver Dam Slope, Coyote Spring Valley, Gold Butte-Pakoon Clark, Mormon Mesa, and Piute-Eldorado. The monitoring strata approximate the CHUs and desert tortoise ACECs and represent the 1994 delineation of recovery units which would not include the Colorado Desert Recovery Unit. The results are provided in Table 11. For additional or updated information on desert tortoise population monitoring, visit the Desert Tortoise Recovery Office website at: http://www.fws.gov/nevada/desert_tortoise/index.html.

Table 11. Desert tortoise density estimates for strata in the action area (Service 2010).

Recovery Unit	Stratum	Area Sampled (mi^2 /km^2)	Number Transects	Total Transect Length (mi/km)	No. Tortoises Observed	Density Estimate (/mi^2 -/ km^2)
NE Mojave	Beaver Dam Slope	320/828	66	411/662	23	8.6/3.3
	Coyote Spring	431/1,117	99	650/1,046	43	9.4/3.6
	Gold-Butte Pakoon	763/1,977	128	782/1,258	22	4.7/1.8
	Mormon Mesa	374/968	132	807/1,298	76	14.3/.5.5
Eastern Mojave	Piute-Eldorado	901/2,334	44	301/485	18	3.1/8.1

6.2.2 Factors Affecting the Desert Tortoise in the Action Area

6.2.2.1 Consultations within the Action Area-November 1997 to Present

Since the previous PBOs were issued for the action area (November 1997), the Service issued the biological opinions identified in Appendix C to Federal agencies for projects or actions that resulted in substantial desert tortoise effects (*e.g.,* more than 100 ac habitat disturbance). The resulting effects to the environmental baseline for the desert tortoise expressed in acreage of habitat disturbance are discussed by program below. The precise number of desert tortoises killed or injured as a result of the projects or actions covered under the biological opinions is unknown mostly due to the difficulty in locating desert tortoises, particularly small ones. The Service often relies on desert tortoise density estimates and habitat disturbance as a surrogate for mortality take particularly for large disturbances. For information on the environmental baseline prior to November 1997, refer to the previous PBOs: 1-5-96-F-023, 1-5-97-F-251, and 1-5-98-F-053.

6.2.2.2 Land Sales

The SNDO authorized approximately 63 land disposal (sale) actions totaling approximately 10,300 ac within potential desert tortoise habitat from 2002 to 2010. These lands are no longer managed in accordance with Federal policy unless a nexus is established to a Federal action (*e.g.,* a permit proposed to be issued by the Corps of Engineers under section 404 of the Clean Water Act). The effects to the desert tortoise and incidental take exemption would typically fall under purview of section 10 of the Act.

6.2.2.3 Leases and Patents

The SNDO authorized approximately 138 R&PP actions totaling 4,218 ac within potential desert tortoise habitat from 2002 to 2010. Lands leased under the authority of the R&PP Act remains under the jurisdiction of BLM and section 7 consultation requirements, up until a patent is issued.

6.2.2.4 Other Land Use Authorizations

Other land use authorizations encompass various activities including research projects, field trips, class use, and apiary sites. The SNDO authorized approximately 206 actions totaling 84 ac of new disturbance within potential desert tortoise habitat from 2002 to 2010.

6.2.2.5 Rights-of-Way

The SNDO authorized approximately 50 actions totaling 460 ac of new disturbance within potential desert tortoise habitat for pre-activity geotechnical excavation and sampling from 2002 to 2010. For the same period, the SNDO authorized approximately 360 actions totaling 1,123 ac of new disturbance within potential desert tortoise habitat for the construction or expansion of a buried natural gas or water pipelines, sewers, power, or fiber-optic cables; 237 actions totaling 2,145 ac for building substations and linear transmission/distribution lines; 343 actions totaling 1,962 ac to allow access to various sites and provide infrastructure for future development, and inter- and intra-state transportation; 86 actions for communication sites including radio and television sites, totaling 81 ac; and 97 actions totaling 1,856 ac for flood-control projects.

Major transportation facilities that transect tortoise habitat in the action area include: Interstates 15, 215, and 515; U.S. Highways 93 and 95; SR 160, 161, 163, 164, 165, 168, and 169; and the Union Pacific Railroad. Other paved and unpaved roads form a network of roads and public access into desert tortoise habitat.

The Las Vegas RMP (1998) established a limitation for vehicular travel within all ACECs within Clark County to protect the desert tortoise and its critical habitat. In this plan, vehicle use within the four desert tortoise ACECs was limited to designated roads and trails. BLM identified new illegal roads and trails created in all these ACECs. Efforts are underway to inventory existing roads and trails and complete the designation of roads. The inventory of 906 mi of routes and 1,724 features was completed in 2007. BLM designated 812 mi of roads as open and 94 mi of roads as closed on July 15, 2008. Following road designation, BLM began signing the open routes and signing and restoring closed road segments including restoration of habitat damage created by vehicles traveling off designated roads.

Several major ROWs were issued by BLM in the action area since 1998. A Kern River Gas Transmission pipeline was constructed in 2002-2003. The 2003 pipeline project approximates the previous Kern River natural gas pipeline constructed in 1991.

Approximately 50 ft of the construction ROW overlapped areas disturbed by construction of the 1991 Kern River Gas Transmission pipeline. The pipeline ROW crosses approximately 318.8 mi of potential desert tortoise habitat, of which about 102.9 mi traverse desert tortoise critical habitat. Pipeline construction in Nevada resulted in disturbance of 1,649 ac of desert tortoise habitat including 141 ac of desert tortoise critical habitat; 390 ac of desert tortoise critical habitat previously disturbed by the first pipeline; 294 ac of new disturbance of non-critical habitat; and 824 ac of non-critical habitat previously disturbed by the first pipeline. During construction of the 2003 KRGT pipeline project, over 840 desert tortoises were encountered and one was killed in Clark County, Nevada as a direct result of project activities. One tortoise was killed on June 8, 2011, as a result of maintenance operations.

The UNEV gas pipeline was constructed in 2011-2012. There were 366 desert tortoise encounters during construction of the UNEV pipeline, all of which appeared to be healthy. An unknown number of tortoises may have been encountered more than once. A total of 90 tortoises were relocated off the ROW and 3 tortoises voided their bladder. Five tortoises were known to be killed by project-related activities. BLM estimates that a total of 689 ac of desert tortoise habitat was disturbed during the construction of the UNEV Pipeline Project. Of these 689 ac, 1.6 ac are long-term disturbance as a result of valve stations and access roads. The remaining 677.4 ac are anticipated to be restored. Approximately 378 ac (153 ha) of desert tortoise critical habitat was temporary disturbance; 309 ac (125 ha) of non-critical habitat was temporary disturbance; and 0.8 ac of critical and 0.8 ac on non-critical habitat was long-term disturbance.

6.2.2.5.1 *Renewable Energy*

To date, the Service has issued biological opinions to BLM for ROWs to construct, operate, and maintain the Amargosa Farm Road and Silver State solar energy projects in the action area. The Service also issued a PBO to BLM for proposed solar energy development within SEZs, two of which occur within the action area.

The Amargosa Farm Road Solar Project is located at the western limit of the action area in Nye County. Desert tortoise surveys conducted in 2009 for the Amargosa Farm Road Solar Project resulted in observation of four deteriorated burrows on the 7,670 ac surveyed during a time when tortoises would have been most active. No dead or live tortoises were observed nor were any shells, scutes, or bone segments of dead tortoises detected.

The Silver State Solar Project is located in southern Clark County 2 mi east of Primm near the California border and I-15. The proposed project would be constructed in three phases and was proposed to result in disturbance of approximately 2,966 ac of desert tortoise habitat. The Service estimates that approximately 123 sub-adult and adult desert tortoises and an unknown number of juvenile tortoises will be captured and translocated during the life of the project. No more than three adult or sub-adult tortoises and an unknown number of juvenile desert tortoises and eggs are anticipated to be killed or injured during translocation and monitoring due to stress associated with this activity. Phase I has been constructed and is operating. Recently, the proponent modified their proposed action for subsequent phases of the project. The modification in combination with new information on desert tortoise habitat connectivity and substantial additional effects to the species not previously considered, triggered reinitiation of consultation for the remaining phases which is in process.

BLM proposed two Solar Energy Zones (SEZs) for solar energy development within the action area. The Service issued a PBO for future solar energy projects within these two SEZs that will be appended to the PBO. The USGS desert tortoise model (Nussear *et al*. 2009) identifies the entire Dry Lake SEZ as having overall high habitat suitability for desert tortoise (suitability score greater than or equal to 0.5 out of 1.0). On the basis of surveys conducted in the adjacent Mormon Mesa CHU, the Dry Lake SEZ may support up to 213 desert tortoises. The Amargosa SEZ is located in the Amargosa Desert. The Amargosa SEZ includes a variety of land use types such as secondary and unimproved roads, trails, pipelines, electrical transmission lines, utility corridors, and other facilities developed around the Amargosa Farms community.

6.2.2.6 Mining Activities

In 2009, BLM withdrew approximately 944,343 ac of public lands in the action area from settlement, sale, location, entry, or patent under the United States mining law. This important conservation achievement reduced the threat to desert tortoises as a result of mining including direct mortality and harassment, habitat loss and degradation, environmental contaminants, nonnative plants, and road effects. The SNDO authorized approximately 366 actions totaling 4,586 ac of disturbance within potential desert tortoise habitat for permits, leases, or contracts within the mineral management program from 2002 to 2010.

6.2.2.7 Recreation and Roads

Annually, the SNDO issues approximately 60 SRPs for various uses. Permitted uses range from speed-based OHV races to non-speed organized group activities including tours and rocket launches. The SNDO has authorized approximately 179 recreation actions from 2002 to 2010 within potential desert tortoise habitat.

An extensive road network exists in the action area ranging from two-track routes to major interstate highways. Roads provide access to large tracts of public land for recreational use. Desert tortoise injuries and mortalities occur throughout the action area as a result of vehicle encounters.

In 1994, BLM began to inventory and designate roads on public lands in Clark County (Figure 22). In 2003-2005, BLM completed an inventory of all roads and trails in the following ACECs: Coyote Spring, Gold Butte (all 7 ACECs), Mormon Mesa, and Virgin River – totaling 981 mi. In 2007-2008, BLM completed an inventory of roads and trails over 1.8 million ac within Clark County – totaling 9,228 mi mapped and 899 mi digitized from satellite imagery. In 2011, BLM began inventory of routes in Nye County which will continue when funding is available.

On January 28, 2011, BLM published the Notice of Intent for Recreation Area Management Plans and Comprehensive Transportation and Travel Management plans. This effort will result in route designations for motorized and non-motorized recreation throughout Clark County outside the ACECs listed above.

Additional information on roads is provided in the environmental baseline section for desert tortoise critical habitat (Section 6.3).

6.2.2.8 Livestock Grazing

The SNDO currently administers five active grazing allotments (Figure 19), three of which are currently grazed (Table 12). In 1969, all grazing allotments in Clark County were designated as ephemeral. There are four additional allotments managed by the Arizona BLM Field Office that partially cross into eastern Nevada, near Mesquite and are not considered in this consultation.

Table 12. Active grazing allotments in the action area included in this consultation

Allotment	**Acres**
Flat Top Mesa (actively grazed)	3,850
Muddy River	27,282
Lower Mormon Mesa (actively grazed)	48,010
Hidden Valley (actively grazed)	56,202
Wheeler Wash	64,303

6.2.2.9 Fire Management

BLM manages fire on approximately 3,332,000 ac of public land. Since 2002, the SNDO has implemented or authorized approximately 22 actions totaling 1,718 ac of new disturbance within potential desert tortoise habitat. Between 1980 and 2003, approximately 63,000 ac of BLM-managed land burned within the SNDO. The largest fire recorded was 12,050 ac (4,876 ha). In 2005, a total of eight fires in the Southern Nevada Complex Fire Incident (seven ignited by lightning and one by humans) burned approximately 103,328 ac within the SNDO. Five of these occurred in desert tortoise critical habitat (see biological opinion file no. 1-5-05-F-526).

BLM and USGS in Nevada have also implemented emergency rehabilitation projects after wildfires (DeFalco *et al*. 2007). Because natural plant succession is variable over time subsequent to disturbance, land managers and researchers attempt to facilitate revegetation of disturbed sites and typically observe mixed results (Ostler *et al*. 2002; Warren and Ostler 2002; Ostler and Hansen 2003; Abella *et al*. 2007; DeFalco *et al*. 2007). Site treatment, soil amendments, timing of the projects, and the environmental conditions all work to influence effectiveness of these efforts.

6.2.2.10 Desert Tortoise Conservation Center

The San Diego Zoo, under contract with the Service, operates the Desert Tortoise Conservation Center in Las Vegas, a 222-ac (90-ha) facility on an 11,014-ac BLM management area for desert tortoise and Mojave Desert research. The facility provides a site for desert tortoise training, temporary tortoise holding and health assessments, research, headstarting, and support for population augmentation. Ill or injured tortoises may be rehabilitated then returned to the wild which includes tortoises taken as a result of BLM actions within the scope of this PBO.

6.2.2.11 Habitat Conservation Plans and Associated Incidental Take Permits

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

On July 11, 1995, the Service issued a section 10(a)(1)(B) incidental take permit (No. PRT-801045) under the Act to Clark County, Nevada, including cities within the county and the Nevada Department of Transportation (NDOT). The permit became effective August 1, 1995, and allowed the "incidental take" of desert tortoises for a period of 30 years on 111,000 ac of non-Federal land in Clark County, and approximately 2,900 ac associated with NDOT activities in Clark, Lincoln, Esmeralda, Mineral, and Nye counties, Nevada. The Clark County Desert Conservation Plan (DCP) served as the permittees' HCP and detailed their proposed measures to minimize, monitor, and mitigate the effects of the proposed take on the desert tortoise (RECON 1995). The permittees imposed, and NDOT paid, a fee of $550 per ac of habitat disturbance to fund these measures. The permittees expended approximately $1.65 million per year to minimize and mitigate loss of desert tortoise habitat. The majority of these funds were used to implement minimization and mitigation measures, such as increased law enforcement; construction of highway barriers; road designation, signing, closure, and rehabilitation; and tortoise inventory and monitoring within the lands initially conserved during the short-term HCP, and other areas being managed for desert tortoise recovery. The benefit to the species, as provided by the DCP, minimized and mitigated some adverse effects to covered species within the permit area and contributed to recovery of the desert tortoise. Actions funded by the DCP that provided the most benefit to the desert tortoise includes purchase of livestock grazing allotments, desert tortoise translocation projects, and construction of tortoise barriers along highways.

On November 19, 2000, the Service issued the Intra-Service Biological and Conference Opinion on Issuance of an Incidental Take Permit to Clark County, Nevada for a MSHCP (File No. 1-5-00-FW-575). On November 22, 2000, the Service issued an incidental take permit (TE-034927) to Clark County, Nevada, including cities within Clark County and

NDOT. This HCP is the only regional HCP in place that overlaps the action area. The incidental take permit allows incidental take of desert tortoise for a period of 30 years on 145,000 ac of non-Federal land in Clark County, and within NDOT's ROW, south of the 38th parallel in Nevada. The MSHCP and Environmental Impact Statement (RECON 2000), serves as the permittees' HCP and details their proposed measures to minimize, mitigate, and monitor the effects of covered activities.

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

6.2.2.12 Subsidized Desert Tortoise Predators

The metropolitan areas of Las Vegas and Henderson; Mesquite, Pahrump, Boulder City, Searchlight, and Laughlin communities; and casino industry locations at Jean and Primm provide subsidized resources for desert tortoise predators. These areas are adjacent to BLM lands. Esque *et al*. (2010) found that predation rates were higher near human population concentrations, at lower elevation sites, and for smaller tortoises and females. In 2008, elevated mortality (as high as 43 percent) occurred throughout the range of the Mojave desert tortoise. Esque *et al*. (2010) hypothesize that low population level of typical coyote prey (*i.e.,* jackrabbits and other small animals) due to drought conditions influenced high predation rates in previous years. Predation may have been exacerbated in areas with high levels of subsidized predators. Many historical reports of increased predation may indicate that high predation rates are more common than generally considered and may impact recovery of the desert tortoise throughout its range.

As the human presence in the action area increases, the incidence of unrestrained domestic and/or feral dogs in tortoise habitat may subsequently increase. Preliminary results from a study in the Mojave Desert of California indicate a significantly higher percentage of tortoises with moderate to severe canid-like shell trauma within 2 mi of settlements than tortoises at more remote sites (Demmon and Berry 1995). Others have also reported high incidence of canid-like shell damage at sites with feral dogs and dog packs (Bjurlin and Bissonette 2001). Predation appears to play an important role in clutch failure (Germano 1994). Bjurlin and Bissonette (2004) found that nest predation was highly variable which may increase due to regular presence of humans, particularly researchers.

6.2.2.13 Climate Change

The following information concerning climate change is summarized from the revised recovery plan for the desert tortoise (Service 2011).

Global climate change and drought are potentially important long-term considerations with respect to recovery of the desert tortoise. Recent climatic changes have affected a broad range of organisms with diverse geographical distributions (Walther *et al*. 2002). Although we do not have information regarding specific direct effects of climate change on the desert tortoise or its habitat, the Intergovernmental Panel on Climate Change has suggested a 6.3 to 7.2 ° F increase in annual mean temperature, with the greatest increases occurring in summer (June-July-August mean up to 9º F increase) (Christensen *et al*. 2007). Precipitation likely will decrease by 5 to 15 percent annually in the region, with winter precipitation decreasing in the range of 5 to 20 percent (Christensen *et al*. 2007).

Because germination of the desert tortoise's food plants is highly dependent on stable winter precipitation and temperature, the forage base could be reduced due to increasing temperatures and decreasing or unreliable precipitation during critical winter months. Winter precipitation in the Mojave Desert is much more reliable than the summer rains. One potential scenario is that the winter precipitation would shift to the north over time, leading to drier winters in the Mojave Desert, negatively impacting the growth of the spring annual plants. Spring annual plants, which are dependent on winter precipitation, provide essential forage for the desert tortoise. However, rainfall patterns may change in unpredictable ways, some areas may get wetter and other areas drier, with both situations altering desert tortoise habitat. Areas with increased rainfall would likely have increased growth of nonnative, invasive species, altering the mixture of plants available for desert tortoise forage and changing the fire regime. Therefore, desert tortoise habitat may potentially change over the life of the project due to climate change. Further predictions need to be developed specifically for the desert tortoise to help inform recovery efforts.

6.3 Desert Tortoise Critical Habitat Baseline in the Action Area

Desert tortoise critical habitat is composed of specific geographic areas that contain the PCEs of critical habitat, consisting of the biological and physical attributes essential to the species' conservation within those areas. Below are the specific PCEs of desert tortoise critical habitat.

PCE: Sufficient space to support viable populations within each of the six [five per the revised recovery plan] recovery units, and to provide for movement, dispersal, and gene flow.

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

PCE: Suitable substrates for burrowing, nesting, and overwintering; burrows, caliche caves, and other shelter sites.

PCE: Sufficient vegetation for shelter from temperature extremes and predators.

PCE: Habitat protected from disturbance and human-caused mortality.

The action area includes four desert tortoise CHUs described below. Desert tortoise recovery actions completed by BLM since 1997 that affect critical habitat include mineral withdrawal from desert tortoise ACECs in 2009, and road closures and designations including habitat restoration.

The 1998 RMP limited vehicular travel within all ACECs in the action area to designated roads and trails. Following 1998, BLM identified that new illegal roads and trails were being created in all these ACECs. A road inventory was completed for Coyote Spring, Gold Butte, and Mormon Mesa ACECs in 2007 which identified 906 mi of roads and trails and 1,724 other disturbances. On July 15, 2008, BLM designated 812 mi of roads as open and 94 mi of roads as closed in ACECs. Following road designation, BLM began signing the open routes and signing and restoring closed road segments and habitat damage created by vehicles travelling off designated roads.

In 1994-1996, BLM designated routes in the Piute-Eldorado ACEC resulting in approximately 466 mi of open roads and 135 mi of road closed encompassing 328,235 ac. In 2001, BLM designated approximately 43 mi of open roads in the Rainbow Gardens ACEC encompassing 38,766 ac. In 2008, BLM designated routes in 10 additional ACECs including Coyote Springs, Gold Butte, Mormon Mesa, and Virgin River ACECs:

- **Mormon Mesa ACEC** - approximately 149,254 ac with approximately 193 mi of open roads – 13 mi closed
- **Coyote Springs ACEC** - approximately 51,530 ac with approximately 120 mi of open roads – 19 mi closed
- **Gold Butte ACEC, Part A** - approximately 186,565 ac with approximately 250 mi of open roads – 30 mi closed. This part of Gold Butte includes popular destinations like Whitney Pockets, Falling Man, Black Butte, and the Virgin Mountains. Adverse effects to the desert tortoise in this area are largely tied to vandalism and OHV use.

The 1998 RMP established a limitation for vehicular travel within all ACECs in the action area to conserve desert tortoise critical habitat. Vehicle use within the four desert tortoise ACECs and Rainbow Gardens ACEC was limited to designated roads and trails. In recognition of the importance of roads and their potential effects to the desert tortoise and other BLM sensitive species, BLM conducted road monitoring activities in 2010-2011 within ACECs in Clark County (BLM 2011). As part of road monitoring, BLM collected data on condition and use of non-paved roads. The project covered six ACECs within Clark County including more than 740,000 ac of desert tortoise critical habitat and 200,000 ac outside critical habitat. Road monitoring produced 561 point features representing incidents of various sizes and types throughout the project area. Sign damage was the most common type of incident documented. Illegal vehicle incursions accounted for approximately 75.5 mi of disturbance and 20 percent of all incidents documented. Documentation of 44.6 ac of disturbance among 70 sites was attributed to casual use and other recreational activities. Of the all the data collected for area disturbances, 70 percent consisted of sites that receive regular use from different types of users.

6.3.1 Mormon Mesa Critical Habitat Unit Baseline

The Mormon Mesa CHU is dominated by a flat landscape and a series of washes. The dominant plant community is Mojave Desert Scrub with patches of Joshua Tree and blackbrush. The CHU has a relatively large edge effect due to its shape. The Mormon Mesa CHU is contiguous with the Beaver Dam Slope ACEC to the east and Desert NWR to the west.

The Union-Pacific railroad, US 93, and I-15 restrict tortoise movement within and adjacent to the CHU by creating barriers and compromising habitat connectivity. US 93 bisects the western section of the Mormon Mesa CHU. In 2010, NDOT installed approximately 19 mi of desert tortoise exclusionary fencing along both sides of US 93 with culverts to allow tortoise movement underneath the highway and reduce habitat fragmentation. Unfenced SR 168 intersects US 93 and crosses east-west through the western central portion of the CHU. The Sheep Range, Meadow Valley Mountains, Mormon Mountains, and Arrow Canyon Range form barriers to east-west tortoise movement and habitat connectivity. The railroad affects connectivity between the eastern and western portions of the CHU.

Traffic counter data collected and analyzed by BLM, January through June 2011 on two roads adjacent to US 93 in Coyote Springs ACEC portion of the Mormon Mesa CHU indicate 1,091 vehicles entered the western portion of the ACEC in 2011 and 4,635 vehicles entered the east side of the ACEC in 2011.

Ongoing and proposed development by Coyote Springs Investment (CSI) substantially affect critical habitat in the western section of the CHU. CSI constructed a golf community on the property and plans for additional development. The CSI property is generally bounded on the south by SR 168, on the north by the Clark-Lincoln county line, on the east by Pahranagat Wash, and on the west by US 93. The entire project area comprises approximately 13,100 ac, of which 6,881 ac are planned for residential and commercial development and 6,219 ac are planned as a natural reserve that will ultimately be named the Coyote Springs Resource Management Area. As partial mitigation, CSI will pay $750,000 to fund research and conservation measures for the desert tortoise in the Mormon Mesa CHU.

Three major pipelines cross the Mormon Mesa CHU, two of which are Kern River natural gas transmission pipelines constructed in 1991 and 2002-2003; and the third is the UNEV petroleum fuel pipeline constructed in 2011-2012. The three pipelines cross the southern and eastern portions of the Mormon Mesa CHU and were constructed mostly parallel to one another. The pipeline ROWs cross approximately 23 mi of the Mormon Mesa CHU.

BLM designated ROW corridors through the Mormon Mesa CHU along US 93 and north of I-15. Refer to Map 2-4 in the Las Vegas RMP (BLM 1998). The Southwest Intertie/ON Line electric power transmission line project will disturb 375 ac of the Mormon Mesa CHU along US 93 in Clark and Lincoln counties. (File No. 84320-2010-F-0391) which contributes to fragmentation of the western section of the CHU.

Numerous wildfires occurred in desert tortoise habitat across the range of the desert tortoise in 2005 due to abundant fuel from the proliferation of nonnative plant species after a very wet winter. Approximately 3 percent of the Mormon Mesa CHU burned as a result of these fires. Although it is known that desert tortoises were burned and killed by the wildfires, desert tortoise mortality estimates are not available. Recovery of these burned areas is likely to require decades.

The Service determined that the Mormon Mesa CHU continues to provide sufficient space, forage and soil conditions, substrates and shelter sites, and vegetation (PCEs 1-4) for the desert tortoise. Nonnative plants, including Sahara mustard (*Brassica tournefortii*), contribute to habitat degradation and affect the PCE for forage (PCE 2) and vegetation (PCE 4). Overall, PCE 5 continues to function through important habitat protections. The CHU is mostly protected from livestock grazing, speed-based OHV events, land disposal, and the potential habitat loss due to mining has been reduced through the 2009 mineral withdrawal; however, habitat may be adversely affected by future ROWs, particularly major linear ROWs. The existing degree of habitat disturbance, degradation, and fragmentation in the CHU has affected all PCEs but not to the extent that the CHU has been adversely modified and no longer serves its role for recovery of the species.

6.3.2 Gold Butte-Pakoon Critical Habitat Unit Baseline

Approximately 192,300 ac of the CHU occurs within the action area with the remaining 298,000 ac in Arizona. Tortoises in the CHU are essentially isolated from other tortoise populations by the Virgin Mountains and Grand Wash Cliffs to the east, the Colorado River to the south, and I-15 and Virgin River to the north and west. Habitat within the CHU is mostly contiguous with minimal fragmentation.

Wildfire is likely the most important threat to critical habitat in this CHU. Approximately 13 percent of the Gold Butte-Pakoon CHU burned as a result of the 2005 fires.

A network of unpaved roads occur across much of the CHU but most of the area, especially south of the Virgin Mountains, is relatively inaccessible to casual vehicular use. Recreational use at Lake Mead National Recreation Area has caused some illegal OHV use and habitat disturbance. Traffic counter data collected and analyzed by BLM, January through June 2011 on SR 170/Gold Butte Byway indicate 8,245 vehicles entered the Gold Butte area in 2011.

The Gold Butte-Pakoon CHU is the least impacted CHU in the action area. All five PCEs continue to function in the CHU and provide for recovery of the species.

6.3.3 Piute-Eldorado, Nevada Critical Habitat Unit Baseline

The Piute-Eldorado CHU in Nevada is contiguous with the 453,800-ac Piute-Eldorado (Fenner) CHU in California. The northern half of the Piute-Eldorado CHU in Nevada occurs within the Northeastern Mojave Recovery Unit and the other contiguous critical habitat occurs in the Colorado Desert Recovery Unit. The diverse topography and vegetation provide opportunities for desert tortoise populations to survive climate change (Service 1994a). The CHU surrounds the city of Searchlight and includes two large valleys, Piute and Eldorado. Historic mining produced many old corrals and mining sites. The surrounding ranges provide abundant drainages with desert wash habitat dominated by catclaw acacia (*Acacia greggii*) communities.

The BCCE includes a portion of the northern CHU in Eldorado Valley and provides additional protection. The term of the BCCE is for 50 years and will be retained in a natural condition with the purpose for recovery of the desert tortoise and conservation of other species in the area. Certain uses shall be prohibited within the BCCE including motor vehicle activity off designated roads, livestock grazing, and any activity that is inconsistent with the purposes of the BCCE.

US 95 bisects the CHU, fragmenting critical habitat into eastern and western areas. Other sources of habitat fragmentation include SR 163, SR 164, and SR 165. Several years ago, US 95 was widened through the CHU with desert tortoise exclusionary fencing and culvert underpasses installed to protect tortoises and allow some degree of tortoise movement access across the highway. Although habitat fragmentation occurred as a result of the fencing, the recovery value of the critical habitat along the highway was substantially increased. Tortoise exclusionary fencing has also been installed along SR 163, SR 164, and SR 165.

Much of Piute Valley has been degraded by OHV use, mining, utility corridors, and grazing. An extensive network of dirt roads exists. The communities of Searchlight, Boulder City, Cal-Nev-Ari, Nelson, and Laughlin are adjacent to critical habitat. Residents and visitors use the CHU for recreation and other purposes. Visitors to Lake Mead National Recreation Area use US 95 and connected roads for access. No road traffic data was collected in 2011 for the Piute-Eldorado CHU.

No major wildfires have occurred within the CHU in recent years. Currently, the most important impact to the Piute-Eldorado CHU is habitat fragmentation, degradation, and disturbance associated with casual OHV use, utility corridors, and transportation routes. Nelson Hills in Eldorado Valley, east of US 95 has historically been used for casual and organized OHV events.

The Service determined that the Piute-Eldorado CHU continues to provide sufficient space, forage and soil conditions, substrates and shelter sites, and vegetation (PCEs 1-4) for the desert tortoise. Nonnative plants contribute to habitat degradation and affect the PCE for forage (PCE 2) and vegetation (PCE 4). Overall, PCE 5 continues to function through important habitat protections including the BCCE. The CHU is mostly protected from livestock grazing, speed-based OHV events, land disposal, and the potential habitat loss due to mining has been reduced through the 2009 mineral withdrawal; however, habitat may be adversely affected by casual OHV use and future ROWs, particularly major linear ROWs. The existing degree of habitat disturbance, degradation, and fragmentation in the CHU has affected all PCEs but not to the extent that the CHU has been adversely modified and no longer serves its role for recovery of the species.

6.4 Southwestern Willow Flycatcher and Critical Habitat Baseline

Historical distribution and status of the flycatcher in Nevada is not well known. Although accounts of breeding flycatcher locations date back to 1987 when Unitt reported flycatcher breeding at Indian Springs, Corn Creek, and the Colorado River (NDOW 1997), many areas with suitable breeding habitat for flycatchers were not surveyed until the early 2000s. Subsequent surveys have confirmed breeding at Ash Meadows NWR, the Lake Mead Delta, Meadow Valley Wash, the Muddy River, Pahranagat Valley, and the Virgin River. Many of these areas do not supported breeding flycatchers on an annual basis, but sites in the Pahranagat Valley, Muddy River, and Virgin River have remained relatively stable over the last 5 years and have supported more than 95 percent of the breeding pairs of flycatchers in Nevada with approximately 37 percent of these breeding pairs (average of 24 pairs) using sites along the Virgin River and 8 percent (average of 5 pairs) along the Muddy River (SWCA 2008-2012).

The entirety of the Virgin River is considered suitable habitat for foraging and migrating southwestern willow flycatchers. Several sites occur along the Virgin River that provide suitable habitat and are occupied by breeding flycatchers (see SWCA 2010 for maps). Numbers of breeding pairs and nests varies annually but has remained fairly stable over the last 5 years along the Virgin River (Table 13). Three sites comprising approximately 58.3 ac, of which BLM owns and manages 14.0 ac, are located at the City of Mesquite (MESQ). These sites are located in the floodplain of the river and are dominated by a mix of saltcedar and coyote willow (SWCA 2012). Seven sites comprising approximately 567 ac, of which BLM owns and manages 264 ac, are located at Mormon Mesa (MOME). These sites have been heavily influenced by flooding events in the last decade. These sites are dominated by a mix of saltcedar, coyote willow, and some scattered Goodding's willow (SWCA 2012).

Table 13. Number of southwestern willow flycatcher nests and pairs and breeding sites located along the Virgin River (2007- 2011)

YEAR	SITE	NUMBER OF PAIRS	NUMBER OF NESTS
2007	MESQ	13	16
2008	MESQ	11	11
2009	MESQ	12	16
2010	MESQ	7	16
2011	MESQ	7	9
2007	MOME	11	12
2008	MOME	13	14
2009	MOME	13	18
2010	MOME	10	15
2011	MOME	13	20
All associated surveys conducted and reported by SWCA. Not all sites were surveyed in all years.			

Suitable habitat for foraging and migrating southwestern willow flycatchers exists in small patches of riparian habitat along the Muddy River, some of which is owned and managed by BLM. Thorough assessment of these areas has not been completed. The majority of foraging and migratory habitat and suitable breeding and occupied habitat for flycatchers occurs at the headwaters of the Muddy River and its confluence with Lake Mead (see SWCA 2012 for maps). This habitat occurs in Overton Wildlife Management Area and Warm Springs Natural Area, which are owned and managed by NDOW and SNWA, respectively. Additional breeding sites occur in the federally managed Ash Meadows NWR.

BLM will continue fuel treatments along the Virgin River started in 1998 to reduce threats to the communities of Mesquite, Bunkerville and Riverside (previously described in informal consultations 1-5-98-I-316, 1-5-03-I-438, 1-5-03-I-510, and 1-5-03-I-535). The Virgin River riparian corridor has converted to a dense saltcedar stand that contains a large fuel load that, if it ignites, would create a hot fast fire that would threaten adjacent communities. BLM has rehabilitated parcels burned in 1998 and 2003 and treated additional stretches of BLM lands on the river to reduce saltcedar.

The 2005 floods altered the treatment sites and adjacent BLM lands within the floodplain. The floodplain was overwhelmed with flood waters, vegetation on treatment sites and semi-wet and wet terraces were either scoured clear or buried by silt, and the channel moved within the floodplain, creating new sandbars and new dry terraces.

6.4.1.1 Conservation Needs of the Southwestern Willow Flycatcher

In the action area, flycatchers require dense riparian habitat that provides sufficient shelter and food. Nesting flycatchers also require nesting habitat where predators, particularly brown-headed cowbirds, are not common to the extent that nests fail. Nesting habitat should include slow-moving or standing water or saturated soils.

6.5 Yuma Clapper Rail Baseline

Historical distribution and status of the Yuma clapper rail in Nevada is not well known. Alcorn (1988) reported visual detections of up to 8 clapper rails at the Las Vegas Wash on two different dates in 1959. Suitable breeding habitat for clapper rails of the Virgin River, Muddy River, and Las Vegas Wash in Clark County were surveyed starting in 2000, and clapper rails were detected at sites along the Virgin River in Mesquite and Mormon Mesa and along the Muddy River in Overton (McKernan and Braden 2001). Additional surveys in subsequent year have confirmed breeding Yuma clapper rails at Ash Meadows NWR in Nye County and along the Muddy River at Overton Wildlife Management Unit in Clark County. Annual total number of detections per year throughout Nevada is low (less than 10). Nesting rails have not been detected on any lands owned and managed by the BLM.

6.5.1.1 Conservation Needs of the Yuma Clapper Rail

The Yuma clapper rail requires marsh habitat with dense vegetation with mats of decadent vegetation and open stands and open water. Rails require sufficient prey including crayfish and other invertebrates. Habitat with acceptable levels of selenium should also be available to rails in the action area. Rails require area protected from human activities including development, groundwater pumping and diversions; and environmental contaminants that contribute to alteration of river and stream hydrology, water availability, and water table levels.

6.6 Virgin River Chub and Critical Habitat Baseline

BLM administered land adjacent to critical habitat for Virgin River chub and woundfin is within the Virgin River ACEC. The major limiting factors for the Virgin River chub and other native fish species both rangewide and within the action area are modification and loss of habitat and the introduction and establishment of nonnative fish, particularly red shiner. The building of dams and associated reservoirs, water diversion structures, canals, laterals, aqueducts, and dewatering of streams causes loss or degradation of available habitat. The decline in both the species' range and population numbers is due to the physical reduction in available habitats within the various river systems caused by these water projects. This loss of habitat has been exacerbated due to the introduction and establishment of exotic species, further reducing the suitability of remaining habitats for woundfin and Virgin River chub.

Potential threats to the species' survival include further water removal, desalinization, urban growth, sedimentations, pollution, channel alteration, and competition/predation by introduced fishes, especially the red shiner. The threats are magnified by the naturally limited range of this fish and its consequent vulnerability to extensive losses from a single threat.

6.6.1.1 <u>Conservation Needs of the Virgin River Chub</u>

> The most important conservation need for the Virgin River chub is streams and backwaters with sufficient flow and free of nonnative predators such as the red shiner and blue tilapia. The Virgin River chub requires suitable habitat consisting of deep runs or pool habitats of slow to moderate velocities with large boulders or instream cover, such as root snags. Numbers of chub should be sufficient to endure predation by nonnative fish and effects of drought, wildfires, and floods which result in stream sedimentation and reduced dissolved oxygen levels.

6.7 Woundfin and Critical Habitat Baseline

Woundfin abundance has declined significantly due to the introduction of red shiner. Woundfin has virtually been eliminated wherever red shiner became established which includes the action area, Arizona, and Utah. Very few woundfin are found in the reach of the Virgin River in the action area.

The woundfin population numbers that have existed in the action area (Nevada) are largely a result of stocking efforts in Arizona and Nevada since the late 1990s. About 11,200 woundfin were stocked in the Nevada portion of the Virgin River in 1999; 4,500 woundfin stocked in the Nevada portion of the Virgin River in 2000 (Holden and Golden 2000, NDOW 2001); and approximately 5,000 stocked in 2003 in the Beaver Dam reach of the Virgin River. Golden and Holden (2004) sampled these areas from 1996 – 2002 and reported dramatic declines of woundfin and other native species during the drought years of 1999 through 2002. In Nevada, no woundfin were collected by the fall of 2001 and none were collected in 2002, the lowest flow year on record. Albrecht *et al*. (2007) report that woundfin have remained absent in this lowest portion of the Virgin River since that time.

BioWest, Inc. conducted extensive fish monitoring in the Virgin River from 2009 to 2011 (Kegerries R., and B. Albrecht. Lower Virgin River Fish Monitoring 2009-2011: Final Report). In more than 2,350 seine hauls during those years, no woundfin and 187 Virgin River chub were observed in reaches of the Virgin River within Nevada and immediately upstream in Arizona. Only nine chub were captured in reaches entirely within Nevada, the balance being reported in the "Experimental Reach," which has approximately two-thirds of its length in Arizona.

Assuming one-third of the fish observed in the Experimental Reach were actually in Nevada, the total number of Virgin River chub observed in Nevada from 2009 to 2011 was approximately 68 fish. Chubs are usually associated with pool habitats, which are relatively scarce and ephemeral within the constantly shifting Virgin River channel.

In 2012, BioWest observed an increase in native fish throughout the lower Virgin River system, including Nevada. A total of 5 woundfin and 66 Virgin River chub were observed in the Virgin River within Nevada and immediately upstream in Arizona. Using the same conversion assumptions for the reach only partially within Nevada, approximately 3 woundfin and 23 chub were observed within Nevada in early 2012. Only about 6 chub were observed in Nevada in August 2012 and only about 3 chub in September 2012. These numbers are typical for Nevada where there are no woundfin except for a rare few following a large flood or spring run-off, for example, and a very few but consistent chub at any one time, probably traveling downstream from healthier populations upstream in Arizona and/or Utah.

Woundfin do not persist in the presence of red shiner, which are dense in both the Nevada and Arizona sections of the Virgin River, and subsequent surveys in August and September 2012 revealed a single woundfin and no woundfin, respectively, within these states. Chub persisted at a very low level, and are probably largely ephemeral non-reproducing members of the local Virgin River fish community in Nevada. The general situation of few or no listed fish within the Nevada portion of the Virgin River will almost certainly persist until red shiner can be eradicated from these reaches.

6.7.1.1 Conservation Needs of the Woundfin

The most important conservation need for the woundfin is runs and quiet waters adjacent to riffles free of nonnative predators such as the red shiner and blue tilapia. As stated above for the Virgin River chub, woundfin numbers should be sufficient to endure predation by nonnative fish and effects of drought, wildfires, and floods which result in stream sedimentation and reduced dissolved oxygen levels.

6.8 Moapa Dace Baseline

The action area is the entire range of the Moapa dace; therefore, the environmental baseline for the Moapa dace in the action area is the same as the rangewide description above.

6.9 Ash Meadows Species and Critical Habitat Baseline

The action area is the entire range of the Ash Meadows species and critical habitat, therefore the environmental baseline for these species in the action area is the same as the rangewide description above.

Section 7: Effects of the Proposed Action

Refer to Table 2 for listed species and their critical habitat that may be adversely affected by BLM activities by program.

7.1 Desert Tortoise and Critical Habitat Effects

Our estimate of the numbers of desert tortoises and eggs that are likely to occur within the action area and be affected by future projects will be derived from pre-project survey data. We acknowledge, however, that not all individuals killed or injured during project activities will be detected. The inability to detect all tortoises is largely due to the cryptic nature of desert tortoises and their fossorial habits, and limited abundance; and in the case of juveniles and eggs, their small size and location underground that reduce detection probabilities of these life stages. Another confounding factor is that scavengers may locate, consume, or remove carcasses before monitors can locate them.

Measures proposed by BLM to minimize the effects to the desert tortoise are described below. The specific effects minimized by the measures are identified in Appendix D.

7.1.1 Effects of Handling and Moving Desert Tortoises

Desert tortoises in harm's way on projects will be captured and moved to safe areas prior to any ground disturbance. Captive tortoises may be released in the action area as part of a population augmentation project. Although utility-scale solar energy projects are beyond the scope of this consultation, other projects may be proposed to be appended under this PBO that require capture and movement of tortoises beyond their home range. Tortoises moved short distances (*e.g.,* several hundred feet) may return to the point of capture and be in harm's way. Tortoises moved beyond their home ranges are more active and may be injured or killed by other human actions (*e.g.,* struck by vehicle) or stress. Stress associated with artificially increasing the density of tortoises in an area and thereby increasing competition for resources; and disease transmission between and among translocated and resident desert tortoises. Physiological stresses associated with handling and movement or from density-dependent effects could exacerbate this risk if translocated individuals with subclinical upper respiratory tract disease or other diseases present symptoms subsequent to translocation. This potential conversion of translocated desert tortoises from a non-contagious to contagious state may increase the potential for infection in the resident population above pre-translocation levels. To minimize this risk, health assessments may be required on all desert tortoises to be moved beyond their home range prior to being released in accordance with the most recent Service guidance.

Because we cannot reasonably predict if an increase in disease prevalence within a resident desert tortoise population may occur due to translocation, BLM and the project proponent should implement the most recent Service translocation guidance, which includes, but is not limited to, the following measures:

- Use experienced biologists and approved handling techniques;
- do not move or translocate any animal that has clinical signs of disease; and
- monitor translocated, resident, and control individuals to help determine the effects of moving tortoises.

Apart from disease, translocation also affects resident desert tortoises within the area due to local increases in population densities. Desert tortoises from project sites would likely be moved to areas now supporting a resident population, which may result in increased inter-specific encounters and, thereby, an increased potential for spread of disease, potentially reducing the health of the overall population; increased competition for shelter sites and other limited resources; increased competition for forage, especially during drought years; and increased incidence of aggressive interactions between individuals (Saethre *et al*. 2003). To minimize potential density-dependent effects, recipient areas must be sufficiently large to accommodate and maintain the resident and translocated desert tortoises.

Capturing, handling, and moving tortoises may result in accidental death or injury if performed improperly, such as during extreme temperatures, or if individuals void their bladders and are not rehydrated. Averill-Murray (2002) determined desert tortoises that voided their bladders during handling had lower overall survival rates (0.81 to 0.88) than those that did not void (0.96). If multiple desert tortoises are handled by biologists without the use of appropriate protective measures and procedures, such as reused latex gloves, pathogens may be spread among individuals.

Because of the difficulty in locating juvenile desert tortoises and eggs, an unknown number of tortoises and eggs will not be found during clearance surveys and consequently be killed by project activities.

7.1.2 **Effects of Roads on the Desert Tortoise**

The combined environmental effects generated by roads (*e.g.*, thermal, hydrological, pollutants, noise, light, invasive species, human access), referred to as the "road-effect zone," extend outward from approximately 300 to 2,600 ft beyond the road edge. Vehicles on well-maintained and paved roads may travel at excessive speeds, preventing the operator from seeing desert tortoises in time to avoid them. Roads enhance connectivity between rural and heavily populated areas and may facilitate urbanization. Roads may facilitate future development of an area, increasing use of surrounding habitats by humans for hunting, collection, and other recreational activities (Andrews *et al.* 2008).

Slow-moving animals such as the desert tortoise are not capable of crossing roads quickly which further increases their mortality risk associated with roads. These long-lived species likely experience irreparable population impacts when adult females are killed. While urban areas present obvious concerns for road kills, road mortality has been considered the greatest non-natural source of vertebrate mortality in protected areas. The transformation of physical conditions on and adjacent to roads eliminates areas of continuous habitat which simultaneously create long-lasting edge effects (Andrews *et al.* 2008).

The presence of a road poses a substantial risk to tortoises and their habitat and the more roads there are the greater is the proportion of the tortoise population that is under the threat of illegal off-road activity (Boarman 2002a). The effects of roads and highways on animals are not limited to the immediate vicinity of a roadway because road mortality affects dispersing individuals as well as those whose home range includes the road. In addition, introduced predators and invasive plants can migrate outward from roads, affecting native animals in adjacent areas. The total area affected, or the *road-effect zone* can be substantial for species that either travel long distance or are vulnerable to predation by species introduced along road corridors (Boarman and Sazaki 2005). Continued use of existing roads may result in habitat fragmentation; increased opportunities for collection or vandalism; introduction of nonnative plants and animals; injury or mortality as a result of encounters with pets; and illegal release of pet tortoises including exotic species.

Road kills and litter from vehicles and trail users may attract subsidized tortoise predators. Roads are also major attractants for common ravens, which are predators on juvenile tortoises (Knight and Kawashima 1993, Boarman 1993). Ravens, being partly scavengers, are known for cruising road edges in search of road kills (Kristan *et al*. 2004). Census data indicate that desert tortoise numbers decline as vehicle use increases (Bury *et al*. 1977) and that tortoise sign increases with increased distance from roads (Nicholson 1978). Tortoises often use roads which have depressions as drinking sites. Vehicular activity on unpaved roads following rains may preclude tortoises from drinking water, which may be available for only brief periods. Tortoises that move or occur in the paths of vehicles may be killed or injured (Bury and Luckenbach 2002, Nicholson 1978), or collected as pets or food (Berry *et al*. 1996). Other potential effects of activities associated with roads include mortality, injury or harassment of individuals as a result of vehicle encounters including disruption of feeding, breeding and sheltering behavior during road construction; grading, paving, and graveling; and maintenance activities.

Project access roads may be used solely by project vehicles or by both project and public vehicles. While measures imposed on project activities minimize the risk and take of desert tortoises that may occur on roads, such measures do not typically apply towards public users. Effects to desert tortoises on new project access roads or substantial improvements to existing roads that provide public access to previously inaccessible areas are project-related effects. Effects to desert tortoises that result from public activities on existing access roads used by both public and project vehicles are not typically considered project-related effects.

Habitat recovery is slow in the desert. As a result, proliferation of roads and unauthorized off-road vehicle use has left persistent scars in the desert. OHVs remain a major source of desert tortoise habitat degradation that disrupts water balance, thermoregulation and energy requirements of desert tortoises (Service 1994a); reduces availability of food for tortoises (Service 1994a); and increases erosion and changes drainage patterns. (Brooks and Lair 2005).

7.1.3 **Effects of Nonnative Plant Species on the Desert Tortoise**

BLM actions that result in surface disturbance increase the potential introduction and spread of nonnative, potentially invasive plant species into habitats adjacent to the project sites. Project vehicles and equipment may transport nonnative propagules into the project area where they may become established and proliferate. In addition, the introduction of nonnative plant species may lead to increased wildfire risk, which ultimately may result in future habitat losses (Service 2011; Brooks *et al*. 2003) and changes in forage opportunities for desert tortoises. If herbicides are used, tortoises may be directly or indirectly affected.

OHV activity, roads, livestock grazing, agricultural uses, and other activities contribute to the spread of nonnative species (or the displacement of native species) and the direct loss and degradation of habitats (Brooks 1995; Avery 1998). For example, unmanaged livestock grazing, especially where plants are not adapted to large herbivorous mammals or where the nonnative species are less palatable than the natives, can preferentially remove native vegetation, leaving nonnative plants to grow under reduced competition (Wittenberg and Cock 2005).

It is widely known that roadsides are one of the primary pathways for nonnative plant invasions into desert regions (Amor and Stevens 1976 and Brooks and Pyke 2001, cited in Brooks and Berry 2006). Roads facilitate dispersal of plant seeds (Trombulak and Frissell 2000, cited in Brooks and Berry 2006). Four-wheel drive vehicles carry significantly more seeds than two-wheel drive vehicles (Lonsdale and Lane 1994, cited in Brooks and Berry 2006). OHV use tends to be concentrated around dirt roads and other pathways of travel away from roadsides, such as washes and utility ROWs (Matchett *et al*. 2004, cited in Brooks and Berry 2006) which may explain why there are more nonnative plant species near dirt roads. In addition, dirt roads are often associated with elevated levels of livestock grazing and other human-related activities (Service 1994a). Roadsides not only experience high levels of disturbance, but they also have high levels of productivity from rainfall flow off of road surfaces and onto adjacent roadside verges (Johnson *et al.*, 1975 and Starr 2002, cited in Brooks and Berry 2006). Where road densities are high, nonnative plant richness and biomass may increase from the combined effects of high nonnative plant biomass near roads, increased dispersal of seeds along and away from roads by vehicles, decreased distances from roads to other areas of the landscape, and locally high productivity levels along roadsides.

The effects of nonnative plants on desert tortoise behavior are mostly unknown at this time. Dense cover of nonnative grasses may create a movement barrier to small tortoises and reduce the amount of native forage available to small tortoises.

BLM proposed the following conservation measures to address the potential effects from nonnative plant species which include those described previously for habitat effects: Require a weed management plan with monitoring and control components; implement actions to avoid introduction of weed by vehicles and equipment; use low-toxicity herbicides applied in accordance with the plan; use certified weed-free seed mixes of native shrubs, grasses, and forbs of local origin; provide worker awareness training; limit ground disturbance; and expedite reestablishment of native vegetation in disturbed areas to prevent weeds from colonizing newly disturbed areas.

7.1.4 Edge Effects on the Desert Tortoise

Desert tortoises also may be adversely affected by construction noise, ground vibrations, and artificial lighting. Increased noise levels and the presence of full-time facility lighting may affect desert tortoise behavior. While limited data exists on the effect of noise on desert tortoises, Bowles *et al.* (1999) demonstrated that the species has relatively sensitive hearing, but few physiological effects were observed with short-term exposures to jet air craft noise and sonic booms. These results cannot be extrapolated to chronic exposures over the lifetime of an individual or a population. Based on the ability of other species to adapt to noise disturbance, noise attenuation as distance from the project increases, and the fact that desert tortoises do not rely on auditory cues for their survival, we do not expect any desert tortoises to be injured or killed as a result of most project-related noise.

Because few data exist relative to edge effects from noise, light, vibration, and increased dust from project activities, we cannot determine how these potential impacts may affect desert tortoise populations within and adjacent to project areas. Thus, the magnitude and extent of these edge effects cannot be articulated at this time, but conceivably could disturb individual desert tortoises to the extent that they abandon all or a portion of their established home ranges and move elsewhere.

7.1.5 Effects on Desert Tortoise Genetics and Population Connectivity

Genetic variability of the species and sufficient ecological heterogeneity within and among populations must be maintained to ensure desert tortoise recovery (Murphy *et al*. 2007; Hagerty and Tracy 2010). This variation is necessary to allow tortoises to adapt to changes in the environment over time (Service 1994a, 2011). Because desert tortoises occupy large home ranges, the long-term persistence of extensive, unfragmented habitats is essential for the survival of the species (Service 1994a, 2011). The loss or degradation of these habitats to urbanization, habitat conversion from frequent wildfire, or other landscape-modifying activities place the desert tortoise at increased risk of extirpation because the tortoise depends on the cover of shrubs and annuals for forage provided by contiguous native vegetation communities.

Landscape genetic analysis performed by Latch *et al.* (2011) identified both natural (slope) and anthropogenic (roads) landscape variables that significantly influenced desert tortoise gene flow of a local population. Although they found a higher correlation of genetic distance with slope compared to roads, desert tortoise pairs from the same side of a road exhibited significantly less genetic differentiation than tortoise pairs from opposite sides of a road. Some project access roads may decrease population connectivity substantially beyond the existing conditions.

As discussed in the revised recovery plan (Service 2011) and elsewhere, habitat linkages are essential to maintaining rangewide genetic variation (Edwards *et al.* 2004, Segelbacher *et al.* 2010) and the ability to shift distribution in response to environmental stochasticity, such as climate change (Ricketts 2000, Fischer and Lindenmayer 2007, EPA 2009). Natural and anthropomorphic constrictions (*e.g.*, I-15 at the Nevada-California border) can limit gene flow and the ability of desert tortoises to move between larger blocks of suitable habitat and populations. In the action area, existing anthropomorphic constrictions compound effects of natural barriers on desert tortoise population connectivity.

Linkages in the action area are already influenced by existing anthropomorphic constrictions that compound effects of natural barriers on desert tortoise population connectivity. These barriers include: I-15; US Highways 93 and 95; SR 160, 161, 163, 164, 165, and 168; the large-scale desert tortoise translocation site south of SR 161 and the development at Primm, Nevada; the Union-Pacific railroad; numerous utility corridors and transmission lines with associated access roads; and a proposed high-speed train along the I-15 corridor. Some of these facilities function as sources of mortality, thus the combined impacts from the edge effects (*e.g.*, impacts from construction-related noise, light, dust, increased vehicular traffic, and ground vibration), existing obstacles to occupancy and movement, and potential increases in mortality have the potential to exert a significant adverse effect on the connectivity function of this and other areas where occupied and suitable habitats occur in narrow bands surrounded by lower quality habitats. Conserving the smaller-scale, internal redundancy within remaining portions of the habitat linkage is essential. Since redundancy in the linkage network between core populations in this portion of the species' range is extremely limited, maintenance of connectivity along the I-15 corridor at the Nevada-California state line is imperative.

Climate change may exacerbate insufficient connectivity among tortoise populations, given that future temperatures generally are expected to rise; the effects of climate change on rainfall are less predictable at this time (International Panel on Climate Change 2007). A future rise in temperature would increase environmental variability. Because of its habitat requirements and life history traits, the desert tortoise is considered to be highly vulnerable to the effects of climate change (EPA 2009, National Wildlife Federation 2011). The combination of increased environmental variability and decreased genetic variation in desert tortoise populations would lead to a higher likelihood of extirpation in linkage areas due to stochastic factors and human-related activities. Thus, landscape-scale redundancy in core habitat-linkage reserve design is an important principle in conservation strategies for widely distributed species like the desert tortoise (Service 1994a, 2011).

7.1.6 Effects of Subsidized Desert Tortoise Predators

The common raven is a known predator of the desert tortoise. Human activities in desert tortoise habitat potentially subsidize limited resources available for ravens and other desert tortoise predators. Habitat disturbance may remove shrubs and cover for desert tortoises exposing them to avian and other predators. Animals killed by vehicles on roads provide food for desert tortoise predators. Other human sources of desert tortoise predator subsidies include trash and discarded food, ponded water, and raven roosting and nesting sites.

Most raven predation on tortoises appears to occur during the raven breeding season (Boarman 2002b). By one estimate, ravens probably do most (75 percent) of their foraging within 0.25 mi of their nest (Sherman 1993) and raven predation pressure is notably intense near their nests (Kristan and Boarman 2001). Therefore, ravens nesting on transmission towers, where no other nesting substrate exists within 0.5 mi, may significantly reduce juvenile tortoise populations within 0.25 mi of the corridor, but this effect is quite localized.

Natural predation rates may be altered or increased when natural habitats are disturbed or modified and human presence in otherwise remote desert areas increases. During the past few decades, the population of the common raven has increased substantially in the desert southwest, primarily in response to human-provided subsidies of food, water, and nest sites. There is documentation of numerous carcasses of hatchling and juvenile desert tortoises under the nests of common ravens and a reduction in the proportion of hatchling and juvenile desert tortoise at several locations in the Mojave Desert. Human activities that attract common ravens, desert kit foxes, feral dogs, and coyotes by providing resources in the form of food or water that would otherwise be unavailable may substantially increase predation of tortoises in the area (Berry 1986; BLM 1990). Road-kill of wildlife provides additional attractants and subsidies for opportunistic predators and scavengers. The use of water to control dust on construction sites and access roads result in ponding of water would provide a subsidized resource for ravens and other desert tortoise predators.

To avoid and minimize the availability of predator subsidies, BLM proposed measures to control trash and other subsidized resources by (1) requiring transmission line support structures and other facility structures be designed to discourage their use by raptors for perching or nesting (*e.g.*, by use of anti-perching devices) in accordance with the most current Avian Power Line Interaction Committee guidelines, (2) develop and implement a trash abatement program for each project to contain trash and food in closed and secured containers and remove them periodically, (3) prepare and implement a Nuisance Animal and Pest Control Plan to include monitoring ravens and their use of tall structures and other species that are attracted to developed areas, and (4) fence and net evaporation ponds and open water sources to prevent use by ravens and other predators.

7.1.7 Effects of Land, Realty, and Rights-of-way Actions on Listed Species and Desert Tortoise Critical Habitat

Actions under this program result in a wide range and extent of effects to the desert tortoise. Most actions involve vehicles and equipment which is an important threat to the desert tortoise. Tortoises may take shelter under parked vehicles and be killed, injured, or taken by other means when the vehicle is moved. Most project effects resulting in injury of mortality of desert tortoise on previous projects have been associated with vehicle or equipment use and activity.

BLM may authorize actions that result in desert tortoise habitat and tortoises that occur on these lands becoming isolated from adjacent habitat and populations. BLM will coordinate with the Service at the project-level consultation to determine the appropriate measures to minimize effects to the tortoise which may include capturing and relocating the tortoises to secure habitat.

7.1.7.1 Land Disposal

BLM may dispose of up to 5,000 ac of non-critical desert tortoise habitat during the 5-year term of this consultation. BLM does not propose to dispose of any critical habitat or habitat for listed species other than the desert tortoise. Although this PBO evaluates only the effects that may result from the transfer of BLM-administered land out of Federal ownership, we anticipate that the direct and indirect effects to listed species that may occur after transfer would be evaluated under section 10 of the Act. The survey for and removal of desert tortoises under the MSHCP is not a mandatory condition of the associated permit. In some cases, BLM may retain management discretion on the land following disposal to the extent that measures in this consultation may be enforced by BLM and incidental take may be exempted on the land under this PBO. Once BLM relinquishes discretion on the land, incidental take would no longer be exempted under section 7 unless another Federal nexus is established and section 7 consultation is completed. Lands transferred out of Federal administration would likely no longer benefit from conservation mandates of Federal agencies under section 7 of the Act.

The transfer of BLM land out of Federal administration may result in development for commercial purposes, residential housing, local government projects, or other actions. Once lands are transferred out of BLM administration, impacts that result from future non-Federal actions on these lands may be considered as cumulative effects, which are identified in that section of this PBO.

Based on desert tortoise abundance estimates of 8 adult and sub-adult tortoises per mi^2, we anticipate that approximately 38 adult and sub-adult desert tortoises may occur on the 3,000 ac of disposal lands. In addition to sub-adult and adult desert tortoises, the disposal lands likely support juvenile desert tortoises (*i.e*., less than 6.3 in) and eggs. Estimating densities of juvenile desert tortoises is difficult because of low detection probabilities due to their small size and cryptic nature. However, based on a 4-year study of their population ecology, Turner *et al.* (1987) determined that juveniles accounted for 19 to 81 percent of the overall population. Using this range, we estimate that the disposal lands footprint may support 7 to 31 juveniles.

In addition, we expect the project area to support desert tortoise eggs if the disposed lands are cleared during the desert tortoise nesting period, approximately May and June (Turner *et al.* 1984; Wallis et al. 1999). Estimating the number of tortoise eggs is extremely difficult given that the eggs are buried beneath the soil surface and are present only from approximately May through September. To estimate the number of eggs that could be present on site, we used the mean clutch size of 5.38 eggs per clutch (Turner *et al.* 1986) and a mean number of clutches of 1.6 per female per year (Turner *et al.* 1984). Assuming a 1:1 sex ratio (Turner *et al.* 1984; Turner *et al.* 1987), 19 desert tortoises on disposal lands may be reproductive females that together could produce 164 eggs in a given year. Applying these assumptions (*i.e*., the 1:1 sex ratio and all females produce 5.38 eggs in 1.6 clutches) to estimate the number of eggs on the proposed project site has an unknown but high level of uncertainty. Therefore, while we cannot calculate a precise estimate for the number of eggs that may occur on disposal lands, we use this estimate, which constitutes the best available information, assuming surface disturbance occurs during the nesting period.

Desert tortoises from adjacent parcels may move onto areas to be developed if no barrier exists to exclude them from project areas. As development proceeds, public use and impacts in adjacent areas are anticipated to increase. These uses include increases in recreation, vandalism, ravens and dogs, illegal trash dumping, habitat degradation, and illegal collection of desert tortoise.

7.1.7.2 Leases

BLM may issue leases for R&PP actions that may disturb up to 1,000 ac of non-critical desert tortoise habitat and 650 ac of non-critical desert tortoise habitat for airport development. The effects of leases on the desert tortoise are expected to be similar to ROW actions described below. Based on the analysis for land disposals above, we anticipate that approximately 21 adult and sub-adult desert tortoises; 4 to 17 juveniles; and 90 eggs may occur on lands proposed for leases.

7.1.7.3 Pre-project geotechnical ROWs

Pre-project ROWS may disturb up to 5 ac of desert tortoise critical habitat and 100 ac of non-critical desert tortoise habitat during the term of this PBO. In addition to habitat disturbance, desert tortoises may be killed or injured by vehicles and equipment traveling to and from work areas on access roads or by off-road travel. Small tortoises are cryptic and difficult to see and more likely to be killed by project vehicles and equipment. We determined that few tortoises (about two) and eggs occur on the 105 ac that may be disturbed.

7.1.7.4 Linear ROWs

Linear ROWs for infrastructure projects, such as power transmission towers and poles, fences, buildings, and other structures, may provide perching, roosting, and nesting opportunities for ravens and other avian tortoise predators. The presence of transmission towers in areas otherwise devoid of other raven nesting substrates (*e.g.*, Joshua trees, palo verdes, cliffs), may introduce heavy predation to an area previously immune to such predation (Boarman 1993). Project activities may provide food in the form of trash and litter which attracts important tortoise predators such as the common raven, kit fox, and coyote (BLM 1990, Boarman and Berry 1995). The majority of raven predation occurs during the spring and is most likely accomplished by breeding birds (Boarman 2002b). Ravens use transmission towers as well as other anthropogenic structures as nest sites which threaten small tortoises in the area surrounding the nest site (Boarman 2002b). During the raven breeding season, most foraging is probably done near the nest (Sherman 1993) and most food is likely brought back to or near the nest. The effects of subsidized predators on the desert tortoise are further described above in Section 7.1.6.

Tortoises may fall into trenches or other excavations that remain open. The risk to tortoises from open trenches and excavations is proportionate to the level of tortoise activity, length of the trench or excavation, and how long the trench is open and available to tortoises. While continuous or frequent monitoring of trenches and excavations by project biologists and monitors, tortoises may fall into the open areas. Fencing or covering the open areas to prohibit tortoise access is the most effective measure.

The greatest potential threat to desert tortoises resulting from linear ROW and similar actions is from vehicles and heavy equipment activity on new and existing access roads. Project access roads are often required for activities authorized by BLM on ROWs which may use or require upgrades to existing roads or routes; will be temporary or long-term; and may provide public access to areas not previously accessible. ROW roads may provide new access into tortoise habitat for the public resulting in all the effects associated with increased human presence. Any tortoise on an access road during project hours would be highly vulnerable. If vehicles travel at excessive speeds on access roads they may inadvertently run over desert tortoises. Vehicles and equipment may stray from existing roads or designated areas and kill or injure tortoises, or crush their burrows. Roads provide direct invasion routes and habitat generation for invasive weedy plants. Tortoises could also be killed or injured as a result of being crushed by worker vehicles commuting to and from the project area. Tortoises in harm's way and not relocated before project activities commence, or not avoided by vehicles, could also be killed or injured. The effects of roads on the desert tortoise are further described in Section 8.1.2.

Linear ROW action impacts to tortoise populations may affect tortoises at have levels well beyond those of many point sources of impacts (Boarman 2002a). In a retrospective evaluation of results of 234 biological opinions in California and Nevada (LaRue and Dougherty 1999), 80 percent (47/59) of the tortoises reported killed in California and Nevada were killed along utility corridors. Most of those were along the Kern-Mojave Pipeline (Olson *et al*. 1993, Olson 1996). Considerable habitat destruction or alteration occurs when pipelines and transmission lines are constructed and the impacts are repeated as maintenance operations or new pipelines or power lines are placed along existing corridors. Open pipes on the ground available to tortoises may serve as traps for tortoises and other animals (Olson *et al*. 1993).

If not located and removed, tortoises could be killed by development or surface-disturbing activities. Tortoises may be taken by capture and relocated from harm's way. Construction projects would likely kill and injure desert tortoises during activities such as clearing and grubbing of vegetation; trenching activities and entrapment in open trenches and pipes; and collisions with or crushing by vehicles or heavy equipment, including individuals that take shelter under parked vehicles and are killed or injured when vehicles are moved. Additional harassment of tortoises adjacent to the properties may occur as a result of increased levels of noise and ground vibrations produced by blasting, vehicles, and heavy equipment (Bondello 1976; Bondello, *et al*. 1979).

Overall, we expect death and injury of most sub-adult and adult tortoises to be avoided during construction, operation, and maintenance activities through implementation and compliance of minimization measures in this PBO. Measures intended to minimize injury and mortality of desert tortoises include, but are not limited to, avoidance of occupied desert tortoise habitats, use of fencing to exclude desert tortoises from project areas; assignment of an authorized desert tortoise biologist to monitor and oversee project activities and compliance with protective measures; timing of activities to minimize effects to desert tortoises (*e.g.*, conduct activities during the inactive season and when temperatures are above desert tortoise activity thresholds); move or translocate tortoises from harm's way in coordination with BLM and the Service when avoidance is infeasible; worker awareness training; conduct pre-activity surveys to locate desert tortoises on-site; restrict vehicles to access roads with enforceable speed limits; and minimize the risk of entrapment by capping pipes and constructing escape ramps in open excavations.

Failure to report tortoise injuries and mortalities may result in additional take of tortoises if measures are insufficient to address the cause of such take. If BLM is not notified in advance of the project, proper oversight may not occur. If tortoise-proof fencing is installed, over time breaches may occur, thus allowing tortoises to pass through the barrier and be in harm's way. Temporary fencing left in place following the action may contribute towards habitat fragmentation. Materials and trash left behind following a project or action may be ingested by tortoises, entrap or entangle tortoises, attract desert tortoise predators such as common ravens and coyotes, or provide shelter for tortoises which when removed may result in displacement or injury of the tortoise.

Activities in the action area that occur during and immediately after rainfall may result in adverse effects to desert tortoises which may be attracted to roads or project areas to drink or may be disturbed to the extent that they fail to drink thus affecting their survival. During previous projects in the action area, desert tortoises were known to become highly active during spring, summer, and fall precipitation events resulting in tortoise mortalities and many tortoises captured and moved from harm's way. The risk to tortoises in association with precipitation rises substantially during this time.

Linear construction projects can negatively affect desert populations. Studies suggest that differences in the extent of the threat are related to the scale of the project, the ability of crews to avoid disturbing burrows, and timing of construction to avoid peak activity periods of tortoises (Boarman 2002a). In addition to the discrete disturbance points formed by towers and lines, maintenance roads and repeated operations can (1) introduce continuous sources of disturbance and (2) provide potential sites for invasion of nonnative species. ROWs can cause habitat destruction and alteration where vegetation is minimal, possibly increasing mortality, directly or indirectly (Boarman 2002a).

Following construction, the public may use project access roads which may result in adverse effects to tortoise populations. Humans use the desert for off-road exploration, casual shooting and target practice, personal or commercial collection of animals and plants, searches and digging for minerals and gems, geocaching (GPS guided stash hunts), and even the production of illegal drugs. Desert tortoise shells found in the Mojave Desert with bullet holes were examined forensically and it was determined that these tortoises were alive when they were shot (Berry 1986). Project personnel could illegally collect tortoises for pets or bring dogs to the project area.

Based on the analysis above for land disposal actions, we anticipate that approximately 63 adult and sub-adult desert tortoises, 12 to 51 juveniles, and 275 eggs may occur on lands proposed for linear ROWs.

7.1.7.5 Site-type ROWs

BLM may issue site-type ROWs for communication sites or towers, flood-control structures, wells, and other activities with similar effects to the desert tortoise and its critical habitat within the planning area. Communication sites typically affect a 100 ft by 100 ft area and require an access road. Following construction, personnel periodically visit the sites for maintenance at which time, tortoises that occur on the access road are at greatest risk of take due to vehicle activity on the access roads. Most flood-control projects are located in or near urbanized areas such as Las Vegas and Pahrump where tortoise habitat may be degraded to some degree. Tortoises may be affected by well projects or activities by a minor level of disturbance (about 0.5 ac per year based on 2002-2010 data). If cross-country travel is required, tortoises may be crushed aboveground or in their burrows.

BLM estimates that 750 ac of desert tortoise non-critical and 25 ac of desert tortoise critical habitat may be affected by all site-type ROWs under this PBO. Based on the analysis above for land disposal actions, we anticipate that approximately 10 adult and sub-adult desert tortoises, 2 to 8 juveniles, and 43 eggs may occur on lands proposed for site-type ROWs.

7.1.8 Effects of Mining on the Desert Tortoise and its Critical Habitat

The direct effects and many of the indirect effects of mining are similar to those described above for ROW activities. Future oil and gas activity will be managed with no surface occupancy. The current mineral withdrawal for all ACECs within the SNDO jurisdiction went into effect November 2009 for a period of 20 years. The withdrawal would not affect valid, existing claims.

During the term of this PBO, BLM estimates that 100 ac of desert tortoise critical habitat and 500 ac of non-critical habitat may be disturbed for locatable minerals and the same amount of disturbance for saleable mineral. BLM estimates that leasable minerals may disturb 25 ac of critical and 200 ac on non-critical desert tortoise habitat (Table 3).

Based on the analysis above for land disposal actions, we anticipate that approximately 18 adult and sub-adult desert tortoises, 3 to 15 juveniles, and 77 eggs may occur on lands proposed for mining actions.

7.1.9 Effects of Recreation on the Desert Tortoise

7.1.9.1 <u>Speed Events</u>

Studies show that vehicles that stray off existing roads and trails may cause habitat disturbance and collapse occupied burrows – crushing nests and burying the occupants (Burge 1983; Bury 1978 and 1980). Historically, event spectators have been difficult to control at many OHV events which has resulted in substantial environmental and habitat damage (Burge 1983). Vehicles operated by spectators of an organized event, may enter unauthorized areas or travel cross-country to observe a race, causing adverse effects on individual desert tortoises or their habitat (Burge 1983; Woodman 1983). Unauthorized route proliferation, crushing of shrubs, and wind erosion resulting from vehicle disturbance contribute to habitat degradation and loss. NDOW has documented that an unauthorized trail became incorporated into an OHV event course near Johnnie, Nevada (NDOW 2002).

Studies have also shown that in areas of moderate to intensive OHV use, the number of perennial shrubs, as well as desert tortoise reproduction and body mass, are reduced (Biosystems Analysis 1991; Bury and Luckenbach 1986; Bury 1987). In addition, OHV activities reduce floral diversity and forage species availability for desert tortoises (Medica, *et al*. 1976; Webb, *et al.* 1978). Bury (1987) demonstrated that desert tortoise densities and health deteriorated as a result of off-road vehicle activities when contrasted to populations from appropriately controlled areas. Impacts from OHVs to the soils and vegetation of desert ecosystems that support the desert tortoise are well documented and may affect desert tortoise populations and habitat quality over a long period of time. Many of these effects are similar to habitat disturbance associated with activities involving construction (e.g., projects within ROW).

Census data indicate that desert tortoise numbers decline as OHV use increases (Bury, *et al.* 1977), and that desert tortoise sign increases with increased distance from roads (Nicholson 1978). Desert tortoises that move or occur in the paths of recreational vehicles may be killed or injured (Bury 1978; Bury and Luckenbach 1986; Luckenbach 1975; Nicholson, 1978), or collected as pets.

Noise levels produced by OHVs may alter tortoise behavior (potentially affecting foraging and other activities) or cause hearing loss, but these effects are difficult to assess and are not well documented. Noise from OHVs has the potential to disrupt communication and mask the sounds of approaching predators (Service 1994a). Brattstrom and Bondello (1983) stated that the best available scientific data indicate that acoustical impacts of recreation vehicles pose a threat to the well-being of desert vertebrates, and that the problem is not just the abilities of specific sounds to carry into desert regions, but the abilities of specific sound sources to penetrate deep into these regions. Bondello (1976) reported that reptile hearing can be damaged by exposure at close range by impulsive noise from recreation vehicles. More recently, Bowles, *et al*. (1997) found that no significant temporary threshold shift, or temporary change in auditory sensitivity, was detected even in the most acoustically sensitive tortoises after a worst case scenario exposure to subsonic aircraft noise. Some desert tortoises did, however, prove to have relatively sensitive hearing at summer temperatures.

The effects of OHV activity on arid lands continue long after the event if some physical property of the soil is altered. Loosened soils blown off the surface can collect at the bases of shrubs or accumulate in nearby foothills, resulting in small dunes. Finer pulverized soils require lower threshold wind velocities for transportation than coarser pulverized soils having higher fine-clay content. Alluvial fans, bajadas and desert flats with sandy soils, which have very low moisture content and are devoid of vegetation, are most affected by wind erosion following disturbance by OHVs (Gillette and Adams 1983). Recovery of Mojave desert vegetation and soils may require 30 to 100 years or more following OHV activity (Lathrop 1983). Dust may be deposited on vegetation along the course. Gibson, *et al.* (1998) determined that heavy dust does not kill creosote bush; however, net photosynthesis may be reduced and leaf temperature substantially increased. Continued use of existing event courses may preclude natural revegetation of these disturbed areas. Course widening and rut formation are effects documented to occur as a result of previous BLM-permitted OHV events.

Jennings (1993) found that 3 of the 10 most preferred desert tortoise forage plants, *Euphorbia albomarginata*, *Astragalus layneae*, and *Camissonia boothii*, were largely confined to washes. The desert tortoises in this study spent significantly more time traveling and foraging in hills, washes, and washlets than on the flats, the same areas preferred by recreational vehicle users and typically used for OHV events. In the southern, eastern, and northeastern Mojave and the Sonoran deserts, washes are also important in the ecology and behavior of desert tortoises (Woodbury and Hardy 1948; Burge 1978; Baxter 1988). Desert tortoises use the washes for travel, excavation of burrows or dens, and for feeding. Because desert tortoises spend so much more time in washes and hills, they are also more likely to suffer direct mortality from vehicles than if they used the habitat randomly.

While the footprint of race courses are within existing disturbed areas (typically 15-ft wide or 30-ft wide), direct effects to the desert tortoise may still occur as a result of the proposed action. New habitat disturbance beyond existing baseline conditions may occur as a result from uncontrolled actions of race participants that cause their race vehicles to stray off the existing race course, particularly given the high rates of speed in some portions of the course. Desert tortoises and vegetation within their habitat could be crushed or injured/damaged from these actions, and they are most likely to occur on a more frequent basis in portions of the course nearest the center line on either sides of the race course. In addition, desert tortoises and vegetation may also be crushed or injured/damaged when race vehicles stray off the existing race course as a result of maneuvering turns at high rates of speed, losing control of their vehicles, and/or crashing their vehicles. These actions will occur less frequently and would likely result in effects beyond 200 ft from the center line on either side of the race course. Medical response activities and retrieval of out-of-commission vehicles could have similar effects in these areas. It is unknown where along the race course, how frequent, or the level of effect these incursions into open desert tortoise habitat may occur or have, but it is anticipated that it will be a relatively small portion of the undisturbed action area.

Locations of the check points, spectator areas, pit and parking areas, and pre- and post-race activities to prepare and clean up the race course are designated within existing disturbed locations. However, race activities, associated equipment, vehicles and support crews, or spectators and their vehicles may move beyond the boundaries of the designated areas and cause new disturbance by crushing, damaging or trampling vegetation and compacting soil within desert tortoise habitat. Following the race event, spectators and other members of the public may use the race course, designated spectator or pit areas, and access roads which may result in adverse effects to desert tortoise populations and their habitats.

Numerous conservation measures have been proposed by BLM and if implemented appropriately, they should minimize or greatly reduce these potential effects: 1) worker and volunteer environmental awareness program; 2) designated spectator and pit areas with boundary markers; 3) directional signs and volunteers to direct spectators; 4) implementation of preventative measures along race course; 5) authorized biologist and other personnel monitoring pre-race, race day and post-race activities; and 6) race course and designated race areas in previously disturbed locations.

Desert tortoises that are active during the speed event and enter the race course are at high risk for death or injury. Due to high-speed nature of the event, there are few if any measures that could be implemented to locate and move tortoises from harm's way during the event. The most effective measure is time the events to occur when tortoises are least active as proposed by BLM.

Desert tortoises physically moved out of harm's way prior to or during the race to prevent mortality or injury could be inadvertently harmed if not handled properly. Urine and large amounts of urates are frequently voided during handling and may represent a severe water loss, particularly to juveniles (Luckenbach 1982). Overheating can occur if tortoises are not placed in the shade when ambient temperatures equal or exceed temperature maximums for the species. The following measures proposed by BLM should reduce these potential effects to desert tortoises: 1) worker and volunteer environmental awareness program; 2) utilization of Service-approved protocols for handling desert tortoises and excavating burrows; and 3) authorized biologist or other trained personnel to handle desert tortoises.

The resulting indirect impacts to the desert tortoise may include the risk of death, injury, or lower reproductive potential through increased predation and degradation and fragmentation of the habitat surrounding the project area. There is a potential for an increase in the number of predatory and scavenger species due to the presence of humans and improper disposal of trash. Participants, spectators and volunteers associated with the proposed race may provide food in the form of trash and litter; or water, which attracts desert tortoise predators such as the common raven, kit fox, and coyote (BLM 1990; Boarman and Berry 1995). Natural predation in undisturbed, healthy ecosystems is generally not an issue of concern. However, predation rates may be altered when natural habitats are disturbed or modified (BLM 1990). Ravens likely would be attracted to human activities and power lines for perch sites and food sources, increasing the potential for predation on juvenile desert tortoise in adjacent habitats. BLM propose to minimize these impacts by: 1) implementing a litter-control program during and after the event; and 2) providing a worker and volunteer environmental awareness program.

OHV activity may degrade desert tortoise habitat in the surrounding landscape by introducing nonnative weeds or plants into the action area, which later spread into the surrounding desert, increasing fuel loads for wildfires and competing with native forbs, shrubs and other food sources for the desert tortoise. The following measures proposed by BLM should help reduce these potential effects to desert tortoise habitat: 1) minimization of disturbance; 2) wash/steam-clean all equipment and vehicles associated with the event; and 3) restoration or remediation new disturbance.

Hazardous materials associated with OHV activities such as diesel fuel, gasoline, oils, and solvents/chemicals will be used during the proposed race event. There may be incidents of small spills of these materials during the event, leading to isolated areas of contaminated soil and vegetation in desert tortoise habitat. The following measures proposed by BLM should help reduce these potential effects to desert tortoise habitat: 1) pre-race inspection of all vehicles; 2) designated pit areas for refueling or repairs; and 3) containment of spills and proper disposal.

Humans use the desert for other recreational purposes including off-road exploration, casual shooting and target practice, searches and digging for minerals and gems, geocaching (GPS guided stash hunts). Personal or commercial collection of animals and plants may occur in association with recreational uses. Spectators or race participants and support crews could illegally collect desert tortoises or utilize the open desert for various uses after the race event.

7.1.9.2 Non-speed Events

Most effects from non-speed events to the desert tortoise would result from vehicular travel to event or activity sites. The road effects are described above in Section 7.1.2.

7.1.10 Effects of Livestock Grazing on the Desert Tortoise

The full range of grazing effects may never be thoroughly understood and is much more diverse and complex than a simple enumeration of individual impacts (Donahue 1999), or lack thereof. Livestock may trample tortoises, crush their burrows, and reduce the vegetation on which tortoises depend for food, protection from predators, thermoregulation, and intraspecific behavioral interactions. Avery and Neibergs (1997) have observed tortoise burrows that were partially or completely destroyed by cattle trampling. They saw tortoises trying unsuccessfully to enter completely destroyed burrows. Grazing can alter the environment by compacting soils, depositing urine and feces, and trampling vegetation. Once altered, upland vegetation communities appear to change or improve only gradually. When management is directed at improving upland vegetation associations improvements have occurred in as little as 20 years, but areas not receiving much precipitation (*i.e.,* less than 12 inches of annual precipitation) generally have not improved (U.S. Department of Interior 1994). Wagner (1994) observed that natural recovery from grazing in arid and semiarid areas was likely to be especially slow, sometimes requiring a century or more.

Ecological processes may take a long time to express themselves, and many depend on rare or unpredictable events on a particular site which may occur once every 20 years or so. Climate must be recognized as a confounding factor in research on the effects of grazing. Because long-term ecological changes caused by climate may mask or confound impacts due to grazing, research based on short-term studies may not effectively detect such changes or determine their causes (Donahue 1999). Thus, 3-5 year studies are limited in their effectiveness in quantifying changes (Noss and Cooperrider 1994).

Tracy *et al*. (1996) found that in years of very low annual productivity, tortoises lay fewer eggs. They also found that cattle foraging reduced tortoise forage abundance enough to cause tortoises to lay fewer eggs than normal. The conclusion is that, in years of low precipitation, cattle may remove enough forage to reduce tortoise reproductive output, thus competition occurs in those years.

Little is known about the long-term effects of livestock on animals other than ungulates. The desert tortoise is of particular concern. Livestock eat or trample the same plants that tortoises feed upon. One tortoise eats far less plant forage in a year than a cow eats in a single day (Donahue 1999; Noss and Cooperrider 1994). In general, vegetation diversity decreases with grazing intensity, especially under continuous grazing pressure.

Laylock (1994) cites a Nevada study in which 30 years of protection from grazing resulted in increased vegetal cover of all life forms.

Cattle introduce propagules of nonnative plants by bringing seed into an area either on their coats or in feces. Many nonnative plant species have established themselves in part due to environmental modifications by livestock and ranching practices. Although these plants take hold and spread simply because they out-compete native species, more often it is because livestock grazing has changed the environment in ways conducive to nonnatives' establishment and proliferation (Donahue 1999; Noss and Cooperrider 1994). Nonnative plants such as red brome are usually well-adapted to grazing and invade overgrazed sites. Most range managers agree that moderate to heavy grazing over several years will usually change plant composition. Changing the plant species composition can substantially affect both erosion and rainwater infiltration (Noss and Cooperrider 1994).

In a study of 530 different rangeland sites in southern Utah, Gelbard (1999) found that cheatgrass (*Bromus tectorum*) cover was five times greater on sites without cryptobiotic soils (disturbed by either cattle or motorized use) than on sites with undisturbed crusts; 64 percent of all sites that were disturbed and lacking crusts were attributed to cattle grazing. Heavy grazing reduced crusts by 98.5 percent and light grazing reduced crusts by 52.3 percent at the Desert Experimental Range in southern Utah (Marble 1990). Creatgrass and other nonnative annual grasses provide the fine fuels that facilitate wildfires. Nonnative plants such as cheatgrass are usually well-adapted to grazing and invade overgrazed sites. Changing the plant species composition can substantially affect both erosion and infiltration (Noss and Cooperrider 1994).

In the Mojave Desert of Nevada and Arizona, signs of increased soil compaction were evident in grazed areas compared to ungrazed areas between highway and highway ROW fences (Durfee 1988). Avery (1998) measured soil type, bulk density, and infiltration in an exclosure that cattle were excluded from for approximately 12 years and compared them to grazed areas outside the exclosure. Avery demonstrated that soil in heavily trampled areas near water tanks was coarser, had higher bulk density, greater penetration resistance, and lower infiltration rates (all are measures of soil compaction) than in the protected area.

Environmental Impact Statements prepared by BLM between 1978 and 1989 indicate that removal of livestock from hot deserts would result in less soil erosion, increased water infiltration rates, and soils would generally improve. Vegetation would gain health and vigor, and cover would increase (U.S. GAO 1991).

Laylock (1994) cites a Nevada study in which 30 years of protection from grazing resulted in increased vegetation cover of all life forms. Other studies have documented significantly greater native plant species richness in ungrazed areas compared to those that are grazed (Brady *et al*. 1989; Floyd-Hanna *et al*. 2000). Sixteen years following removal of livestock grazing from the Appleton-Whittell Research Ranch Sanctuary in New Mexico resulted in an increase in plant and animal diversity (Brady *et al.* 1989).

Numerous studies document the adverse effects on the cryptobiotic crusts of arid soils as a result of disturbance (Jones 2001, USDI 2001). Removal or damage of the cryptobiotic crusts may have adverse impacts on desert soils and nutrient cycling. Soil and plant characteristics of low-and mid-elevation arid and semi-arid ecosystems in North America west of the Rocky Mountains indicate that these ecosystems evolved with low levels of soil surface disturbance. Neff *et al.* (2005) found that many soils in southeastern Utah are protected from surface disturbance by biological soil crusts that stabilize soils and reduce erosion by wind and water. These cryptobiotic crusts are only prominent components of ecosystems where large-bodied herbivores have been absent from recent evolutionary history such as in the arid west. If grazing leads to disturbance of these soil crusts, regeneration typically requires decades for the recolonization of microbes and hundreds of years for a crust lichen community to form. Neff *et al.* compared never-grazed grassland in Canyonlands National Park with two historically grazed sites with similar geologic, geomorphic, and geochemical characteristics that were grazed from the late 1800s until 1974. Despite almost 30 years without livestock grazing, surface soils in the historically grazed sites have 38–43 percent less silt, as well as 14–51 percent less total elemental soil magnesium, sodium, potassium, and manganese content relative to soils never exposed to livestock disturbances.

Neff *et al.* (2005) also found that grazing may also lead to changes in soil organic matter content including declines of 60–70 percent in surface soil carbon and nitrogen relative to the never-grazed sites. This study further suggests that nutrient loss due to wind erosion of soils should be a consideration for management decisions related to the long-term sustainability of grazing operations in arid environments.

Livestock turned out onto the range during the period of peak growth and nutritional value of forage can have an opportunity to graze the most nutritious forage first, forcing wildlife to forage and survive in a habitat that has been degraded nutritionally. The total biomass present in tortoise habitat may have little relation to the amount of suitable desert tortoise forage available to the tortoise which has an extremely narrow and highly selective diet requirement. Generally, a reduced level of nutritional intake has been shown to affect growth rates in juvenile desert tortoises (Medica *et al*. 1975) and female reproductive output (Turner *et al*. 1986, 1987; Henen 1992). Fencing can prevent livestock from moving to better forage areas, resulting in higher frequencies and intensities of defoliation than would occur otherwise (Donahue 1999).

Hobbs and Huenneke (1992) report that increases in baseline nutrient status such as those resulting from input from livestock feces can exacerbate the likelihood of invasive weedy plants. Deposition of feces and urine by livestock can alter the baseline nutrient status of ecosystems causing nutrient enrichment. For most arid western rangelands which have a naturally low nutrient status, this gradual enrichment is an important problem with important implications for the entire ecosystem. Nutrients are removed from the ecosystem when cattle are taken off the range (Donahue 1999).

Oftedal (2002) suggests that tortoises selectively forage for plants high in protein and water (high PEP index plants) during optimal environmental conditions (*i.e.,* high rainfall years). Although high PEP index plants may only germinate and grow in wet years, such plants can be scarce. Tortoises in the West Mojave have been observed to search out and eat scarce plants high in protein such as *Astragalus*, *Lotus*, and *Camissonia* (Jennings 1993). In Ivanpah Valley, California, livestock outside exclosures removed plants high in protein leaving lower quality forage for tortoises (Avery 1998).

Jones (2000) conducted a quantitative review of the effects of cattle grazing in arid systems on 16 response variables. Eleven of 16 analyses (69 percent) revealed significant detrimental effects of cattle grazing, suggesting that cattle can have a negative impact on arid ecosystems. Soil-related variables were most negatively impacted by grazing (3 of 4 categories tested were significantly impacted).

Winter grazing effects: There is considerable evidence that winter grazing can impact xeric communities. Dormant woody riparian species are known to be especially negatively affected by browsing and trampling (Elmore and Kauffmann 1994). In upland communities, decadent plants with standing dead or dormant growth are unattractive to native herbivores but will be readily eaten by cattle in winter (Ganskopp 1993). The removal of this natural protective barrier can result in heavy grazing of the new growth on the plant by numerous herbivores, which can lead to increased plant mortality (Painter 1995).

In Utah, a study by Rasmussen and Brotherson (1986) compared a winter-grazed site to an ungrazed site between the Paria River and the Arizona state line in southern Utah. The ungrazed site had higher species diversity, significantly greater litter cover, significantly greater shrub cover, significantly greater winterfat (*Krascheninnikovia lanata*) cover, greater coverage of Indian ricegrass (*Achnatherum hymenoides*), and 10 times less Russian thistle (*Salsola kali*) cover than the winter-grazed site. They attributed the lower coverage of Indian ricegrass in the winter-grazed site to the fact that Indian ricegrass actively grows during the late winter months. In addition to impacts to the vegetal communities, Avery and Neibergs (1997) found that cattle grazing during winter may result in destruction of a large percentage of active tortoise burrows.

While considerable literature exists that enumerate the negative effects of grazing on the tortoise, particularly focused on habitat effects, there are no studies to date that quantify effects of grazing on entire populations of tortoises, or that demonstrate the absence or insignificance of such effects. Although this knowledge is critically needed in order to inform management of the desert tortoise and its habitat, collecting such data may take decades.

7.1.11 Effects of Fire Management on the Desert Tortoise

If a wildfire occurs in desert tortoise habitat and requires BLM suppression activities, desert tortoises and their habitat may be affected but if suppression does not occur, the effects of the wildfire may be widespread resulting in devastating effects to localized tortoise populations. Wildfire suppression activities are typically short in duration (less than a week) and effects are localized. Desert tortoises, their nests, and habitat may be crushed by fire suppression vehicles and equipment traveling off-road. Creating fuel breaks may result in a swath of disturbance and create conditions for nonnative plants to establish. If suppression activities are not undertaken by BLM or hindered, the amount of habitat burned and number of tortoises affected by the fire may increase.

7.1.12 Effects of Vegetation and Resource Management on the Desert Tortoise

BLM estimates that a maximum of 25 ac of critical habitat and 50 ac of non-critical habitat may be affected by each of these two programs (Table 3). Overall, the desert tortoise is likely to benefit from activities implemented under this program by restoring the native plant communities, thus improving habitat conditions. Acreage of disturbance that may result from implementation of vegetation management activities is based on BLM's assessment of potential actions during the term of this consultation and effects of previous similar activities.

In addition to habitat impacts, individual desert tortoises could be killed, injured, or harassed by program activities which include:

- encounters with project vehicles and equipment;
- capturing and relocating from harm's way;
- improper handling;
- exposure to herbicides;
- burrows crushed by project vehicles and/or equipment; and
- disruption of behavior including foraging, breeding, and sheltering.

Actions may involve use of heavy equipment, ATVs, or hand-tools and include recontouring, ripping of soil, ground watering, broadcast seeding, use of water trucks for dust abatement, and vegetation planting. The behavior of individual tortoises including foraging, breeding, and sheltering may be temporarily disrupted as a result of project activities. Weeds and invasive nonnative plants may become established as a result of transport into project areas by vehicles and equipment. Animals used by permittees or contractors may also facilitate establishment of weeds and nonnative plants.

Use of vehicles and heavy equipment may increase the risk of injury or mortality of individuals, short-term displacement/noise during the project, short-term loss of vegetation (though unlikely), and temporary ground disturbance. Many potential effects of habitat restoration are the same as, or similar to, other surface-disturbing activities identified below. Activities associated with weed treatments that may affect the desert tortoise include application of herbicides; clearing or cutting vegetation by hand or with machinery; and use of ATVs on disturbed areas for site access. Effects to the desert tortoise include: unintentional removal/destruction of plants used by tortoises for forage or shelter; soil compaction; alteration of local microclimate through vegetation removal; and harassment, injury or mortality of tortoises as a result of vehicle or machinery operation.

Although some adverse effects are anticipated, most effects to the desert tortoise that would occur under these two programs will be beneficial to the species. These effects include long-term improvement of plant species diversity (including food sources); long-term reduction in erosion; long-term increased habitat quality; increased tortoise abundance and distribution through habitat enhancement; decreased potential for future nonnative plant invasions; and decreased wildfire potential.

The desert tortoise may be affected by weed management activities which are approximately the same as those identified above for vegetation management. BLM did not provide an estimate of anticipated disturbance of tortoise habitat that may result from this program due to the uncertainty associated with funding and scope of potential projects. Site-specific effects of weed management activities would be identified when such actions are proposed and developed by appropriate agencies. At that time, BLM will submit the appropriate documents to the Service to append the action to this biological opinion. Any vegetation and weed treatment in desert tortoise habitat will be conducted only after coordination/consultation with the Service.

7.1.13 **Desert Tortoise Habitat Effects including Critical Habitat**

Our analysis of effects to desert tortoise critical habitat follows Service-issued guidance: *Application of the "Destruction or Adverse Modification" Standard under section 7(a)(2) of the Endangered Species Act* issued on December 9, 2004; and *Guidance on Conducting Endangered Species Act section 7 Consultations on the Desert Tortoise and Other Species* issued on February 15, 2005. These guidance documents indicate that critical habitat analyses should focus on the entire critical habitat area designated *unless* the final rule for the designation identifies another basis for the analysis, such as discrete units and/or groups of units that are necessary for different life cycle phases, units representing distinctive habitat characteristics or gene pools, or units fulfilling essential geographic distribution requirements; and that the analysis should focus on the function and conservation role of affected CHU for the species.

The evaluation of actions that may affect critical habitat for desert tortoise should consider the effects of the action on its physical and biological factors, or PCEs. The five PCEs of desert tortoise critical habitat include: (PCE 1) sufficient space to support viable populations within each recovery unit and to provide for movement, dispersal, and gene flow; (PCE 2) sufficient quality and quantity of forage species and the proper soil conditions to provide for the growth of these species; (PCE 3) suitable substrates for burrowing, nesting, and over-wintering; burrows, caliche caves, and other shelter sites; (PCE 4) sufficient vegetation for shelter from temperature extremes and predators; and (PCE 5) habitat protected from disturbance and human-caused mortality.

Direct impacts to desert tortoise critical habitat from implementation of all actions under all programs in this PBO would be no more than 1,605 ac (Table 3) in the Mormon Mesa, Beaver Dam Slope, Gold Butte-Pakoon, and Piute-Eldorado CHUs. Most of this anticipated disturbance (1,000 ac) would result from ROW grants. The number of acres that may be disturbed for each CHU is unknown and will be analyzed when projects are proposed.

Habitat disturbance caused by project vehicles and equipment often result in damage to desert soils which are protected by fragile organic or inorganic crusts. The organic crust can be the result of various microflora such as algae, lichen, and fungi, which form cryptobiotic crusts or macroflora consisting of the remnants of fibrous root material from dead annual plants (Cooke and Warren 1973; Went and Stark 1968). The inorganic crust can be comprised of desert pavement, silt/clay, or chemicals. All of these crusts help prevent erosion, and may increase infiltration and retard evaporation (Epstein *et al.* 1966).

Mechanical disturbance of desert soils may cause: (1) changes in annual and perennial plant production and species composition including introduction of nonnative plants, including noxious weeds, or increases in the area of distribution of weeds; (2) outright soil loss due to increased rates of water and wind erosion; (3) reduced soil moisture; (4) reduced infiltration rates; (5) changes in soil thermal regime; and (6) compaction or an increase in surface strength (Adams, *et al*. 1982; Biosystems 1991; Burge 1983; Bury 1978; Bury and Luckenbach 1983 and 1986; Davidson and Fox 1974; Hinkley *et al*. 1983; Nakata 1983; Vollmer *et al*. 1976; Webb

1983; Wilshire 1977 and 1979; Wilshire and Nakata 1976; Woodman 1983). When the soil surface is exposed by vehicular activity (*e.g.*, OHVs), the thermal insulation provided by the vegetative cover is decreased, which results in increased daytime temperatures. Higher temperatures decrease the soil moisture, which causes soil temperature to increase further because less heat is required to vaporize the water present. Revegetation is inhibited as a result of these processes (Webb *et al*. 1978).

The potential proliferation of nonnative plant species could also contribute to an increase in fire frequency within the action area by providing sufficient fuel to carry fires. Fires in desert tortoise habitat result in loss of habitat by altering of plant composition and structure, and would impact all the PCEs.

The proposed CSI development would impact PCE 4 in the Action Area by reducing vegetation for shelter from temperature extremes and predators. An increase in new sites for perches and nests (e.g., fence posts, power poles and towers, signs, building, bridges) for the common raven would increase mortality of tortoises due to increased foraging advantages for common ravens. Tortoises that use vegetation as shelter within the undisturbed habitat immediately adjacent to the development footprint may find their shelter site inadequate and would be most susceptible to predation by ravens. In addition, ROWs, particularly for linear projects such as transmission and the proposed CSI detention basin within the BLM utility corridor, results in the removal of the vegetative shelter for tortoises and provides a swath of bare ground across the landscape. Desert tortoises that cross, or attempt to cross these areas are highly visible to predators, particularly avian predators such as the common raven or red-tailed hawk.

The numerous fires of 2005 burned approximately 15,559 ac, or 4 percent of the Mormon Mesa CHU. In total, the 2005 fires burned approximately 10 percent of the Northeastern Mojave Recovery Unit. These numbers represent a worst-case scenario: burned acreages are the total area inside fire perimeters, and are not broken out by unburned areas and burn severity class, as this information is currently not available. Although efforts are underway to rehabilitate these burned areas, it is unlikely that areas that were severely burned will return to fully functional desert tortoise habitat for decades. Unburned areas or areas that were not severely burned within and adjacent to fire perimeters may contribute seed and promote recovery of burned areas.

Project Access Effects on the Desert Tortoise

Access to project sites would be identified by BLM and included in the project-level consultation. Access to project work areas outside of the fenced facilities may kill or injure desert tortoises due to construction of new routes or increased use and improvement of existing routes. The primary effect of project access on desert tortoises is the risk of injury or mortality from vehicle strikes. The risk to desert tortoises on access roads is influenced by variables such as speed limits, weather conditions, the nature and condition of the roads, and activity patterns of desert tortoises at the time the roads are in use. Further complicating this risk is use of project roads by the public.

Existing access roads, utility corridors, and other infrastructure may be used to the maximum extent feasible. Because all workers will participate in the proposed worker awareness training, and appropriate signage and speed limits will be posted, workers may be less likely to strike desert tortoises than a casual user. Low speed limits for project vehicles and equipment would allow operators more time to see a desert tortoise in their path or harm's way. Temporary or project-created roads will be closed where appropriate. In addition, clearance surveys and the use of authorized desert tortoise biologists and monitors during construction of the access roads will minimize potential effects to the desert tortoise. Speed limits would minimize the risk to desert tortoises.

Effects of Loss of Desert Tortoise Habitat

BLM determined that all programs except livestock grazing may include projects or activities that may result in disturbance of, or other impacts to desert tortoise critical habitat as identified in Table 3.
Because recovery of vegetation in the desert can take decades or longer, we consider most ground-disturbing impacts to be long-term. Vasek *et al*. (1975) found that in the Mojave Desert transmission line projects resulted in a unvegetated maintenance road, enhanced vegetation along the road edge and between tower sites (often dominated by nonnative species), and reduced vegetation cover under the towers, which recovered significantly but not completely in about 33 years. Webb (2002) determined that absent active restoration following extensive disturbance and compaction in the Mojave Desert, soils in this environment could take between 92 and 124 years to recover. Other studies have shown that recovery of plant cover and biomass in the Mojave Desert could require 50 to 300 years in the absence of restoration efforts (Lovich and Bainbridge 1999). Based on a quantitative review of studies evaluating post-disturbance plant recovery and success in the Mojave and Sonoran deserts, Abella (2010) found that it takes 76 years for full reestablishment of total perennial plant cover and an estimated 215 years for the recovery of species composition typical of undisturbed areas. He also found that a number of variables likely affect vegetation recovery times, including but not limited to climate (*e.g*., precipitation and temperatures), invasion by nonnative plant species, and the magnitude and extent of ongoing disturbance.

Projects that have the ability to retain the native root structure and seeds within the project area would help retain soil stability, minimize soil erosion, and minimize fugitive dust pollution. Retention of native seed and roots within the project site will also facilitate recovery of vegetative cover. Use of native plant species will minimize the need to water the vegetation, because native species are already adapted to the local climate and moisture regime of the area.

Although we do not know precisely where the disturbance identified in Table 3 will occur or within which of the three recovery units the disturbance will occur, the disturbance does not constitute a numerically significant portion of the three affected recovery units; however, we do not have the ability to place a numerical value on edge effects, habitat degradation, impacts to habitat connectivity, and overall fragmentation that the proposed action may cause or that occurs in the recovery units as a whole. As a result, the percentage of habitat within the recovery unit that would be lost underestimates impacts on the desert tortoise, especially in light of existing land uses, changes in species composition and fire regimes due to establishment of nonnative plant species, existing and increasing disease and predation rates, and the expansion of human occupancy in what were once remote desert landscapes. The revised recovery plan (Service

2011) and 5-year review (Service 2010a) provide detailed discussions of these and other past, present, and future threats facing the desert tortoise.

7.2 Southwestern Willow Flycatcher and Critical Habitat Effects

Migrant southwestern willow flycatchers occurrence in the action area is irregular, unpredictable, and of short-duration. Adverse effects to the flycatcher could result from ROW, mining, casual recreation, fire management, vegetation management, and resource management actions in the action area. We anticipate that the BLM strategies for riparian habitat conservation will maintain the conditions that support flycatcher habitat; however, habitat improvement projects may result in short-term adverse effects to the southwestern willow flycatcher and its critical habitat. Critical habitat for the southwestern willow flycatcher occurs within the Virgin River ACEC and is therefore protected from most potential adverse effects that may result from the proposed action.

Flood-control activities may affect nesting riparian habitat by loss of riparian woodlands, stream channelization and stabilization, invasive species encroachment, and habitat fragmentation. Construction of water diversion structures may cause decreases in the water table that would adversely affect flycatcher habitat. Construction of other structures near riparian habitats may produce noise that could affect breeding and nesting behavior.

The Virgin River ACEC was withdrawn from mineral entry but valid existing mining claims may result in effects to individual flycatchers and their habitat. Habitat loss and degradation may result from clearing of vegetation; excavating roads, trenches, and pits; and storing waste. Grubbing of vegetation, recontouring of washes, dredging and filling, and other habitat disturbing activities could result in loss of nesting habitat if riparian vegetation is removed or water levels are significantly altered.

Speed-based OHV activities are not allowed in the Virgin River ACEC. Organized and non-speed activities, mountain bike events, horse endurance rides, and casual recreation may occur in the Virgin River ACEC but are limited to existing roads, trails, and dry washes. Southwestern willow flycatchers may be disturbed by recreation activities depending on seasonal timing of the action. If within or adjacent to riparian habitats, trails could result in increases in human disturbance of birds. Indirect impacts from increased noise and human presence, dispersal of noxious weeds, and dust effects associated with unpaved roads and trails could further reduce habitat quality.

Direct impacts to the southwestern willow flycatcher from fire suppression could result in the incremental long-term disturbance of breeding and foraging habitat and contribute to habitat fragmentation. Direct short-term impacts could include the loss of flycatcher eggs or young if fire suppression activities were to occur during the breeding season. However, potential long-term impacts would be minimized through emergency stabilization and rehabilitation actions following any necessary fire suppression activities.

Prescribed burning may enhance flycatcher habitat over time, particularly if saltcedar is burned and native vegetation is replanted. Prescribed fire may decrease bank stability and lead to increased runoff until native vegetation can become established. Vegetation management or fuels reduction may include the removal of invasive plant species by hand pulling, cutting, or herbicide treatments if approved by BLM and the Service. Vegetation management activities may result in short-term adverse effects to flycatcher critical habitat. BLM proposes to conduct vegetation management activities when flycatchers are not present; therefore, no adverse effects to flycatchers are anticipated. Long-term beneficial effects would include improved ecological health and vegetation resiliency, and a reduction of potential fire events that could affect riparian habitats.

7.3 Yuma Clapper Rail and Critical Habitat Effects

Yuma clapper rails occur in marsh habitats in the action area. Marsh habitat may be affected by BLM actions including issuance of linear ROWs, fire management, vegetation management, and resources management. Actions (or failure to take action) that maintain or increase overgrowth of cattails or other emergent vegetation with increasing accumulation of dead plant material may alter habitat to the extent rail access through vegetation becomes restricted or eliminated. The interior of the patches is usually where nests are built, and if adult birds cannot adequately access the interior of the patch, nests may be built in more exposed and unsafe areas. Similarly, foraging is impeded since the invertebrate prey of the Yuma clapper rail can remain hidden and less available in the dead vegetation mats.

Prescribed burns are intended to improve marsh habitat by removing decadent vegetation but may result in short-term adverse effects to the rail. Individual birds may be disturbed and leave the treatment area. The prescribed burns would not take place during the breeding period of the Yuma clapper rail, therefore nests, eggs, and chicks are not at risk. Adult Yuma clapper rails are flightless during the late summer, and burns would not be planned for that period. Although Yuma clapper rail adults and juveniles would be able to escape once fire was ignited by flying away or moving through the vegetation, there remains the risk of an individual Yuma clapper rail being killed during the course of a prescribed burn in marsh habitat. At least one individual was lost during implementation of a project on the Colorado River in Arizona.

The ROW effects described above for the southwestern willow flycatcher also apply to the Yuma clapper rail. Adverse effects to the rails would also occur if groundwater is withdrawn or local hydrology affected to the extent that marsh habitat is reduced or degraded. Actions that would disrupt natural processes that establish and maintain marsh habitat may adversely affect Yuma clapper rails.

7.4 Virgin River Chub and Woundfin and Critical Habitat Effects

BLM may issue ROWs or conduct fire management actions that result in adverse effects to the Virgin River chub, woundfin, and their critical habitat. Construction and maintenance of ROW projects are unlikely to impact populations of Virgin River chub or woundfin as alignments are generally sited on stable areas outside the active floodplain or along roads and not within the Virgin River floodplain. Where the alignments cross the river, it is unlikely that adverse effects would occur to individual chub or woundfin. Powerline ROWs would likely span the Virgin River and floodplain and would not require access roads through the riparian area. Therefore, no direct adverse effects to these species are anticipated as a result of ROW actions.

Flood-control projects (site-type ROWs) that are proposed within the Virgin River riparian area may alter the stream flow range and regime, change instream habitat, cause a reduction in stream heterogeneity, lead to a change in water temperatures, or lead to an increase in sediment load with a reduction in natural organic input. Water quality may be reduced by the introduction of pollutants and run-off associated with construction and operation of flood-control projects. Altered stream habitats have the tendency to favor populations of nonnative fishes which further threaten native fish populations (Moyle 2002).

Prescribed fire, fuels reduction, and fire suppression activities may adversely affect chub or woundfin habitat by increasing runoff and sediment loads that may enter aquatic systems or decrease bank stability. Direct take of fish could occur during water extraction, by uptake through hoses into storage tanks in the fire suppression aircraft. Water extraction and transport equipment used to suppress wildfire could introduce nonnative fish or invertebrate species; however, BLM's best management practices will be used to decrease or eliminate this risk.

7.5 Moapa Dace Effects

The Moapa dace may be adversely affected by ROWs, mining, or fire management actions if groundwater is withdrawn from the California Wash or Coyote Spring Valley hydrographic basins as a direct or indirect result of these actions. The effects of the proposed groundwater pumping on the Moapa dace were previously analyzed in a 2006 Intra-Service PBO described in Section 5.10. Because the interconnections among adjacent hydrographic basins are not fully understood in combination with uncertainty regarding future water use, adverse effects may occur to the Moapa dace as a result of BLM actions. The Service anticipates future BLM actions involving groundwater use from either of these basins will be evaluated and appended to this PBO and tiered to the 2006 PBO for the MOA, as appropriate. The use of water for future BLM actions will become part of the environmental baseline for the Moapa dace.

7.6 Ash Meadows Species and Critical Habitat Effects

BLM may issue ROWs that may impact individual plants and disturb critical habitat for the spring-loving centaury, Ash Meadows gumplant, or Ash Meadows niterwort. BLM proposes to issue no more than one ROW during the term of this PBO that would impact any population of listed plant. Listed plant habitat on BLM land is managed as avoidance areas not exclusion areas. If impacts cannot be avoided, effects to the species may occur.

The listed aquatic species are dependent on surface water provided by the Amargosa Desert groundwater basin; and the listed plants need water within 20 inches of their root system (BioWest 2010). Therefore, the groundwater declines that have occurred due to groundwater pumping in the past have adversely affected these species and are likely to continue to affect these species. Small declines in spring discharge, changes in water temperature, and adjustments in soil or water chemistry resulting from groundwater withdrawals in the basin may affect species inhabiting waters in spring pools and wetland systems in the Ash Meadows area. Withdrawals from groundwater or surface water sources may alter hydrological regimes and reduce the amount of surface water available to the species, resulting in adverse effects on Ash Meadows species and their critical habitat. Hydrological dynamics within wetland and riparian areas may also be affected, thereby potentially affecting the aquatic and terrestrial plant and animal species that utilize these resources. Individual organisms may die and local populations may become extirpated if water resources are reduced.

Critical habitat may be lost or degraded, potentially resulting in loss of PCEs of critical habitat. The PCEs potentially affected include saltgrass meadows alongside streams and pools, saline seeps, moist to wet clay soils along streams or in seeps, and spring outflows. The primary threat to the critical habitat and PCEs is lowered groundwater elevation due to groundwater pumping in support of ROWs or mining projects.

Small declines in spring discharge, changes in water temperature, drying of soils, and adjustments in soil or water chemistry resulting from groundwater withdrawals in the basin may affect all groundwater-dependent species and their critical habitat. A thorough project-level analysis would be required to provide more information on the effects of changes in spring discharge, groundwater levels, water temperature, and water and soil chemistry to Ash Meadows listed species.

The Amargosa Desert Hydrographic Basin is currently over-appropriated. The hydrologic impacts to Ash Meadows aquatic resources from future actions that require groundwater are uncertain, but fluctuations in water levels in the Amargosa Desert Hydrographic Basin have been tied directly to groundwater pumping (Bedinger and Harrill 2006). Groundwater pumping associated with future the actions is indirect and interrelated. Withdrawals from groundwater or surface water sources may alter hydrological regimes and reduce the amount of water available to the species, resulting in adverse effects on Ash Meadows species identified in this biological opinion. Hydrological dynamics within wetland and riparian areas may also be affected, thereby potentially affecting the aquatic and terrestrial plant and animal species that utilize these resources. Individual organisms may die and local populations may become extirpated if water resources are reduced.

The groundwater declines that have occurred due to groundwater pumping in the past have adversely affected these species and are likely to continue to affect these species. The Ash Meadows plant species are adapted to the wetter environments of the AMNWR.
Small declines in spring discharge, changes in water temperature, drying of soils, and adjustments in soil or water chemistry resulting from the project's groundwater withdrawals in the basin may affect all groundwater-dependent species and their critical habitat. A thorough project-level analysis would be required to provide more information on the effects of changes in spring discharge, groundwater levels, water temperature, and water and soil chemistry to Ash Meadows listed species.

Section 8: Cumulative Effects

Cumulative effects are those effects of future non-Federal (state, tribal, local government, or private) activities that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Projects that may result in adverse effects to the desert tortoise on private (non-Federal) land are anticipated to fall under purview of existing HCPs and associated incidental take permit. At this time, no HCP is in place for the action area to exempt take of other listed species affected by the proposed action.

Increased development not subject to section 7 may cause habitat loss, degradation, and fragmentation of desert tortoise habitat, as well as increased adverse effects to individual desert tortoises, contributing to the cumulative effects to the species.

Groundwater use will continue and may result in adverse effects to groundwater-dependent species as described above.

Section 9: Conclusion

After reviewing the status, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the desert tortoise, southwestern willow flycatcher, Yuma clapper rail, Virgin River chub, woundfin, Moapa dace, spring-loving centaury, Ash Meadows sunray, Ash Meadows milkvetch, Ash Meadows ivesia, Ash Meadows gumplant, Amargosa niterwort, Ash Meadows naucorid, Ash Meadows Amargosa pupfish, Ash Meadows speckled dace, or Warm Springs pupfish.

We have determined that the proposed action is not likely to destroy or adversely modify designated critical habitat for the desert tortoise, southwestern willow flycatcher, Yuma clapper rail, Virgin River chub, woundfin, spring-loving centaury, Ash Meadows sunray, Ash Meadows milkvetch, Ash Meadows ivesia, Ash Meadows gumplant, Ash Meadows naucorid, Ash Meadows Amargosa pupfish, or Ash Meadows speckled dace.

We have reached this conclusion because:

- Impacts to desert tortoises and groundwater dependent species will be minimized or avoided through implementation of measures intended to minimize the potential adverse effects to these species.

- BLM will avoid breeding areas and seasons for the southwestern willow flycatcher and Yuma clapper rails (except wildfire suppression activities).
- To minimize impacts to groundwater dependent species, BLM will require applicants to implement conservation measures, including purchase and relinquishment of groundwater rights to offset the effects of groundwater withdrawal and avoidance of siting points of groundwater withdrawal closer to species occurrences and (or) increased pumping in areas with a significant potential to affect habitat for those species.

Section 10: INCIDENTAL TAKE STATEMENT

Each BLM action that may result in incidental take must have an incidental take statement, whether the action is preparing planning documents for future projects or the implementation of specific activities under the plan. The take anticipated as a result of a specific action would be a subset of the programmatic incidental take statement. Though the intent in the appended programmatic approach is for the programmatic incidental take statement to contain all necessary reasonable and prudent measures and associated terms and conditions, due to the lack of available information regarding the specifics of individual projects, it may be necessary to develop project-specific reasonable and prudent measures and terms and conditions to ensure the minimization of the impacts of the incidental take associated with the specifics of each individual project. However, if this is the case, the Service would carefully consider whether the individual proposed project is beyond the scope of the programmatic consultation.

Section 9 of the Act, as amended, prohibits take (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species of fish or wildlife without a special exemption. "Harm" is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering (50 CFR § 17.3). "Harass" is defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering (50 CFR § 17.3). Incidental take is any take of listed animal species that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant. Under the terms of sections 7(b)(4) and 7(o)(2) of the Act, taking that is incidental to, and not intended as part of the agency action, is not considered a prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The Service hereby incorporates by reference the conservation measures proposed by BLM from the *Description of the Proposed Action* into this incidental take statement as part of these terms and conditions to be applied to ongoing actions for which incidental take of desert tortoise is exempted. The terms and conditions below and any additional measures proposed by BLM or included by the Service may be applied to future actions appended to this biological opinion. Where action-specific terms and conditions (*i.e.*, terms and conditions developed for each action to be appended and covered under this programmatic opinion in the future) vary from or contradict the minimization measures proposed under the *Description of the Proposed Action* or general terms and conditions below, the action-specific terms and conditions shall apply. The measures described below are general in nature and may or may not apply to future actions proposed for appendage to this PBO. Terms and conditions are nondiscretionary and must be implemented by BLM so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, in order for the exemption in section 7(o)(2) to apply.

BLM has a continuing duty to regulate the activity that is covered by this incidental take statement as long as the affected area is retained in Federal ownership and/or control. If BLM (1) fails to require the project proponent to adhere to the action-specific terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, and/or (2) fails to retain oversight to ensure compliance with action-specific terms and conditions, the protective coverage of section 7(o)(2) may lapse.

10.1 **Amount or Extent of Take Anticipated- Desert Tortoise**

Based on the analysis of the proposed action, effects provided above, and measures proposed by BLM, the Service anticipates that the take of desert tortoise identified in Table 14 below could occur as a result of projects and actions that may be authorized, carried out, or funded by the BLM without the requirement to append the action to this PBO (*i.e.,* actions that result in total disturbance of 20 ac desert tortoise habitat or 5 ac desert tortoise critical habitat).

In the absence of site-specific surveys, our incidental take exemption was primarily based on the 2010 population density estimate for the Northeastern Mojave Recovery Unit. The 2010 data estimates eight adult/sub-adult and four juveniles (19 to 81 percent the number of adults) desert tortoises occur per mi^2 in the action area. Should the extent of habitat disturbance exceed the level identified in our effects analysis or the number of desert tortoises taken as stated below is exceeded, reinitiation of consultation would be required (see Reinitiation Requirement).

As indicated below, the incidental take anticipated for livestock grazing is unknown. While it is likely that desert tortoises may be crushed aboveground or in their burrows by livestock, these takes will not likely be discovered or included in the annual consultation reports. Most effects to the desert tortoise from livestock grazing are habitat effects which may result in harm to tortoises at the landscape level. Essentially, most or all tortoises whose home range overlap actively grazed allotments may be affected by the long-term grazing of livestock to some degree including death. BLM and the Service will use rangeland monitoring data to assess desert tortoise habitat effects which in turn will serve as a surrogate for incidental take. Similarly, we have no estimate for take as a result of casual recreation which is nearly impossible to quantify accurately.

The number of desert tortoise eggs taken as a result of the proposed action is unknown. In the effects analysis, we used the best available information to estimate the number of eggs that may be present if surface disturbance occurs during the tortoise nesting season (approximately May through September). We exempt the incidental take of all eggs within the parameters of Table 14 which is mostly based on the number of acres disturbed as a surrogate for our estimate for take of tortoise eggs; if the anticipated acreage of disturbance is exceeded, so is the number of eggs taken.

10.2 **Effect of Take**

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the Mojave desert tortoise. This determination is based in part on the implementation of conservation measures detailed in this PBO and BA provided by BLM with their request for consultation and subsequent discussions during the consultation period.

Table 14. Programmatic-level incidental take exemption for desert tortoise

Program/activity	**Non-injury or non-mortality estimate (excluding harm)**		**Injury or Mortality**
	Adults/ sub-adults	Juveniles (<100 mm)	All size classes unless specified
1. Lands and Realty			
• Land disposal (with BLM discretion)	10	5	2
• R&PP leases	21	10	2
• Airport leases	8	4	2
• Other FLPMA (non-ROW) actions	1	1	0
2. Rights-of-way			
• Pre-project geotechnical	2	1	1 (<100 mm)
• Linear ROWs	63	31	4
• Site-type ROWs	10	5	2
3. Mining			
• Locatable	9	5	1
• Leasable	1	1	0
• Saleable	9	5	1
4. Recreation Management			
• Speed events (pit, spectator areas, and new courses)	5 per event; 50 total during term of PBO (any size class desert tortoise)		No more than1 per event and 4 total (any size class) during term of PBO
• Non-speed events and trails	1	1	2 (<100 mm)
• Casual, non-permitted	unknown	unknown	unknown
5. Livestock Grazing	unknown	unknown	unknown
6. Fire Management	13	6	1
7. Vegetation Management	1	1	1 (<100 mm)
8. Resource Management	1	1	1 (<100 mm)
MAXIMUM TAKE EXEMPTION	**200 + unknown no. for casual recreation and grazing**	**77 + unknown no. for casual recreation and grazing**	**24 + unknown no. for casual recreation and grazing**

10.3 Reasonable and Prudent Measures with Terms and Conditions

The Service believes that the following reasonable and prudent measures (RPMs) and associated terms and conditions are necessary and appropriate to minimize take of desert tortoise. The measures below must be implemented to ensure incidental take exemptions apply but do not limit BLM from imposing additional measures, as appropriate. Because actions are expected to proceed that do not exceed the acreage thresholds or require further consultation with the

Service, we expect BLM to require all protective measures for proposed actions, which may include measures not identified below.

RPM 1: Applies towards lands and realty, ROWs, and mining actions and other activities that involve vehicle and equipment use, excavations, or blasting. *BLM, and other jurisdictional Federal agencies as appropriate, shall implement or ensure implementation of measures to minimize injury or mortality of desert tortoises due to project construction, operation and maintenance; and most actions involving habitat disturbance.*

Terms and Conditions:

1.a. *Field Contact Representative*—BLM shall ensure a Field Contact Representative (FCR) (also called a Compliance Inspection Contractor) is generally designated for each contiguous stretch of construction activity for linear projects or isolated work areas for non-linear projects. The FCR will serve as an agent of BLM and the Service to ensure that all instances of non-compliance or incidental take are reported. BLM has discretion over approval of potential FCRs; however, those who also may be acting as authorized desert tortoise biologists, and must also be approved by the Service (see Term and Condition 1.c). All FCRs will report **directly** to BLM and the Service.

The FCR, authorized desert tortoise biologist, and monitors (see Term and Condition 1.c.) shall have a copy of all stipulations when work is being conducted on the site and will be responsible for overseeing compliance with terms and conditions of the ROW grant, including those for listed species. BLM shall ensure the FCR and authorized desert tortoise biologists have authority to halt any activity that is in violation of the stipulations. The FCR shall be on site year-round during all project activities.

Within 3 days of employment or assignment, the project proponent and BLM shall provide the Service with the names of the FCR.

1.b. *Authorized desert tortoise biologist*—All authorized desert tortoise biologists (and monitors) are agents of BLM and the Service and shall report directed to BLM and the proponent concurrently regarding all compliance issues and take of desert tortoises; this includes all draft and final reports of non-compliance or take. The initial draft report shall be provided to BLM and Service within 24 hours of the observation of take or non-compliance.

An authorized desert tortoise biologist will be assigned to each piece/group of large equipment engaged in activities that may result in take of desert tortoise (*e.g.*, clearing, blasting, grading, lowering in pipe, hydrostatic testing, backfilling, recontouring, and reclamation activities) and other work areas that pose a risk to tortoises. BLM may use their discretion to require a monitor instead of an authorized desert tortoise biologist to monitor equipment that is low risk to tortoises.

Authorized desert tortoise biologists, monitors, and the FCR (see Term and Condition 1.a.) shall be responsible for ensuring compliance with all conservation measures for the project. This responsibility includes: (1) enforcing the litter-control program; (2) ensuring that desert tortoise habitat disturbance is restricted to authorized areas; (3) ensuring that all equipment and materials are stored within the boundaries of the construction zone or within the boundaries of previously-disturbed areas or designated areas; (4) ensuring that all vehicles associated with construction activities remain within the proposed construction zones; (5) ensuring that no tortoises are underneath project vehicles and equipment prior to use or movement; (6) ensuring that all monitors (including the authorized desert tortoise biologist) have a copy of the required measures in their possession, have read them, and they are readily available to the monitor when on the project site.

An authorized desert tortoise biologist will serve as a mentor to train desert tortoise monitors and will approve monitors if required. An authorized desert tortoise biologist is responsible for errors committed by desert tortoise monitors.

An authorized desert tortoise biologist shall record each observation of desert tortoise handled in the tortoise monitoring reports. Information will include the following: location (GPS), date and time of observation, whether the desert tortoise was handled, general health and whether it voided its bladder, location desert tortoise was moved from and location moved to, unique physical characteristics of each tortoise, and effectiveness and compliance with the desert tortoise protection measures. This information will be provided **directly** to BLM and the Service.

Potential authorized desert tortoise biologists must submit their statement of qualifications to the Service's Nevada Fish and Wildlife Office in Las Vegas for approval, allowing a minimum of 30 days for Service response. The statement form is available on the internet at: *http://www.fws.gov/nevada/desert_tortoise/auth_dt_form.htm*.

Prior to final approval to begin work on the project, the authorized desert tortoise biologists will have read the required measures (terms and conditions and other stipulations) and have a copy of the measures available at all times while on the project site. BLM shall provide the appropriate agency contact for the project to the Service and the Service will include the forms with approval letters. Biologists and monitors should be visibly identifiable on the project site, which may include use of a uniquely designated hardhat or safety vest color.

1.d. *Desert tortoise monitor*—Desert tortoise monitors assist an authorized desert tortoise biologist during surveys and serve as apprentices to acquire experience. Desert tortoise monitors ensure proper implementation of protective measures, and record and report desert tortoises and sign observations in accordance with Term and Condition 1.c. They will report incidents of noncompliance to the authorized desert tortoise biologist or FCR. No monitors shall be on the project site unless supervised by an authorized desert tortoise biologist or approved by the BLM.

If a desert tortoise is immediately in harm's way (*e.g.*, certain to immediately be crushed by equipment), desert tortoise monitors may move the desert tortoise then place it in a designated safe area until an authorized desert tortoise biologist assumes care of the animal.

Desert tortoise monitors may not conduct field or clearance surveys or other specialized duties of an authorized desert tortoise biologist unless directly supervised by an authorized desert tortoise biologist or approved to do so by the Service; "directly supervised" means an authorized desert tortoise biologist has direct sight and voice contact with the desert tortoise monitor (*i.e.,* within approximately 200 ft of each other).

Within 3 days of employment or assignment, the project proponent and BLM shall provide the Service with the names of desert tortoise monitors who would assist an authorized desert tortoise biologist.

1.e. *Desert tortoise education program*—A desert tortoise education program shall be presented to all personnel on site during construction activities by an agency or authorized desert tortoise biologist. The Service, BLM, and appropriate state agencies shall approve the program. At a minimum, the program shall cover desert-specific Leave-No-Trace guidelines, the distribution of desert tortoises, general behavior and ecology of this species, sensitivity to human activities, threats including introduction of exotic plants and animals, legal protection, penalties for violation of State and Federal laws, reporting requirements, and project measures in this biological opinion. All field workers shall be instructed that activities must be confined to locations within the approved areas and their obligation to walk around and check underneath and vehicles and equipment before moving them (or be cleared by an authorized desert tortoise biologist). In addition, the program shall include fire prevention measures to be implemented by employees during project activities. The program shall instruct participants to report all observations of desert tortoise and their sign during construction activities to the FCR and authorized desert tortoise biologist.

1.f. *Vehicle travel*— Project personnel shall exercise vigilance when commuting to the project area to minimize risk for inadvertent injury or mortality of all wildlife species encountered on paved and unpaved roads leading to and from the project site. Speed limits will be clearly marked, and all workers will be made aware of these limits. On-site, personnel shall carpool to the greatest extent possible.

During the desert tortoise less-active season (generally November through February), vehicle speed on project-related access roads and in the work area will not exceed 25 mph. All vehicles and construction equipment will be tightly grouped.

During the more-active season (generally March through October), and if temperatures are above 60 but below 95 °F for more than 7 consecutive days, vehicle speed on project-related access roads and in the work area will not exceed 15 mph. All vehicles and construction equipment will operate in groups of no more than three vehicles. An authorized desert tortoise biologist and desert tortoise monitor will escort or clear ahead of vehicles and equipment for ROW travel. The escort will be on foot and clear the area of tortoises in front of each traveling construction equipment group (see *Desert tortoise clearance*). The escort will use a recreational vehicle with ground visibility (*e.g.*, UTV); however, at least one authorized desert tortoise biologist and one desert tortoise monitor must ride together and survey both sides of the vehicle. The speed/pace will be determined by an authorized desert tortoise biologist and shall be slow enough to ensure adequate inspection.

New access and spur road locations will be sited to avoid potentially active tortoise burrows to the maximum extent practicable.

1.g. *Unauthorized access*—BLM shall ensure that unauthorized personnel, including the public and off-duty project personnel, do not travel on project-related temporary access roads, to the greatest extent practicable.

During the more-active season (generally March through October), and if temperatures are above 60 but below 95 °F for more than 7 consecutive days, project- and non-project-related activities on all access roads that intersect the ROW will be monitored and logged. During construction, the ROW will be fenced at public roads that intersect the ROW. Signs will say that access on the ROW is strictly prohibited except by authorized personnel and that violators will be prosecuted.

1.h. *Desert tortoise clearance*—Prior to surface-disturbing activities, authorized desert tortoise biologists potentially assisted by desert tortoise monitors, shall conduct a clearance survey to locate and remove all desert tortoises from harm's way including areas to be disturbed using techniques that provide full coverage of all areas (Service 2009). During the more-active season, clearance surveys will be conducted either the day prior to, or the day of, any surface-disturbing activity. During the less-active season, clearance surveys will be conducted within 7 days prior to any surface-disturbing activity. No surface-disturbing activities shall begin until two consecutive surveys yield no individuals.

An authorized biologist shall excavate all burrows that have characteristics of potentially containing desert tortoises in the area to be disturbed with the goal of locating and removing all desert tortoises and desert tortoise eggs. During clearance surveys, all handling of desert tortoises and their eggs and excavation of burrows shall be conducted solely by an authorized desert tortoise biologist in accordance with the most current Service-approved guidance (currently Service 2009). If any tortoise active nests are encountered, the Service must be contacted immediately, prior to removal of any tortoises or eggs from those burrows, to determine the most appropriate course of action. Unoccupied burrows shall be collapsed or blocked to prevent desert tortoise entry. Outside construction work areas, all potential desert tortoise burrows and pallets within 50 ft of the edge of the construction work area shall be flagged. If the burrow is occupied by a desert tortoise during the less-active season, the tortoise shall be temporarily penned (see Term and Condition 1.k.). No stakes or flagging shall be placed on the berm or in the opening of a desert tortoise burrow. Desert tortoise burrows shall not be marked in a manner that facilitates poaching. Avoidance flagging shall be designed to be easily distinguished from access route or other flagging, and shall be designed in consultation with experienced construction personnel and authorized biologists. All flagging shall be removed following construction activities.

An authorized desert tortoise biologist will inspect areas to be backfilled immediately prior to backfilling.

1.i. *Desert tortoise in harm's way*—Any project-related activity that may endanger a desert tortoise shall cease if a desert tortoise is found on the project site. Project activities may resume after an authorized desert tortoise biologist or desert tortoise monitor (see restrictions in Term and Condition 1.d.) removes the desert tortoise from danger or after the desert tortoise has moved to a safe area on its own.

During the more-active season and if temperatures are above 60 but below 95 °F for more than 7 consecutive days, at least 1 monitor shall be assigned to observe spoil piles prior to excavation and covering.

1.j. *Handling of desert tortoises*—Desert tortoises shall only be moved by an authorized desert tortoise biologist or desert tortoise monitor (see restrictions in Term and Condition 1.d.) solely for the purpose of moving the tortoises out of harm's way. During construction, operation, and maintenance, an authorized desert tortoise biologist shall pen, capture, handle, and relocate desert tortoises from harm's way as appropriate and in accordance with the most current Service-approved guidance. No tortoise shall be handled by more than one person. Each tortoise handled will be given a unique number, photographed, and the biologist will record all relevant data on the Desert Tortoise Handling and Take Report (Appendix E) to be provided to BLM in accordance with the project reporting requirements.

Desert tortoises that occur aboveground and need to be moved from harm's way shall be placed in the shade of a shrub, 150 to 1,640 ft from the point of encounter. In situations where desert tortoises must be moved more than 1,640 ft (500 m), translocation procedures may be required. Translocation would likely result in a level of effect to the desert tortoise that would require the appended procedures.

If desert tortoises need to be moved at a time of day when ambient temperatures could harm them (less than 40 ° F or greater than 95° F), they shall be held overnight in a clean cardboard box. These desert tortoises shall be kept in the care of an authorized biologist under appropriate controlled temperatures and released the following day when temperatures are favorable. All cardboard boxes shall be discarded after one use and never hold more than one tortoise. If any tortoise active nests are encountered, the Service must be contacted immediately, prior to removal of any tortoises or eggs from those burrows, to determine the most appropriate course of action.

Desert tortoises located in the project area sheltering in a burrow during the less-active season may be temporarily penned in accordance with Term and Condition 1.k. at the discretion of an authorized desert tortoise biologist. Desert tortoises should not be penned in areas of moderate to heavy public use, rather they should be moved from harm's way in accordance with the most current Service-approved guidance (currently Service 2009).

Desert tortoises shall be handled in accordance with the Desert Tortoise Field Manual (Service 2009). Equipment or materials that contact desert tortoises (including shirts and pants) shall be sterilized, disposed of, or changed before contacting another tortoise to prevent the spread of disease. All tortoises shall be handled using disposable surgical gloves and the gloves shall be disposed of after handling each tortoise. An authorized desert tortoise biologist shall document each tortoise handling by completing the Desert Tortoise Handling and Take Report (Appendix E).

1.k. *Penning*—Penning shall be accomplished by installing a circular fence, approximately 20 ft in diameter to enclose and surround the tortoise burrow. The pen should be constructed with 1-inch horizontal by 2-in vertical, galvanized welded wire. Steel T-posts or rebar should be placed every 5 to 6 ft to support the pen material. Pen material will extend 18 to 24 in aboveground. The bottom of the enclosure will be buried 6 to 12 in or bent towards the burrow, have soil mounded along the base, and other measures implemented to ensure zero ground clearance. Care shall be taken to minimize visibility of the pen by the public. An authorized desert tortoise biologist or desert tortoise monitor shall check the pen at a frequency to ensure that the desert tortoise is secure and not stressed. No desert tortoise shall be penned for more than 48 hours without written approval by the Service. Because this is a new technique, all instances of penning or issues associated with penning shall be reported to the Service within 3 days (see Appendix E).

1.l. *Temporary tortoise-proof fencing*—All construction areas, including open pipeline trenches, hydrostatic testing locations, and tie-in work shall be fenced with temporary tortoise-proof fencing (*e.g.*, silt fencing) or inspected by an authorized desert tortoise biologist periodically throughout and at the end of the day and immediately the next morning. BLM and the Service will determine the appropriate length of open trench that will be allowed on the project.

Fencing will be designed in a manner that reduces the potential for desert tortoises and hatchlings to access the construction areas. Thus, the lower 6 to 12 in of fencing will be folded outward (*i.e.*, away from the construction area and towards the direction a tortoise would approach the work area), and covered with sufficient amount of soil, rocks, and staking to maintain zero ground clearance and secure the bottom section of material. An authorized desert tortoise biologist will check the integrity of the fencing every 2 hours and ensure that there are no breaches in the fencing and no desert tortoises pacing the fence. After the fencing is erected and secure, the inside will be cleared by an authorized desert tortoise biologist. The fencing must remain closed during any construction activities.

1.m. *Permanent tortoise-proof fencing*—Tortoise-proof fencing shall be installed around the boundary of permanent aboveground facilities that require regular monitoring and maintenance and other areas as directed by the BLM or Service. Fence specifications will be consistent with those approved by the Service (Service 2009). Tortoise guards shall be placed at all road access points where desert tortoise-proof fencing is interrupted, to exclude desert tortoises from the facility. Gates shall provide minimal ground clearance and deter ingress by desert tortoises. Permanent tortoise-proof fencing along the project area shall be appropriately constructed, monitored, and maintained. Fencing shall be inspected in accordance with Table 15 and reports prepared in accordance with Term and Condition 7.c. unless modified by the Service. Monitoring and maintenance shall include regular removal of trash and sediment accumulation and restoration of zero ground clearance between the ground and the bottom of the fence, including re-covering the bent portion of the fence if not buried.

Table 15. Desert tortoise fence inspection requirements

Condition	**Minimum Requirements**
First week following fence installation; tortoises active	Inspect fence perimeter, tortoise guards, and gates twice per day, timed to occur when tortoises may be pacing the fenceline.
First week following fence installation; tortoises inactive	Inspect fence perimeter, tortoise guards, and gates once per day.
Beginning the second week following fence construction, tortoises active	Inspect fence perimeter, tortoise guards, and gates once per day.
Beginning the second week following fence construction, tortoises inactive	Inspect fence perimeter, tortoise guards, and gates once per month.
Following major storm event, tortoises active	Inspect fence perimeter, tortoise guards, and gates within 48 hours.
Following major storm event, tortoises inactive	Inspect fence perimeter, tortoise guards, and gates within 72 hours.
Breach in fence observed, tortoise guard or gate requires maintenance, tortoises active	Repair within 48 hours of breach occurrence.
Breach in fence observed, tortoise guard or gate requires maintenance, tortoises inactive	Repair within 1 week of breach occurrence.

1.n. *Wildlife escape ramps*—Earthen plugs, with wildlife escape ramps on either side of the plug, will be provided in open trench segments at no greater than every 0.25 mi. These distances will be reduced if the FCR and authorized desert tortoise biologist determine that the plug/escape ramp spacing is insufficient to facilitate animal escape from the trench. Any tortoise that is found in a trench or excavation shall be promptly removed by an authorized desert tortoise biologist in accordance with the most current Service-approved guidance. If the authorized desert tortoise biologist is not allowed to enter the trench for safety reasons, the alternative method of removal must have prior approval by the Service.

1.o. *Dust control*—Water applied to for dust control shall not be allowed to pool outside desert-tortoise fenced areas, as this can attract desert tortoises. Similarly, leaks on water trucks and water tanks will be repaired to prevent pooling water. An authorized desert tortoise biologist will be assigned to patrol each area being watered immediately after the water is applied and at approximate 60-minute intervals until the ground is no longer wet enough to attract tortoises if conditions favor tortoise activity.

1.p. *Blasting*—If blasting is required in desert tortoise habitat, detonation shall only occur after the area has been surveyed and cleared by an authorized desert tortoise biologist. A 200-ft radius area around the blasting site shall be surveyed and all desert tortoises aboveground within this 200-ft radius of the blasting site shall be moved 500 ft from the blasting site, placed in unoccupied burrow, and temporarily penned (see Term and Condition 1.k.) to prevent tortoises that have been temporarily relocated from returning to the site. Tortoises in burrows would be left in their burrows. All burrows, regardless of occupied status, will be stuffed with newspapers, flagged, and location recorded using a GPS unit. Immediately after blasting, newspaper and flagging will be removed. If a burrow or coversite has collapsed which could be occupied, it shall be excavated to ensure that no tortoises have been buried and are in danger of suffocation.

1.q. *Power transmission projects*—Transmission line support structures and other facility structures shall be designed to discourage their use by raptors for perching or nesting (*e.g.*, by use of anti-perching devices) in accordance with the most current Avian Power Line Interaction Committee guidelines (see terms and conditions 2.b and 2.c.).

1.r. *Timing of construction*—The BLM shall ensure that when possible, the project proponent schedules and conducts construction, operation, and maintenance activities within desert tortoise habitat during the less-active season (generally October 31 to March 1) and during periods of reduced desert tortoise activity (typically when ambient temperatures are less than 60 or greater than 95 °F).

All vehicles and equipment that are not in areas enclosed by desert tortoise exclusion fencing will stop activities in desert tortoise habitat during rainfall events in the more-active season (generally March 1 to October 31), and if temperatures are above 60 but below 95 °F for more than 7 consecutive days.

The Field Contact Representative (FCR) or designee will determine, in coordination with the BLM and Service, when it is appropriate for project activities to continue.

RPM 2: **Predator Control— Applies to all actions.** *BLM, and other jurisdictional Federal agencies as appropriate, shall ensure their agency personnel, the project proponent, and their contractors implement the following measures to minimize injury to desert tortoises as a result of predators drawn to the project area from construction, operation, and minor maintenance activities:*

<u>Terms and Conditions</u>:

2.a. *Litter control, applies to all projects*—A litter control program shall be implemented to reduce the attractiveness of the area to opportunistic predators such as desert kit foxes, coyotes, and common ravens. Trash and food items will be disposed of properly in predator-proof containers with predator-proof lids. Trash containers will be emptied and construction waste will be removed daily from the project area and disposed of in an approved landfill.

2.b. *Deterrence*—The project proponent will implement measures to discourage the presence of predators on site (coyotes, ravens, etc.), including elimination of available water sources, designing structures to discourage potential nest sites, and use of hazing to discourage raven presence.

2.c. *Monitoring and predator control*—Projects that may create nest sites for ravens: The project proponent will monitor for the increased presence of ravens and other potential human-subsidized predators in the vicinity of the project area. A qualified biologist (not necessarily an authorized desert tortoise biologist) shall conduct monthly nest surveys of potential nest sites (*e.g.,* power transmission towers/poles) during the raven breeding season (generally February 1 to April 30) and document the presence of all nests and the species using them. During these monthly surveys, an authorized biologist will also document any sign of predation of desert tortoises below the nest and in the vicinity of the transmission line. If sign of predation is found under a nest, control measures will be implemented in coordination with the Service. The frequency of these nest surveys may be modified as agreed upon by BLM and the Service.

2.d. *Evaporation ponds and open water sources*—BLM will ensure that the ponds are not available to ravens and other predators. Tortoise-proof fencing should be installed to prevent tortoises from entering the ponds.

RPM 3: **Impacts to Desert Tortoise Habitat—Applies towards all actions that involve habitat impacts.** *BLM, and other jurisdictional Federal agencies as appropriate, shall ensure their agency personnel, the project proponent, and their contractors implement the following measures to minimize loss and long-term degradation and fragmentation of desert tortoise habitat, such as soil compaction, erosion,* *crushed vegetation, and introduction of weeds or contaminants from construction, operation, and minor maintenance activities:*

Terms and Conditions:

3.a. *Habitat protection plans*—BLM shall ensure that the applicants develop and implement an approved fire prevention and response plan, erosion control plan, and a weed management plan approved by BLM prior to surface disturbance.

3.b. *Restoration plan*—BLM shall ensure that the applicant develop and implement a restoration/reclamation plan. The plan will describe objectives and methods to be used, species of native plants and/or seed mixture to be used, time of planting, success standards, actions to take if restoration efforts fail to achieve the success standards, and follow-up monitoring. The plan will be prepared and approved prior to the surface disturbance phase of the project. Reclamation will be addressed on a case-by-case basis.

3.c. *Minimizing new disturbance*—Cross-country travel outside designated areas shall be prohibited. All equipment, vehicles, and construction materials shall be restricted to the designated areas and new disturbance will be restricted to the minimum necessary to complete the task (*e.g.*, such as construction of one-lane access roads with passing turnouts every mile rather than a wider two-lane road).

All work area boundaries shall be conspicuously staked, flagged, or otherwise marked to minimize surface disturbance activities.

3.d. *Weed prevention*—Vehicles and equipment shall be cleaned with a high pressure washer prior to arrival in desert tortoise habitat and prior to departure from areas of known invasive weed and nonnative grass infestations to prevent or at least minimize the introduction or spread these species.

3.e. *Chemical spills*—Hazardous and toxic materials such as fuels, solvents, lubricants, and acids used during construction will be controlled to prevent accidental spills. Any leak or accidental release of hazardous and toxic materials will be stopped immediately and cleaned up at the time of occurrence. Contaminated soils will be removed and disposed at an approved landfill site.

3.f. *Residual impacts from disturbance*—BLM shall collect remuneration fees to offset residual impacts to desert tortoises from project-related disturbance to desert tortoise habitat.

Remuneration fees will be used for management actions expected to promote recovery of the desert tortoise over time, including management and recovery of desert tortoise in Nevada. Actions may involve habitat acquisition, population or habitat enhancement, increasing knowledge of the species' biological requirements, reducing loss of individual animals, documenting the species status and trend, and preserving distinct population attributes. Fees will be used to fund the highest priority recovery actions for desert tortoises in Nevada

The current rate is $810 per ac of disturbance, as indexed for inflation, effective March 1, 2012. The next adjustment will become effective March 1, 2013. The fee rate will be indexed for inflation based on the Bureau of Labor Statistics Consumer Price Index for All Urban Consumers (CPI-U) on January 31st of each year, becoming effective March 1st. Fees assessed or collected for projects covered under this biological opinion will be adjusted based on the current CPI-U for the year they are collected. Information on the CPI-U can be found on the internet at: *http://stats.bls.gov/news.release/cpi.nws.htm*.

RPM 4: **Recreation: Speed events—***BLM, and other jurisdictional Federal agencies as appropriate, shall ensure their agency personnel, the project proponent, and their contractors implement the following measures to minimize effects to the desert tortoise as a result of speed OHV events.*

Terms and Conditions:

4.a. An Environmental Awareness Program consisting of a tortoise fact sheet shall be provided to registered drivers and support personnel prior to race activities. The fact sheet will include, but not be limited to discussion of the Act, and consequences of noncompliance with it. Additionally, it will include a tortoise education program with information on the life history of the desert tortoise, legal protection for desert tortoises, penalties for violations of Federal and State laws, general tortoise activity patterns, reporting requirements, measures to protect tortoises, terms and conditions of the biological opinion, and personal measures participants, support personnel, or volunteers can take to promote the conservation of desert tortoises.

4.b. An appropriate number of monitors and crowd-control officials, as determined by BLM in coordination with the Service, shall be present to control spectators and enforce compliance with stipulations of the event permit. Monitors may be BLM or proponent personnel and shall be stationed at all disqualification or hazard areas to record any violations. As a general guideline, the monitors shall enforce terms and conditions of this biological opinion, control unauthorized vehicular travel off existing roads, and ensure that habitat damage does not occur.

4.c. Race vehicles will not exceed the legal speed limit (posted or unposted) on roads used as part of the racecourse except during each race. All other vehicles shall not exceed the legal speed limit (posted or unposted) of the roads used during events. Clark County speed limit for unposted roads is 25 mph. If the speed limit is not posted, the speed limit shall be 25 mph.

4.d. In sections of the racecourse that allow for passing, passing may occur only in those areas that have a clear and defined second lane. Areas not authorized for passing will be clearly flagged.

4.e. Temporary or permanent fences/boundary markers shall be installed around pit and spectator areas to clearly delineate the boundaries of these areas from adjacent desert habitat, using sturdy materials such as roper and T-posts. Monitor(s) will be placed at each pit and spectator area to ensure that spectators remain within the designated boundary. Spectator vehicles shall be restricted to designated spectator areas only.

4.f. Pit crews shall use only authorized pit areas. Pits shall be confined to existing disturbed areas, unless otherwise approved by the Service. Pit areas will be marked with a sign stating that a pit pass is required.

4.g. All event-related activities will be confined to authorized vehicle routes, pit areas, spectator areas, and the course itself, and will not stray into vegetated areas. All major access routes leading into restricted areas will be monitored, or marked closed and bannered off. Personnel shall be stationed at these areas, as appropriate, to enforce access restrictions. Directional signs to spectator and pit areas will be posted at all main access points. "Race-in-progress" signs will be posted at each location where the race crosses another road. Other disqualification or hazard zones will be monitored periodically during the event.

4.h. Sufficient staff from BLM shall be present to check for compliance with stipulations of the race permit. The importance of staying on the racecourse will be stressed to all participants by BLM and the promoters.

4.i. To help control spectators, the event promoters shall station at least one person at the primary entrance to the spectator area for at least 2 hours before the start of the race and 1 hour after the start of the race. This individual will stop all cars coming into the area, give the occupants information on the limits of the spectator area, and advise them where they can and cannot park.

4.j. During pre-race maintenance activities involving the use of heavy equipment to grade new course if required, a tortoise monitor shall be present to check for tortoises.

4.k. Any desert tortoises located on, immediately adjacent to, or moving directly toward the racecourse shall be captured and temporarily held or moved into undisturbed desert habitat within 1,640 ft and placed in the shade of vegetation on BLM-managed lands. All handling and temporary holding of desert tortoise shall be performed by BLM personnel or BLM contractors experienced or trained in the handling of desert tortoises according to current Service-approved protocol (Service 2009). Desert tortoises will be deliberately moved solely for the purpose of moving them out of harm's way. Desert tortoises shall be placed only on lands under the ownership of BLM unless written permission is provided from the landowner. All instances of handling tortoises shall be reported to the Service with the Desert Tortoise Handling and Take Report (Appendix E).

Desert tortoises temporarily held shall be kept shaded at all times until it is safe to release them. Tortoises shall be released in the early morning immediately following each race as stated above.

4.l. All occupied desert tortoise burrows that are in close proximity to the race course but are not at immediate risk of damage from race activities shall be temporarily penned by the authorized biologist(s) or monitor(s) overseen by the biologist to ensure the desert tortoise is confined to the burrow and will not wander onto the course during each race event. Identified burrows will have the entrance blocked 1-2 days before each race event prior to 7:00 a.m. to ensure that desert tortoises are not trapped outside of resident burrows. Removal of the temporary pens shall occur by no later than 12:00 p.m. the day after each race event.

Pens shall be constructed by installing a circular fence, approximately 10 to 20 feet in diameter to enclose the desert tortoise/burrow. The diameter or size of the pen can vary, but the fenced area should provide sufficient space for the desert tortoise to exit the burrow but remain penned. The size, diameter and configuration of the pen will be constructed based on the best professional judgment of the authorized biologist given the field and site conditions. The pen should be constructed with durable materials (*i.e.,* 16 gauge or heavier) suitable to resist desert environments. Fence material should consist of ½-inch hardware cloth or 1-inch horizontal by 2-inch vertical, galvanized welded wire. Pen material should be 24 inches in width. Steel T-posts or rebar (3 to 4 feet long) should be placed every 5 to 6 feet to support the pen material. The pen material should extend 18 to 24 inches aboveground. The bottom of the enclosure shall be buried several inches; soil mounded along the base; and other measures should be taken to ensure zero ground clearance. Care should be taken to minimize visibility of the pen to the public. The authorized biologist(s), monitor(s), or trained BLM personnel should check the pen daily, at a minimum. All instances of penning or issues associated with penning shall be reported to the Service (Appendix E).

4.m. If any participant, event volunteer, spectator or BLM personnel locates an injured desert tortoise, BLM personnel or contractor experienced or trained in handling tortoises, or BLM designated FCR shall be notified immediately (Appendix E). Any desert tortoise injured as a result of race activities shall immediately be transported to a qualified veterinarian. As soon as possible or within 12 hours of the injured tortoise being found, the Service's Nevada Fish and Wildlife Office in Las Vegas shall be notified at (702) 515-5230.

4.n. Permittees shall be responsible for trash and litter clean-up along the course and in spectator and pit areas. Stakes, flagging materials, temporary facilities, litter, and all other event-related materials shall be removed from the course and pit, parking, and spectator areas. The racecourses and parking areas shall be restored, at a minimum, to pre-event conditions within 15 days after the event. Garbage and food, including that not affiliated with the race, will be removed from the areas of the event at the end of each day and will be disposed in authorized sanitary landfills. This effort will reduce the attractiveness of the area to opportunistic predators such as coyotes, kit foxes, and common ravens.

4.o. All vehicles shall be inspected prior to each race to ensure proper fluid containment. Any vehicles leaking fluid (oil, transmission fluid, etc.) will not be allowed to participate in the event. Any fuel or hazardous waste leaks/spills shall be contained immediately and cleaned up at the time of occurrence. Contaminated soil will be removed and disposed at an appropriate facility.

4.p. All event-related vehicles and activities (including pre-race and post-race vehicles and activities) shall be confined to the authorized racecourse, access routes, and designated areas (pit, spectator, and parking areas) and will not stray into vegetated areas. Directional signs to spectator and pit areas will be posted at all main access points.

4.q. The race promoters shall ensure that all measures are deployed to prevent racers from straying into vegetated areas identified as potential problems for disturbance during pre-race meetings with BLM. Potential measures include flagging, signing, reduced speed requirements, identification of corners during driver meetings and as identified by the promoter during the fun run.

4.r. If a vehicle breaks down, it shall be moved to the side of the racecourse, avoiding damage to vegetation to the extent possible. Teams will not be allowed to retrieve vehicles without an official escort to the retrieval site to ensure that no additional habitat disturbance takes place during this process. Any retrieval must be done on the racecourse, not the adjacent vegetated areas.

4.s. If desert tortoise habitat is disturbed as a result of an OHV event or activity, BLM will collect an additional per-acre fee based on the quality of habitat disturbed. This fee will be used by BLM to restore desert tortoise habitat in accordance with BLM restoration methods. The fee rate will be indexed for inflation based on the Bureau of Labor Statistics Consumer Price Index for All Urban Consumers (CPI-U) on January 31st of each year. Fees assessed or collected for projects covered under this biological opinion after March 1st of each year will be adjusted based on the CPI-U. Information on the CPI-U can be found on the Internet at: http://stats.bls.gov/news.release/cpi.nws.htm.

This fee will be paid directly to BLM's State Office in Reno, Nevada. These funds are independent of any other fees collected by BLM for desert tortoise conservation planning. The payment shall be accompanied by the attached Section 7 Fee Payment Form, and completed by the payee (Appendix F).

4.t. All maintenance equipment/vehicles and race vehicles shall be washed/steam-cleaned prior to entering the project area to prevent the spread of noxious weeds. Any vehicle that leaves the project area will be washed/steam-cleaned prior to re-entering the project area.

4.u. Personnel from BLM shall be present during race activities to check for compliance with stipulations or conditions of the race permit, and the terms and conditions of this biological opinion. BLM or race promoters shall disqualify any race participant or driver who violates any stipulations or conditions for the race event. Additionally, failure of any member of the driver's support team or spectators associated with a particular driver or rider to comply with the stipulations or conditions shall result in the disqualification of that driver or rider by BLM or the race promoters.

4.v. Within 15 days following each event, BLM shall inspect each racecourse for new disturbance. These areas of new disturbance will be documented by GPS, photos and other methods to report in accordance reporting requirements, and restored to pre-disturbance conditions.

4.w. The racecourse shall be inspected by monitor(s) or trained BLM personnel as soon as possible after the race to document any observable instances of "take" (mortality or injury) to desert tortoises from race activities. This information will be reported in accordance with Term and Condition 7.d. This information could be used when assessing potential impacts from any future BLM-sanctioned OHV event.

4.x. A brief but complete report shall be written by BLM or race promoters documenting the results of implementation of the terms and conditions. The report shall be submitted to the Service's Nevada Fish and Wildlife Office in Las Vegas within 30 days of completion of each race event or post-race activities.

Appropriate information for the report includes, but is not limited to: amount of new disturbance (documented if possible by photo points or GPS data); amount of take exempted and take reported (Appendix E); effectiveness or ineffectiveness of the terms and conditions of this biological opinion (measured by quantitative data or qualitative observations); fees assessed; and restoration or remediation actions taken to address habitat disturbance including amount of habitat restored. Information relevant to each race event also will be included such as the number of vehicles that participated and approximate number of spectators and support staff.

In addition, BLM or authorized desert tortoise biologist shall complete and provide a Desert Tortoise Handling and Take Report for each instance of desert tortoise injury, mortality, handling, penning, etc. The report will be due to the Service within 7 days following the event.

RPM 5: Livestock Grazing—*BLM, and other jurisdictional Federal agencies as appropriate, shall ensure their agency personnel, the project proponent, and their contractors implement the following measures to minimize effects to the desert tortoise as a result of permitting livestock grazing.*

Terms and Conditions:

5.a. A litter-control program shall be implemented to minimize predation on tortoises by ravens drawn to project sites (*e.g.,* range improvements, water hauls, etc). This program will include the use of covered, raven-proof trash receptacles, removal of trash from project areas to the trash receptacles following the close of each work day, and the proper disposal of trash in a designated solid waste disposal facility. Appropriate precautions must be taken to prevent litter from blowing out along the road when trash is removed from the site. The litter-control program will apply to all actions. A litter-control program will be implemented by the responsible Federal agency or their contractor, to minimize predation on tortoises by ravens and other predators drawn to the project site.

5.b. Livestock grazing in desert tortoise habitat shall be managed consistent with the most current version of the Desert Tortoise Recovery Plan, including allotments or portions of allotments that become vacant and occur within desert tortoise critical habitat outside of ACECs. Grazing may continue in currently active allotments until such time they become vacant. BLM will work with the permittees of active allotments to implement changes in grazing management to improve desert tortoise habitat which may include use of water, salt/mineral licks, or herding to move livestock; changes in season of use and/or stocking rates; installation of exclusionary fences; reconfiguring pasture or allotment boundaries; and retiring pastures or allotments. Renewal of term grazing permits will be appended to this PBO.

5.c. Livestock grazing utilization levels or other thresholds shall be incorporated into the allotment term permits.

5.d. The permittee shall be required to take immediate action to remove any livestock that moves into areas unavailable for grazing. If straying of livestock becomes problematic, BLM, in consultation with the Service, will take measures to ensure straying is prevented.

5.e. All vehicle use in listed species habitat associated with livestock grazing, with the exception of range improvements, shall be restricted to existing roads and trails. Permittees and associated workers will comply with posted speed limits on access roads. No new access roads will be created.

5.f. Use of hay or grains as a feeding supplement shall be prohibited outside designated areas (*e.g*., in and near corrals and watering areas). Where mineral and salt blocks are deemed necessary for livestock grazing management, they will be placed in previously-disturbed areas at least 0.5 mi from riparian areas. In some cases, blocks may be placed in areas that have a net benefit to tortoise by distributing livestock more evenly throughout the allotment, and minimizing concentrations of livestock that result in habitat damage.

5.g. Site visits shall be made to active allotments by BLM rangeland specialists and other qualified personnel, including Service biologists, at a frequency sufficient to ensure compliance with the terms and conditions of the grazing permit. Any instance of non-compliance will be rectified by BLM and permittee, and reported to the Service.

5.h. Livestock levels shall be adjusted to reflect significant, unusual conditions that result in a dramatic change in range conditions (*e.g*., drought and fire) and negatively impact the ability of the allotment to support both listed species and cattle.

5.i. Livestock grazing may continue in desert tortoise habitat under current conditions established in the 1998 PBO (1-5-98-F-053) until such time the term permits come up for renewal based on the existing permit expiration dates. During this interim period for grazing within desert tortoise habitat livestock use may occur from March 1 to October 31, as long as forage utilization management levels are monitored and do not exceed 40 percent on key perennial grasses, shrubs and perennial forbs; and between November 1 and February 28/29, provided forage utilization management levels are monitored and do not exceed 50 percent on key perennial grasses and 45 percent on key shrubs and perennial forbs. If the utilization management levels are reached, livestock will be moved to another location within the allotment or taken entirely off the allotment. BLM will ensure that no livestock grazing (including trespass) will occur in desert tortoise critical habitat or ACECs.

RPM 6: **Vegetation and Resource Management—Applies towards restoration, weed treatments, fish and wildlife projects, desert clean-ups, hazardous material management, mine closures, public information and education, cultural and paleontological activities, and wild horse and burro management.** *BLM, and other jurisdictional Federal agencies as appropriate, shall implement or ensure implementation of measures to minimize injury or mortality of desert tortoises and habitat impacts due to resource and vegetation activities.*

Terms and Conditions:

6.a. In addition to RPMs and terms and conditions required for all actions, BLM will implement RPM 3 and associated terms and conditions (desert tortoise habitat effects) as part of the Vegetation and Resource Management Program, as appropriate.

6.b. Wild horse and burro trap sites will be located in previously disturbed areas where possible. Any significant surface disturbance resulting from herd gathers will be restored to prevent continued public use.

6.c. Only weed-free hay will be used if available and supplemental feeding is required for gathered wild horses and burros.

RMP 7: Compliance and Reporting—Applies towards all actions. *BLM, and other jurisdictional Federal agencies as appropriate, shall ensure their agency personnel, the project proponent, and their contractors implement the following measures to comply with the reasonable and prudent measures, terms and conditions, reporting requirements, and reinitiation requirements contained in this biological opinion:*

Terms and Conditions:

7.a. *Desert tortoise deaths*—The deaths and injuries of desert tortoises shall be investigated as thoroughly as possible to determine the cause. The Service and appropriate state wildlife agency must be verbally informed immediately and within 5 business days in writing (electronic mail is sufficient). The Authorized Desert Tortoise Biologist shall complete the Desert Tortoise Handling and Take Report (Appendix E).

7.b. *Non-compliance*—Any incident occurring during project activities that was considered by the FCR, authorized desert tortoise biologist, or biological monitor to be in non-compliance with this biological opinion shall be immediately documented by an authorized desert tortoise biologist. Documentation shall include photos, GPS coordinates, and details on the circumstances of the event. The incident will be included in the annual report and post-project report.

7.c. *Fence inspection*—Quarterly reports (January-March, April-June, July-September, and October –December) for monitoring and repair of tortoise-proof fencing as specified in Table 15, shall be submitted to the Service's Nevada Fish and Wildlife Office in Las Vegas. Reports are due within the first 30 days following each quarter (e.*g*., the report for quarter January-March is due April 30).

7.d. *Project reporting requirements*—Quarter (non-appended actions), annual, and comprehensive final project reports will be submitted to BLM and the Service's Nevada Fish and Wildlife Office in Las Vegas. Annual reports are required for all appended actions (except those completed and provided in a prior annual report). Annual reports will cover the calendar year and are due April 1st of the following year (*e.g.*, the annual report for calendar year 2013 is due April 1, 2014). Quarterly reports for non-appended actions are due 15 calendar days following the quarter. Final project reports are due within 60 days following completion of the project or each phase of the project.

The Programmatic Biological Opinion Report to the Fish and Wildlife Service (Appendix G) will be used for quarterly, annual, and final project reports, and shall include all Desert Tortoise Handling and Take Reports (Appendix E). If available, GIS shape files will be included.

7.e. *Operation and maintenance*—A written assessment report shall be submitted annually to the Service outlining the operation and maintenance activities that occurred over the past year.

Report to include: It will include frequency of implementation of minimization measures, biological observations, general success of each of the minimization measures. All deaths, injuries, and illnesses of endangered or threatened species within the project area, whether associated with project activities or not, will be summarized in the annual report. The report is due April 1 of each year.

7.f. *Restoration monitoring*—Vegetation restoration success shall be monitored by project proponent and reported to BLM and the Service. Monitoring will include both qualitative and quantitative data collection and analysis. Monitoring frequency and parameters for restoration success will be described in the required restoration/reclamation plan.

7.g. *Wild horse and burro management:* BLM will include wild horse and burro population and forage utilization and population monitoring results in the annual report for this PBO.

10.4 Disposition or Care for Dead or Injured Desert Tortoises

If any project-related personnel locate a dead or injured desert tortoise, they shall immediately notify the designated FCR, authorized desert tortoise biologist, and the Service at (702) 515-5230.

Care should be taken in handling sick or injured desert tortoises to ensure effective treatment. Care should be taken for handling of dead specimens to preserve biological material in the best possible state for later analysis. In conjunction with the care of injured desert tortoises or preservation of biological materials from a dead animal, the finder has the responsibility to carry out instructions provided by the Service to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed.

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

- Injured desert tortoises shall be delivered to a qualified veterinarian for appropriate treatment or disposal. The applicant shall bear the cost of any required treatment of desert tortoises injured from the project, euthanasia of sick desert tortoises, and cremation of desert tortoises that die during treatment. Should sick or injured desert tortoises be treated by a veterinarian and survive, they may be transferred as directed by the Service.

- Dead desert tortoises suitable for preparation as museum specimens shall be frozen immediately and provided to an institution holding appropriate Federal and State permits. Should no institutions want the desert tortoise specimens, or if it is determined that they are too damaged (crushed, spoiled, etc.) for preparation as a museum specimen, then they may be buried away from the project area or cremated, upon authorization by the Service.

- Dead desert tortoises that are needed for later analysis as to cause of death and for law enforcement purposes shall be frozen immediately. Carcasses must be submitted for necropsy and the cost covered by the proponent. Necropsy results must be submitted to the Service and the appropriate state wildlife agencies.

Section 11: Conservation Recommendations

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

The Service recommends the following conservation measures which should be considered for the revised RMP.

1. We encourage BLM to continue to work with project proponents to co-locate power transmission conductor lines to accommodate more transmission lines in a given ROW width.

2. BLM should designate desert tortoise habitat and population linkages as ACECs in coordination with the Service and avoid locating projects in these areas that result in substantial impacts to the desert tortoise (*e.g.,* projects that result in >20 ac disturbance).

3. We encourage BLM to establish contracts directly with environmental consulting firms to implement the measures for major appended actions in this biological opinion and oversee compliance. This would establish primary communication with biologists, improve reporting required in this biological opinion, reduce influences from the project proponents, and inform BLM and the Service of issues in a timely manner. At a minimum for projects with the potential to result in substantial effects to the desert tortoise and its habitat, BLM should approve the contract between the environmental consulting firm and the project proponent to ensure that biologists report directly to BLM and the Service as appropriate (see Term and Condition 1.b.).

4. We suggest that BLM not consider disposal of land within the Amargosa Desert groundwater basin (Hydrographic Basin 230). All existing and future ACECs in the Ash Meadows area should be managed as exclusion areas.

5. BLM should restrict non-emergency activities within habitat for the southwestern willow flycatcher and Yuma clapper rail to the portions of the year when the birds are not present within the action area.

6. BLM should designate staff or other responsible parties to monitor prescribed burns that occur in marsh habitats to ascertain take of Yuma clapper rails. This monitoring would be

accomplished by visual survey of the area being burned during the operation to watch for individual Yuma clapper rails leaving the area. A ground-level visual survey of the burned area post-burn should also be accomplished.

7. We recommend that BLM continue to support augmentation of desert tortoise populations with captive-held tortoises.

8. We recommend that BLM continue to pursue funding to construct a fish barrier in conjunction with the NRCS reconstruction of the Virgin River Diversion at Bunkerville. A second fish barrier should be constructed at Halfway Wash. The barriers would prevent red shiners and tilapia from entering habitat for the woundfin and Virgin River chub. We believe this action is necessary to achieve recovery of these fish species.

9. In the RMP revision, we recommend that BLM include desert tortoise-appropriate habitat monitoring as part of the livestock grazing program. We are concerned that the monitoring in place under the 1998 RMP does not accurately assess impacts to the desert tortoise particularly concerning forage availability.

10. The emergence of off-road experience tours is a relatively recent activity that has not been appropriately evaluated in terms of potential effects to the desert tortoise. We encourage BLM to increase monitoring of these activities and limit the number, location, and timing if necessary to reduce desert tortoise impacts.

11. The land disposal boundaries in the revised RMP should not include or adversely affect desert tortoise linkage areas and high-value desert tortoise habitat (refer to Figure 20).

12. BLM should close all desert tortoise ACECs to all types of organized non-speed OHV events and activities from March 1 to June 15 and September 1 to October 31 to be consistent with the BLM Ely RMP (see REC-18).

13. BLM actions, particularly OHV activities, should avoid desert washes which are important habitat for the desert tortoise.

14. BLM and the Service should prepare a Raven Management Plan for power transmission line projects and other actions that may create feeding, drinking, sheltering, roosting, or breeding habitat for ravens.

Section 12: Reinitiation Requirement

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

(4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

12.1 Desert Tortoise

Reinitiation would also be required if (1) an action proposed to be appended, or during the process of implementation, the threshold for habitat disturbance or take identified in Table 14 (Section 10.1.1) is exceeded; (2) a proposed action would result in effects beyond those identified in the *Effects of the Proposed Action*; or (3) an action is proposed in an area that will result in a level of effect to important habitat for the desert tortoise which may affect our ability to recover the species as determined by the Service.

1. **Lands and Realty**:

   a. Any adverse effects to critical habitat for any listed species are proposed or occur as a result of a BLM lands and realty action.

   b. More than 3,000 ac of desert tortoise habitat is proposed for disposal.

   c. More than 1,000 ac of desert tortoise habitat is proposed for R&PP leases; more than 650 ac are proposed for airport leases; or more than 1 acre is proposed for Section 302 FLPMA actions.

   d. More desert tortoises are taken than identified in Table 14 above.

2. **Rights-of-way**:

   a. More than 5 ac of desert tortoise critical habitat or 100 ac of non-critical desert tortoise habitat is adversely affected or proposed to be adversely affected as a result of pre-project geotechnical activities.

   b. More than 1,000 ac of desert tortoise critical habitat or 4,000 ac of non-critical desert tortoise habitat is adversely affected or proposed to be adversely affected as a result of linear ROW activities.

   b. More than 25 ac of desert tortoise critical habitat or 750 ac of non-critical desert tortoise habitat is adversely affected or proposed to be adversely affected as a result of linear site-type ROW activities.

   c. More desert tortoises are taken than identified in Table 14 above.

3. **Mining:**

   a. More than 100 ac of desert tortoise critical habitat or 500 ac of non-critical desert tortoise habitat is adversely affected or proposed to be adversely affected as a result of locatable mineral activities.

b. More than 25 ac of desert tortoise critical habitat or 200 ac of non-critical desert tortoise habitat is adversely affected or proposed to be adversely affected as a result of leasable mineral activities.

c. More than 100 ac of desert tortoise critical habitat or 500 ac of non-critical desert tortoise habitat is adversely affected or proposed to be adversely affected as a result of saleable mineral activities.

d. More desert tortoises are taken than identified in Table 14 above.

4. **Recreation Management**:

a. Any adverse effects to critical habitat for any listed species are proposed or occur as a result of a speed or non-speed recreation event.

b. More than 130 ac of desert tortoise habitat is adversely affected or proposed to be adversely affected as a result of speed event-related activities or 5 ac due to non-speed-related events.

c. More than 5 ac of desert tortoise critical habitat or 15 ac of non-critical desert tortoise habitat is adversely affected or proposed to be adversely affected as a result of recreational trail actions.

d. More desert tortoises are taken than identified in Table 14 above.

5. **Grazing**:

a. Any adverse effects to critical habitat for any listed species are proposed or occur as a result of livestock grazing.

b. Utilization levels identified in the terms and conditions are exceeded.

c. More desert tortoises are taken than identified in Table 14 above.

6. **Fire Management**:

a. More than 800 ac of desert tortoise critical habitat or 200 ac of non-critical desert tortoise habitat is adversely affected or proposed to be adversely affected as a result of fuel break activities.

b. More desert tortoises are taken than identified in Table 14 above.

7. **Vegetation Management**:

a. More than 5 ac of desert tortoise critical habitat or 20 ac of non-critical desert tortoise habitat is adversely affected or proposed to be adversely affected as a result of vegetation management activities.

b. More desert tortoises are taken than identified in Table 14 above.

8. **Resource Management**:

a. More than 5 ac of desert tortoise critical habitat or 20 ac of non-critical desert tortoise habitat is adversely affected or proposed to be adversely affected as a result of resource management activities.

b. More desert tortoises are taken than identified in Table 14 above.

Reinitiation requirements for actions that adversely affect the southwestern willow flycatcher, Yuma clapper rail, Ash Meadows fishes, and Moapa dace are described below.

12.2 Southwestern Willow Flycatcher

Reinitiation of consultation would be required if appended actions result in the loss of any individual birds or nests; actions are proposed to occur during the breeding season and within potential breeding areas for the flycatcher; long-term adverse effects to flycatcher habitat occurs or is proposed; or proposed actions exceed the scope identified in this PBO.

12.3 Yuma Clapper Rail

Reinitiation of consultation would be required if appended actions result in the loss of any individual birds or nests; actions are proposed to occur during the breeding season and within potential breeding areas for the Yuma clapper rails; long-term effects to rail habitat occurs or is proposed.

12.4 Virgin River Chub and Woundfin

Reinitiation of consultation would be required if proposed or appended actions result, or are anticipated to result, in long-term effects to the Virgin River that would further diminish the ability of either species to persist in the action area.

12.5 Moapa Dace

The most concerning impact to the Moapa dace that could result from BLM actions is the reduction of overall volume or quality of water that would be available to the species, thereby limiting the chance for long-term survival of Moapa dace. Larger water volumes provide the habitat necessary for increased food production and subsequently larger fish, thus greater fecundity. Hence, more numerous, larger eggs provide a better opportunity for species long-term survival.

Habitat loss and associated incidental take of Moapa dace specific to a given project is difficult to separate from the other parties simultaneously withdrawing groundwater from different locations within the same carbonate aquifer. Given this, the most accurate way to establish habitat loss and associated incidental take of Moapa dace is by evaluating the impacts to Moapa dace habitat on a landscape level, as was done in the 2006 PBO. In that parent document, the cumulative withdrawal of 16,100 afy by the parties associated with the MOA predicted a loss of approximately 22 percent riffle and 16 percent pool habitat as measured at the Warm Springs West gage downstream from the Pedersen Unit, when the flows reach 2.78 cfs. Therefore, while incidental take is not authorized under the PBO but deferred to project-specific (appended) opinions, the total amount of incidental take of Moapa dace anticipated for the cumulative actions of parties to the MOA is that which is associated with 22 percent loss in riffle habitat and 16 percent loss in pool habitat. Should flows at the Warm Springs West gage decline to a flow below 2.78 cfs, the amount of incidental take for any project-specific action under the MOA would be exceeded for the Moapa dace and reinitiation of consultation for the Moapa dace would be required

12.6 **Ash Meadows Species**

The most concerning impact to the Ash Meadows species that could result from the indirect effect of BLM actions is the potential reduction in the overall volume of water that would be available to the species, thereby limiting their chance for long-term survival. Reinitiation of consultation would be required if proposed or appended actions result, or are anticipated to result, in any net increase in groundwater use in the Amargosa Desert hydrographic basin.

Section 13: Literature Cited

13.1 **Desert Tortoise**

Abella, S.R. 2010. Disturbance and plant succession in the Mojave and Sonoran deserts of the American Southwest. International Journal of Environmental Research and Public Health 7:1248-1284.

Aber, J.D., K.J. Nadelhoffer, P. Steudler, and J.M. Melillo. 1989. Nitrogen saturation in northern forest ecosystems. Bioscience 39:378-386.

Andrews, K.M, J.W. Gibbons, and D.M. Jochimsen. 2008. Ecological effects of roads on amphibians and reptiles: a literature review. *In* Urban herpetology, J. C. Mitchell, R.E. Jung Brown, and B. Bartholomew, editors. Herpetological Conservation 3:121-143.

Beier, P., D.R. Majka, and W.D. Spencer. 2008. Forks in the road: choices in procedures for designing wildland linkages. Conservation Biology 22:836-851.

Belnap, J. 1996. Soil surface disturbance in cold deserts: effects on nitrogenase activity in cyanobacterial-lichen soil crusts. Biology and Fertility of Soils 23:362-367.

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

BLM (Bureau of Land Management). 2011. Roads monitoring on BLM lands, final project report. Unpublished report submitted to Clark County, Nevada for MSHCP project 2005-BLM-503. 89 pages.

Britten, H.B., B.R. Riddle, P.F. Brussard, R. Marlow, and T.E. Lee. 1997. Genetic delineation of management units for the desert tortoise, *Gopherus agassizii*, in northeastern Mojave Desert. Copeia 1997:523-530.

Brooks, M.L. 2003. Effects of increased soil nitrogen on the dominance of alien annual plants in the Mojave Desert. Journal of Applied Ecology 40:344-353.

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

Brooks, M.L. and B. Lair. 2005. Ecological effects of vehicular routes in a desert ecosystem. Report prepared for the U.S. Geological Survey, recoverability and vulnerability of desert ecosystems program. Western Ecological Research Center, Henderson, Nevada.

Brooks, M.L. and K.H. Berry. 2006. Dominance and environmental correlates of alien annual plants in the Mojave Desert, USA. Journal of Arid Environments 67(1):100–124.

Bunn, D., A. Mummert, M. Hoshovsky, K. Gilardi, and S. Shanks. 2007. California wildlife: conservation challenges. California's wildlife action plan prepared for California Department of Fish and Game by UC Davis Wildlife Health Center. Unpublished report.

Burge, B.L. 1977. Daily and seasonal behavior, and areas utilized by the desert tortoise, *Gopherus agassizii*, in southern Nevada. Proceedings of the Desert Tortoise Council symposium 1977:59-94.

Burge, B.L. 1989. What goes up must come down. Massive balloon releases are a potential threat to tortoises and other wildlife. Tortoise Tracks 10:4.

D'Antonio, C.M., and P.M. Vitousek. 1992. Biological invasions by exotic grasses, the grass/fire cycle, and global change. Annual Review of Ecology and Systematics 23:63-87.

DeFalco, L.A., J.K. Detling, C.R. Tracy, and S.D. Warren. 2001. Physiological variation among native and exotic winter annual plants associated with microbiotic crusts in the Mojave Desert. Plant and Soil 234:10-14.

Duda, J.J., A.J. Krzysik, and J.E. Freilich. 1999. Effects of drought on desert tortoise movement and activity. Journal of Wildlife Management 63:1181-1192.

Edwards, T., C.S. Goldberg, M.E. Kaplan, C.R. Schwalbe, and D.E. Swann. 2004a. Implications of anthropogenic landscape change on inter-population movements of the desert tortoise (*Gopherus agassizii*). Conservation Genetics 5:485-499.

Edwards, T., E.W. Stitt, C.R. Schwalbe, and D.E. Swann. 2004b. *Gopherus agassizii* (desert tortoise). movement. Herpetological Review 35:381-382.

Esque, T.C., K.E. Nussear, K.K. Drake, A.D. Walde, K.H. Berry, R.C. Averill-Murray, A.P. Woodman, W.I. Boarman, P.A. Medica, J. Mack, J.S. Heaton. 2010. Effects of subsidized predators, resource variability, and human population density on desert tortoise populations in the Mojave Desert, USA. Endangered Species Research (12) 167-177.

Fischer, J. and D. B. Lindenmayer. 2007. Landscape modification and habitat fragmentation: a synthesis. Global Ecology and Biogeography 16(3):265-280.

Germano, D.J., R.B. Bury, T.C. Esque, T.H. Fritts, and P.A. Medica. 1994. Range and habitat of the desert tortoise. Pages 57-72, *In* R.B. Bury and D.J. Germano (eds.), Biology of the North American Tortoises. National Biological Survey, Fish and Wildlife Research 13, Washington, D.C.

Hagerty, B.E. 2008. Ecological genetics of the Mojave Desert tortoise. Ph.D. dissertation. University of Nevada, Reno.

Hagerty, B.E., and C.R. Tracy. 2010. Defining population structure for the Mojave desert tortoise. Conservation Genetics. DOI 10.1007/s10592-010-0073-0.

Hagerty, B.E., K.E. Nussear, T.C. Esque, and C.R. Tracy. 2010. Making molehills out of mountains: landscape genetics of the Mojave desert tortoise. Landscape Ecology. DOI 10.1007/s10980-010-9550-6.

Harless, M.L., A.D. Walde, D.K. Delaney, L.L. Pater, and W.K. Hayes. 2009. Home range, spatial overlap, and burrow use of the desert tortoise in the West Mojave Desert. Copeia 2009:378-389.

Longshore, K.M., J.R. Jaeger, and J.M. Sappington. 2003. Desert tortoise (*Gopherus agassizii*) survival at two eastern Mojave Desert sites: death by short-term drought? Journal of Herpetology 37(1):169-177.

Murphy, R.W., K.H. Berry, T. Edwards, and A.M. McLuckie. 2007. A genetic assessment of the recovery units for the Mojave population of the desert tortoise, *Gopherus agassizii*. Chelonian Conservation and Biology 6:229-251.

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

O'Connor, M.P, L.C. Zimmerman, D.E. Ruby, S.J. Bulova, and J.R. Spotila. 1994. Home range size and movements by desert tortoises, *Gopherus agassizii*, in the eastern Mojave Desert. Herpetological Monographs 8:60-71.

Oftedal, O.T. 2002. The nutritional ecology of the desert tortoise in the Mojave and Sonoran deserts. Pages 194-241, *In* T.R. Van Devender (ed.), The Sonoran Desert Tortoise; Natural History, Biology and Conservation. University of Arizona Press, Tucson.

Oftedal, O.T., S. Hillard, and D.J. Morafka. 2002. Selective spring foraging by juvenile desert tortoises (*Gopherus agassizii*) in the Mojave Desert: Evidence of an adaptive nutritional strategy. Chelonian Conservation and Biology 4:341-352.

Randall, J.M., S.S. Parker, J. Moore, B. Cohen, L. Crane, D. Cameron, J.B. Mackenzie, K. Klausmeyer, and S. Morrison. 2010. Mojave Desert ecoregional assessment. September 2010. The Nature Conservancy of California, San Francisco, California.

Service (Fish and Wildlife Service). 1993. Draft desert tortoise (Mojave population) recovery plan. Portland, Oregon.

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

Service (Fish and Wildlife Service). 2009. Desert tortoise (Mojave Population) field manual: (*Gopherus agassizii*). Region 8, Sacramento, California. Available on the internet at: *http://www.fws.gov/ventura/species_information/protocols_guidelines/index.html.*

Service (Fish and Wildlife Service). 2010a. Mojave population of the desert tortoise (*Gopherus agassizii*) 5-year review: summary and evaluation. Desert Tortoise Recovery Office. Reno, Nevada.

Service (Fish and Wildlife Service). 2010b. Rangewide monitoring of the Mojave population of the desert tortoise: 2010 annual report. Desert Tortoise Recovery Office. Reno, Nevada.

Service (Fish and Wildlife Service). 2011. Revised recovery plan for the Mojave population of the desert tortoise (*Gopherus agassizii*). Sacramento, California.

Service (Fish and Wildlife Service). 2010c. Rangewide monitoring of the Mojave population of the desert tortoise: 2010 annual report. Desert Tortoise Recovery Office. Reno, Nevada.

Service (Fish and Wildlife Service). 2010d. Rangewide monitoring of the Mojave population of the desert tortoise: 2008 and 2009 annual report. Desert Tortoise Recovery Office. Reno, Nevada.

Sharifi, M., A.C. Gibson, and P.W. Rundel. 1997. Surface dust impacts on gas exchange in Mojave Desert shrubs. Journal of Applied Ecology 34:837-846.

Tracy, C.R., R. Averill-Murray, W.I. Boarman, D. Delehanty, J. Heaton, E. McCoy, D. Morafka, K. Nussear, B. Hagerty, and P. Medica. 2004. Desert Tortoise Recovery Plan Assessment. Prepared for the U.S. Fish and Wildlife Service. Reno, Nevada.

Wiens, J.A. 2006. Introduction: connectivity research – what are the issues? Pages 23-27, *In* K.R. Crooks and M. Sanjayan (eds.), Connectivity Conservation. Cambridge University Press, Cambridge.

13.2 Southwestern Willow Flycatcher

Browning, M.R. 1993. Comments on the taxonomy of *Empidonax trailii* (willow flycatcher). Western Birds 24:241-257.

Cardinal, S.N. and E.H. Paxton. 2005. Home range, movement, and habitat use of the southwestern willow flycatcher at Roosevelt Lake, AZ – 2004. U.S. Geological Survey report to the U.S. Bureau of Reclamation, Phoenix, AZ.

Drost, C.A., E. Paxton, M.K. Sogge, and M.J. Whitfield. 2001. Food habits of the endangered southwestern willow flycatcher. U.S. Geological Survey, Colorado Plateau Field Station, Flagstaff, Arizona. 25 pages.

Durst, S.L., T.C. Theimer, E.H. Paxton, and M.K. Sogge. 2008. Age, habitat, and yearly variation in the diet of a generalist insectivore, the southwestern willow flycatcher. Condor 110:514-525.

Finch, D. M. and S. H. Stoleson, eds. 2000. Status, ecology, and conservation of the southwestern willow flycatcher. General technical report. RMRS-GTR-60. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 131 p.

Graber, A.E., D. Weddle, H.C. English, S.D. Stump, H.E. Telle, and L.A. Ellis. 2007. Southwestern willow flycatcher 2006 survey and nest monitoring report. Annual report submitted to Arizona Game and Fish Department, Phoenix, Arizona. 105 pages.

Howell, S.N.G., and S. Webb. 1995. A guide to the birds of Mexico and northern Central America. Oxford University Press, New York, New York. 851 pages.

Hubbard, J.P. 1987. The status of the willow flycatcher in New Mexico. Report submitted to New Mexico Department of Game and Fish Endangered Species Program, Santa Fe, New Mexico. 29 pages.

NDOW (Nevada Department of Wildlife). 1997. Summary of southwestern willow flycatcher surveys, 1997. Report submitted to Arizona Game and Fish Department, Phoenix, Arizona. 16 pages.

Owen, J.C., and M.K. Sogge. 2002. Physiological condition of southwestern willow flycatchers in native and salt cedar habitats. Report submitted to Arizona Department of Transportation, Phoenix, Arizona, by U.S. Geological Survey Southwest Biological Science Center, Flagstaff, Arizona. 28 pages.

Owen, J.C., M.K. Sogge, and M.D. Kern. 2005. Habitat and sex differences in the physiological condition of southwestern willow flycatchers (*Empidonax traillii extimus*). Auk 122:1261-1270.

Peterson, R.T. 1990. A field guide to western birds. Houghton Mifflin Company, Boston, Massachusetts. 432 pages.

Phillips, A.R. 1948. Geographic variation in *Empidonax traillii*. Auk 65:507-514.

Phillips, A.R., J. Marshall, and G. Monson. 1964. The birds of Arizona. University of Arizona Press, Tucson, Arizona. 212 pages.

Prescott, D.R.C., and A.L.A. Middleton. 1988. Feeding-time minimization and the territorial behavior of the willow flycatcher (*Empidonax traillii*). Auk 105:17-28.

Ridgely, R.S., and G. Tudor. 1994. The birds of South America: Volume II, the Suboscine Passerines. University of Texas Press, Austin, Texas. 814 pages.

San Diego Natural History Museum. 1995. *Empidonax traillii extimus* in California. The willow flycatcher workshop. 17 November 1995. 66 pages.

Service (Fish and Wildlife Service). 2002. Final recovery plan for southwestern willow flycatcher (Empidonax traillii extimus). Plan submitted to U.S. Fish and Wildlife Service, Region 2, Albuquerque, New Mexico, by southwestern willow flycatcher recovery team technical subgroup.

Sogge, M.K., R.M. Marshall, S.J. Sferra, and T.J. Tibbits. 1997. A southwestern willow flycatcher natural history summary and survey protocol. National Park Service, Colorado Plateau Research Station at Northern Arizona University. May 1997. Technical Report NPS/NAUCPRS/NRTR-97/12.

Sogge, M.K., D. Ahlers, and S.J. Sferra. 2010. A natural history summary and survey protocol for the southwestern willow flycatcher. U.S. Geological Survey, techniques and methods 2A-10. 38 pages.

Stiles, F.G., and A.F. Skutch. 1989. A guide to the birds of Costa Rica. Cornell University Press, New York, New York. 656 pages.

SWCA Environmental Consultants (SWCA). 2005. Southwestern willow flycatcher surveys, demography, and ecology along the lower Colorado River and tributaries, 2004. Annual report submitted to U.S. Bureau of Reclamation, Boulder City, Nevada, by SWCA Environmental Consultants, Flagstaff, Arizona. 244 pages.

SWCA Environmental Consultants (SWCA). 2012. Southwestern willow flycatcher surveys, demography, and ecology along the lower Colorado River and tributaries, 2011. Annual report submitted to U.S. Bureau of Reclamation, Boulder City, Nevada, by SWCA Environmental Consultants, Flagstaff, Arizona. 167 pages.

Unitt, P. 1987. *Empidonax traillii extimus*: an endangered subspecies. Western Birds 18:137-162.

13.3 **Yuma Clapper Rail**

Alcorn, J.R. 1988. The Birds of Nevada. Fairview West Publishing, Fallon, Nevada. 418 pages.

Banks, R.C. and R.E. Tomlinson. 1974. Taxonomic status of certain clapper rails of southwestern United States and northwestern Mexico. Wilson bulletin 86(4):325-335.

Conway, C.J., W.R. Eddleman, S.H. Anderson, and L.R. Hanebury. 1993. Seasonal changes in Yuma clapper rail vocalization rate and habitat use. Journal of Wildlife Management 57(2):282-290.

Eddleman, W.R. 1989. Biology of the Yuma clapper rail in the southwestern U.S. and northwestern Mexico. Final report to Bureau of Reclamation, Yuma projects office and Fish and Wildlife Service, Region 2. Wyoming Cooperative Fish and Wildlife Research Unit, University of Wyoming. 127 pages.

Hinojosa-Huerta, O., S. DeStefano, and W.W. Shaw. 2000. Abundance, distribution and habitat use of the Yuma clapper rail (*Rallus longirostris yumanensis*) in the Colorado River Delta, Mexico. Arizona Cooperative Fish and Wildlife Research Unit, University of Arizona, Tucson. 77 pages.

King, K.A., A.L. Velasco, J. Garcia-Hernandez, B.J. Zaun, J. Record, and J. Wesley. 2000. Contaminants in potential prey of the Yuma clapper rail: Arizona and California, USA, and Sonora and Baja, Mexico, 1998-1999. U.S. Fish and Wildlife Service, Arizona Ecological Services Field Office, Phoenix. 21 pages.

McKernan, R. L., and G. T. Braden. 2001. Status of Yuma clapper rail and yellow-billed cuckoo along portions of Virgin River, Muddy River, and Las Vegas Wash, southern Nevada, 2000. Annual report submitted to Fish and Wildlife Service, Las Vegas, Nevada, by San Bernardino County Museum, Redlands, California. 22 pages.

Roberts, C.L. 1996. Trace element and organochlorine contamination in prey and habitat of the Yuma clapper rail in the Imperial Valley, California. U.S. Fish and Wildlife Service, Carlsbad Field Office, Carlsbad, California. 24 pages.

Rosenberg, K.V., R.D. Ohmart, W.C. Hunter, and B.W. Anderson. 1991. Birds of the Lower Colorado River Valley. University of Arizona Press, Tucson. 416 pages.

Service (Fish and Wildlife Service). 1983. Yuma clapper rail recovery plan. U.S. Fish and Wildlife Service, Albuquerque, New Mexico. 51 pages.

Service (Fish and Wildlife Service). 2010. Yuma clapper rail recovery plan (*Rallus longirostris yumanensis*). Draft first revision. U.S. Fish and Wildlife Service, Southwestern Region, Albuquerque, New Mexico. 64 pages.

Todd, R.L. 1971. Report on the study of the Yuma clapper rail along the Colorado River. Unpublished report for the Colorado River Wildlife Council Meeting, April 5-6, 1971 at Las Vegas, Nevada. 16 pages.

Todd, R.L. 1986. A saltwater marsh hen in Arizona: a history of the Yuma clapper rail (*Rallus longirostris yumanensis*). Arizona Game and Fish Department, Federal Aid Project W-95-R. Completion report. 290 pages.

Tomlinson, C.R. and K. Micone. 2000. Breeding status for the southwestern willow flycatcher and initial surveys for the Yuma clapper rail at various sites in southern Nevada.

Program activities report, January 1, 1999 through December 31, 1999. Nevada Division of Wildlife, Las Vegas. 20 pages.

Tomlinson, R.E. and R.L. Todd. 1973. Distribution of two western clapper rail races as determined by responses to taped calls. Condor. 75(2):177-183.

13.4 **Virgin River Chub and Woundfin**

Albrecht, B., M.E. Golden, and P.B. Holden. 2007. Lower Virgin River long-term monitoring 2003-2005: Final report. BIO-WEST Inc., PN-1040-01. Prepared for Southern Nevada Water Authority, Las Vegas, NV. 43pages.

Cross, J.N. 1975. Ecological distribution of the fishes of the Virgin River (Utah, Arizona, Nevada), unpublished M.S. thesis, University of Nevada, Las Vegas, Nevada.

Deacon, J.E., P.B. Schumann, and E.L. Stuenkel. 1987. Thermal tolerances and preferences of fishes of the Virgin River System (Utah, Arizona, Nevada). Great Basin Naturalist 47(4): 538-546.

Deacon, J.E. and W.G. Bradley. 1972. Ecological distribution of fishes of Moapa River in Clark County, Nevada. Transcripts of American Fisheries Society 101:408-419.

DeMarais, B.D., T.E. Dowling, M.E. Douglas, W.L. Minckley and P.C. Marsh. 1992. Origin of *Gila seminuda* (Teleostei: Cyprinidae) through introgressive hybridization: implications for evolution and conservation. Proceedings National Academy Science, USA, 89:2747-2751.

Fridell, R.A. 2009. Annual Report for section 10(a)(1)(a) permit to U.S. Fish and Wildlife Service, Salt Lake City, UT. 3 pages.

Fridell, R.A. and M.K Morvilius. 2005. Distribution and abundance of fish in the Virgin River between Washington Fields Diversions and Pah Tempe, Utah, 2005. Utah Division of Wildlife Resources Publication Number 05.

Gilbert, C.H. and N.B. Scofield. 1898. Notes on collection of fishes from the Colorado Basin in Arizona. Proceedings U.S. Natural Museum, 20:487-499.

Golden, M.E. and P.B. Holden. 2004. Summary of lower Virgin River studies; 1996-2002. Prepared for the Department of Resources, Southern Nevada Water Authority. Bio-West, Inc. Report PR 449-2; Logan, Utah.

Golden, M.E. and P.B. Holden. 2004. Summary of Lower Virgin River studies 1996-2002, final report. Prepared for the Department of Resources, Southern Nevada Water Authority. BIO-WEST Report PR-449-2.

Hardy, T.B., B. Bartz, and W. Carter. 1989. Population dynamics of the fishes in the Virgin River from 1984 through 1987 and impact analyses of the Quail Creek and North Creek Reservoir systems. Utah State University. 564 pages.

Hickman, T.J. 1987. Study of fishes in the Virgin River (Utah). Annual report 1986. Western Ecosystems, P.O. Box 1575, St. George, Utah. 89 pages.

Holden, P.B. and M.E. Golden. 2000. Annual report for fisheries surveys of the Virgin River. Prepared for U.S. Fish and Wildlife Service. Bio-West, Inc.; Logan, Utah.

Jordan, D.S and B.W. Evermann. 1896. The fishes of North and Middle America. Bulletin U.S. Natural Museum, Part i, 47:i+1x, 1-1240.

Meek, S.E. 1904. The freshwater fishes of Mexico north of the Isthmus of Tehuantepec. Field Museum 93 Zoological Service, 5:i + lxiii, 1-252.

Miller, R.R. and C.L. Hubbs. 1960. The spiny-rayed cyprinid fishes (Plagopterini) of the Colorado River system. Miscellaneous publications of the Museum of Zoology, University of Michigan 115, I-39.

Moyle, P.B. 2002. Inland fishes of California. University of California Press, Berkeley.

NDOW (Nevada Department of Wildlife). 2001. Program activities report- January 1, 2000 through December 31, 2000. Nevada Division of Wildlife, Southern Region, Native Fish and Amphibian Program, Las Vegas, Nevada.

Schuman, P.B. 1978. Response to temperature and dissolved oxygen in roundtail chub, Gila robusta Baird and Girard. Unpublished M.S. thesis, University of Nevada, Las Vegas. 79 pages.

Service (Fish and Wildlife Service). 1994b. Virgin river fishes recovery plan; Salt Lake City, Utah. 45 pages.

Snyder, J.O. 1915. Notes on a collection of fishes made by Dr. Edgar A. Mearns from rivers tributary to the Gulf of California. Proceedings U.S. Natural Museum, 40:573-586.

Williams. C.D. and J.E. Deacon. 1998. Recommendations for a comprehensive Virgin River watershed and native fishes conservation program. Pacific Rivers Council. Alexandria, VA. 51 pages.

13.5 Ash Meadows Plant Species

Barneby, R.C. 1970. A New Astragalus (Fabaceae) from Nevada. Madroño. 20:395-398.

Bedinger, M.S. and J.R. Harrill. 2006. Analytical regression stage analysis for Devils Hole, Death Valley National Park, Nevada. Journal of American Water Resources Association. 42:827-839.

Brandegee, T.S. 1899. New species of western plants. Botanical Gazette. 27:444-457.

Beatley, J.C. 1971. Vascular plants of Ash Meadows, Nevada. University of California laboratory of nuclear medicine and radiation biological report, UNCA 12445. Biology and Medicine, TID-4500. 59 pages

Beatley, J.C. 1977. Endangered plant species of the Nevada Test Site, Ash Meadows, and central-southern Nevada. Unpublished report prepared for the U.S. Energy Research and Development Administration Contract E (11-l)-2307. February 1977. 77 pages.

Bio-West, Inc. 2008. Ash Meadows National Wildlife Refuge vegetation mapping and rare plant survey: 2008 draft progress report. A report prepared for the U.S. Fish and Wildlife Service. On file at Ash Meadows National Wildlife Refuge, Amargosa Valley, NV.

BIO-WEST, Inc. 2009. Ash Meadows National Wildlife Refuge: Pollinator study 2008 annual report. Report submitted to U.S. Fish and Wildlife Service by Bio-West, Inc., Logan, Utah. 15 pages.

BIO-WEST, Inc. 2011. Ash Meadows National Wildlife Refuge: Vegetation community mapping and rare plant survey; final report. Report submitted to U.S. Fish and Wildlife Service by BIO-WEST, Inc., Logan, Utah. 207 pages plus figures and tables.

[BLM and Service] Bureau of Land Management and Fish and Wildlife Service. 2000. Environmental assessment for the proposed and mineral withdrawal at Ash Meadows National Wildlife Refuge, Nye County, Nevada. NV-056-00-16. Bureau of Land Management, Las Vegas, Nevada, and the U.S. Fish and Wildlife Service, Portland, Oregon. 23 pages plus appendices.

Caicco, S. 2005. Threatened and endangered plant species 2005 field survey report. U.S. Fish and Wildlife Service, Ash Meadows National Wildlife Refuge, Nye County, Nevada.

Cochrane, S. 1981. Status report on *Grindelia fraxino-pratensis*. U.S. Fish and Wildlife Service, Reno, Nevada. 52 pages.

Cronquist, A. 1972. A new variety of *Enceliopsis nudicaulis* (Asteraceae) from southern Nevada. Bulletin of the Torrey Botanical Club. 5: 246-247.

Darlington, J.A. 1934. A monograph of the genus Mentzelia. Annals of the Missouri Botanical Garden. 21: 103-227.

Edwards, F. 2006. GIS shape files and metadata describing data and observations. U.S. Fish and Wildlife Service (*in litt.*). December 2006.

Glenne, G. 1998. Nevada native species site survey reports. June and September 1998. On file at U.S. Fish and Wildlife Service, Las Vegas, Nevada.

Grime, J.P. 1977. Evidence for the existence of three primary strategies in plants and its relevance to ecological and evolutionary theory. The American Naturalist 111(982): 1169-1194.

Grime, J.P. 1984. The ecology of species, families and communities of the contemporary British flora. New Phytologist 98(1):15-33.

Hasselquist, N.J. and M. F. Allen. 2009. Increasing demands on limited water resources: consequences for two endangered plants in Amargosa Valley, USA. American Journal of Botany 96:620-626.

Hickman, J. ed. 1993. Jepson manual, higher plants of California. U.C. Press, Berkeley.

Holmgren, N.H. and P.K. Holmgren. 2002. New Mentzelias (Loasaceae) from the Intermountain region of Western United States. Systematic Botany 27:747-762.

Jepson, W.L. 1936. A Flora of California. Associated student store, Berkeley, California.

Johnston, S.C. and T.A. Zink. 2004. Demographics and ecology of the Amargosa niterwort (*Nitrophila mohavensis*) and Ash Meadows gumplant (*Grindelia fraxino-pratensis*) of the Carson Slough Area. Report to the Bureau of Land Management.

Knight, T.A., and G.H. Clemmer. 1987. Status of populations of the endemic plants of Ash Meadows, Nye County, Nevada. Report prepared for the U.S. Fish and Wildlife Service, Reno, Nevada. Project Agreement 86-2-1. 110 pages.

Morefield, J.D. 2001a. Nevada rare plant atlas: *Centaurium namophilum*. Report submitted to the U.S. Fish and Wildlife Service by the Nevada Natural Heritage Program, Carson City, Nevada.

Morefield, J.D. 2001b. Nevada rare plant atlas: *Enceliopsis nudicaulis* var. *corrugata*. Report submitted to the U.S. Fish and Wildlife Service by the Nevada Natural Heritage Program, Carson City, Nevada.

Morefield, J.D. 2001c. Nevada rare plant atlas: *Mentzelia leucophylla*. Report submitted to the U.S. Fish and Wildlife Service by the Nevada Natural Heritage Program, Carson City, Nevada.

Morefield, J.D. 2001d. Nevada rare plant atlas: *Ivesia kingii* var. *eremica*. Report submitted to the U.S. Fish and Wildlife Service by the Nevada Natural Heritage Program, Carson City, Nevada.

Morefield, J.D. 2001e. Nevada rare plant atlas: *Mentzelia leucophylla*. Report submitted to the U.S. Fish and Wildlife Service by the Nevada Natural Heritage Program, Carson City, Nevada.

Morefield, J.D. 2001f. Nevada rare plant atlas: *Nitrophila mohavensis*. Report submitted to the U.S. Fish and Wildlife Service by the Nevada Natural Heritage Program, Carson City, Nevada.

Morefield, J.D. 2001g. Nevada rare plant atlas: *Centaurium namophilum*. Report submitted to the U.S. Fish and Wildlife Service by the Nevada Natural Heritage Program, Carson City, Nevada.

Mozingo, N.H. and M. Williams. 1980. Threatened and endangered plants of Nevada. Report submitted to the U.S. Fish and Wildlife Service, Portland, Oregon, and Bureau of Land Management, Reno, Nevada. 268 pages.

Munns, R. 2002. Comparative physiology of salt and water stress. Plant, Cell and Environment 25:239-250.

Pavlik, B.M. and K. A. Moore. 2010. Reproductive biology of rare plants of Ash Meadows National Wildlife Refuge. Report submitted to U.S. Fish and Wildlife Service and BIO-WEST, Inc., by BMP Ecosciences, Oakland and Davis, California. 146 pages.

Pavlik, B.M. A.E. Stanton and M. Bernegger. 2006. Managing populations of rare plants at Ash Meadows National Wildlife Refuge. Demographic survey and habitat quality assessment to recover *Astragalus phoenix*. Unpublished report prepared for the U.S. Fish and Wildlife Service. December 2006. 39 pages.

Reveal, J.L. 1977. Mentzelia leucophylla. Mentzelia 3:31.

Reveal, J.L. 1978a. Status Report on *Astragalus phoenix* [Barneby] (Ash Meadows milk-vetch). Unpublished draft report prepared for the Department of the Interior. 30 pages.

Reveal, J.L. 1978b. Status Report on *Mentzelia leucophylla* [Brandgee] (Ash Meadows stick-leaf). Unpublished draft report prepared for the Department of the Interior. 35 pages.

Reveal, J.L. 1979. Biogeography of the intermountain region. A speculative appraisal. Mentzelia 4:1-92.

Reveal, J.L. and J.C. Beatly. 1971. Two new species from Nevada. Bulletin of the Torrey Botanical Club 98:332-335.

Reveal, J.L., C.R. Broome, and J.C. Beatley. 1973. A new Centaurium (Gentianaceae) from the Death Valley region of Nevada and California. Bulletin of the Torrey Botanical Club. 100: 353-356.

Roos, J. and L. Roos. 1995. Correspondence from John and Lucille Roos to Ash Meadows National Wildlife Refuge (*in litt.*). May 11, 1995.

SERG (Soil Ecology and Restoration Group) 2004. Demographics and ecology of the Amargosa niterwort (*Nitrophila mohavensis*) and Ash Meadows gumplant (*Grindelia* [sic] *fraxino-pratensis*) of the Carson Slough Area. Report to Anteon Corp. February 10, 2004.

Service (Fish and Wildlife Service). 1980. Devil's Hole pupfish recovery plan. U.S. Fish and Wildlife Service unpublished report, Portland, Oregon.

Service (Fish and Wildlife Service). 1990. Recovery plan for the endangered and threatened species of Ash Meadows, Nevada. U.S. Fish and Wildlife Service, Portland, Oregon. 123 pages.

Service (Fish and Wildlife Service). 2007. Amargosa niterwort (*Nitrophila mohavensis*) five-year review: summary and evaluation. Las Vegas, Nevada: Nevada Fish and Wildlife Office. December 2007.

Service (Fish and Wildlife Service). 2001. Proposal to delist four species and remove critical habitat from Nye County, Nevada and Inyo County, California. June 14.

Wetherwax, M., D.H. Wilken, and N.H. Holmgren. 2012 (v. 1.0). Jepson eFlora, *Nitrophila mohavensis*, Jepson flora project. http://ucjeps.berkeley.edu/IJM.html accessed on June 6, 2012.

White Horse Associates. 2010. Landtypes, Ash Meadows NWR. Report submitted to Ash Meadows National Wildlife Refuge by White Horse Associates, Smithfield, Utah. 1445 pages.

Willoughby, J. 2011. Monitoring of the lower Carson Slough population of Amargosa niterwort near Death Valley Junction , California 2010-2011. Draft Report submitted to Bureau of Land Management, California State Office, Sacramento, California. 51 pages.

Personal Communications- Ash Meadows Plants

Baldino, C. 2012. Biologist for Ash Meadows National Wildlife Refuge, U.S. Fish and Wildlife Service, Amargosa Valley, Nevada. Email communications on OHV activity to Sarah Kulpa, Nevada Fish and Wildlife Office, Reno, Nevada. June 5, 2012.

Breit, G.N. 2010. Mineral Resource Specialist at U.S. Geological Survey, Denver Federal Center. Personal communication and PowerPoint slides via electronic email on soil moisture profiles to Cristi Baldino, Ash Meadows National Wildlife Refuge. September 27, 2010 and October 8, 2010.

Jenson, S. 2010. Soil Scientist for White Horse Associates, Smithfield, Utah. Email communication on Ash Meadows landtypes and hydric soil properties to Cristi Baldino, Ash Meadows National Wildlife Refuge. September 3, 2010.

Schenk, J.J. 2010. Post-doctoral associate, Florida State University, Department of Biological Science. Phone conversation and discussion of *Mentzelia* section *Bartonia* genetics with Sarah Kulpa, Nevada Fish and Wildlife Office. October 13, 2010.

13.6 **Ash Meadows Aquatic Species**

Brown, J.H. and C.R Feldmeth. 1971. Evolution in constant and fluctuating environments: Thermal tolerances of desert pupfish (Cyprinodon). Evolution 25(2):390-398

Deacon, J.E., A.E. Williams, C.D. Williams, and J.E. Williams. 2007. Fueling population growth in Las Vegas: how large-scale groundwater withdrawal could burn regional biodiversity. Bioscience 57:688-698.

Dudley, W. W. and J. D. Larson. 1976. Effect of irrigation pumping on desert pupfish habitats in Ash Meadows, Nye County, Nevada. U.S. Geological Survey Professional Paper 927. 52 pages.

Feldmeth, C.R. 1981. The evolution of thermal tolerance in desert pupfish (Genus Cyprinodon). Pages 357-384. *In* Fishes in North American Deserts. R.J. Naiman, and D.L. Soltz, eds. Wiley-Interscience, New York.

Gerking, S. D. and R. M. Lee. 1983. Thermal limits for growth and reproduction in the desert pupfish Cyprinodon evadensis. Physiological Zoology 56(1):1-9.

Gilbert, C.H. 1893. Report on the fishes of the Death Valley expedition collected in southern California and Nevada in 1891, with descriptions of new species. North American Fauna 7:229-234.

Glick, P., B. A. Stein, and N. A. Edelson, editors. 2011. Scanning the conservation horizon: A guide to climate change vulnerability assessment. National Wildlife Federation, Washington, D.C. 168 pages.

Hirshfield, M.F., C.R. Feldmeth, and D.L. Soltz. 1980. Genetic differences in physiological tolerances of Amargosa pupfish (*Cyprinodon nevadensis*) populations. Science 207 (4434), 999-1001. [DOI:10.1126/science.207.4434.999]

Hubbs, C.L., R.R. Miller, and L.C. Hubbs. 1974. Hydrographic history and relict fishes of the north-central Great Basin. Memoirs of the California Academy of Science 7:1-259.

John, K.R. 1964. Survival of fishes in intermittent streams of the Chiricahua Mountains, Arizona. Ecology 45(1):112-119.

Knight, T.A. and G.H. Clemmer. 1987. Status of populations of the endemic plants of Ash Meadows, Nye County, Nevada. Report prepared for the U.S. Fish and Wildlife Service, Reno, Nevada. Project agreement 86-2-2. 110 pages.

La Rivers, I. 1962. Fishes and fisheries of Nevada. Nevada State Fish and Game Commission, Carson City. 782 pages.

Lee, R. M. and S. D. Gerking. 1980. Survival and reproductive performance of the desert pupfish, *Cyprinodon n. nevadensis* (Eigenmann and Eigenmann), in acid waters. Journal of Fish Biology 17(5):507-515.

McCauley, R.W. and D.A. Thomson. 1988. Thermoregulatory activity in the Tecopa pupfish, *Cyprinodon nevadensis amargosae*, an inhabitat of a thermal spring. Environmental Biology of Fishes 2:135-139, DOI: 10.1007/BF00000744

Miller, R.R. 1943. The status of Cyprinodon macularius and Cyprinodon nevadensis, two desert fishes of western North America. Occasional Papers of the Museum of Zoology, University of Michigan 473:1-25.

Miller, R.R. 1948. The cyprinodont fishes of the Death Valley system of eastern California and southwestern Nevada. Miscellaneous Publications of the Museum of Zoology, University of Michigan 68:1-155.

Moyle, P.B. 1976. Inland fishes of California. University of California Press, Berkeley. 405 pages.

Miller, R. R. 1984. *Rhinichthys deaconi*, a new species of dace (Pisces: Cyprinidae) from southern Nevada. Occasional papers of the Museum of Zoology, Number 707, University of Michigan, Ann Arbor, Michigan. 21 pages.

Minckley, W. L. 1973. Fishes of Arizona. Phoenix: Arizona Game and Fish Department, Sims Printing Company. 293 pages.

Minckley, C. O., and J. E. Deacon. 1973. Observations on the reproductive cycle of *Cyprinodon diabolis*. Copeia 3:610-613.

Minckley, C. O., and J. E. Deacon. 1975. Foods of the Devils Hole pupfish, *Cyprinodon diabolis* (Cyprinodontidae). The Southwestern Naturalist 20:105-111.

Mueller, G.A. 1984. Spawning by Rhinichthys osculus (Cyprinidae) in the San Francisco River, New Mexico. The Southwestern Naturalist 29:354-356.

Naiman, R.J. 1979. Preliminary food studies of Cyprinodon macularius and Cyprinodon nevadensis (Cyprinodontidae). Southwestern Naturalist 24:538-541.

NDOW (Nevada Department of Wildlife). 2007. Native fish and amphibians field trip report. Ash Meadows National Wildlife Refuge.

Otto, R.G. and S.D. Gerking. 1973. Heat tolerance of a desert valley pupfish (Genus *Cyprinodon*). Physiological Zoology 46:43-49.

Parker, M. S., Scoppettone, G. G., Neilson, B. M. 2000. Ecological investigations of two naucorid species (*Ambrysus amargosus* and *A. relictus*) endemic to thermal springs of the Ash Meadows National Wildlife Refuge, Nevada. Final report to U.S. Fish and Wildlife Service. 58 pages.

Polhemus, D. 1994. Proposed recovery actions for the Ash Meadows naucorid (Ambrysus amargosus La Rivers) at Ash Meadows National Wildlife Refuge, Nevada. Correspondence to the Fish and Wildlife Service, September 26, 1994. 12 pages.

Shrode, J.B. and S.D. Gerking. 1977. Effects of constant and fluctuating temperatures on reproductive performance of a desert pupfish, *Cyprinodon n. nevadensis*. Physiological Zoology 50(1):1-10.

Scoettone, G. G., H. L. Burge, P. L. Tuttle, M. Parker, and N. K. Parker. 1987. Life history and status of the Moapa dace (*Moapa coriacea*). Unpublished report: U.S. Fish and Wildlife Service, National Fisheries Research Center, Seattle, Washington. 77 pages.

Scoppettone, G., P. Rissler, S. Byers, S. Shea, B. Nielsen, and J. Sjoberg. 1995. Information on the status and ecology of Ash Meadows fishes and Ambrysus. Unpublished Report. National Biological Service - Reno Field Station and Nevada Department of Wildlife, Las Vegas, Nevada.

Service (Fish and Wildlife Service). 1990. Recovery plan for the endangered and threatened species of Ash Meadows, Nevada. U.S. Fish and Wildlife Service, Reno, Nevada. 130 pages.

Service (Fish and Wildlife Service). 2000. AMNWR 2000 native fish survey. November 15, 2000. Draft unpublished report prepared by the Service, AMNWR, Nye County, Nevada. 7 pages.

Soltz, D. L. and R. J. Naiman. 1978. The natural history of native fishes in the Death Valley system. Natural History Museum of Los Angeles County, Science Series 30:1-76.

Spielman, D., B. W. Brook, and R. Frankham. 2004. Most species are not driven to extinction before genetic factors impact them. Proceedings of the National Academy of Science 42: 15261-15264.

USGS (U.S. Geological Survey). 2005. Selected ground-water data for Yucca Mountain Region, southern Nevada and eastern California, January-December 2003. Open file report 2005-1286.

USGS (U.S. Geological Survey). 2008. Relative abundance and distribution of fishes and crayfish at Ash Meadows, Nye County, Nevada. Annual report (DRAFT). USGS, Western Fisheries Research Center, Reno Field Station. On file at Ash Meadows National Wildlife Refuge, Amargosa Valley, Nevada.

Vasek, F. C., H. B. Johnson, and D. H. Eslinger. 1975. Effects of pipeline construction on creosote bush scrub vegetation of the Mojave Desert. Madroño 23:1-13.

White Horse Associates. 2010. Landtypes at Ash Meadows NWR (Draft). Ash Meadows National Wildlife Refuge, Amargosa Valley, Nevada. June 20, 2010. 541 pages plus appendices.

Williams, J.E. and D.W. Sada. 1985. Status of two endangered fishes, *Cyprinodon nevadensis mionectes* and *Rhinichthys osculus nevadensis*, form two springs in Ash Meadows, Nevada. The Southwestern Naturalist, 30:475-484

Williams, C.D. and J.E. Williams. 1982. Summer food habits of fishes from two springs in east-central Nevada. The Southwestern Naturalist 27:437-445.

13.7 **Moapa Dace**

Coburn, M.M. and T.M. Cavendar. 1992. Interrelationships of North American cyprinid. Pages 328-273, *In* Systematics, Historical Ecology, and North American Freshwater Fishes. R.L. Mayden (ed.). Stanford University Press, Stanford, California.

Cross, J. N. 1976. Status of the native fish fauna of the Moapa River (Clark County, Nevada). Transactions of the American Fisheries Society 105(4):503-508.

Deacon, J. E. and W. C. Bradley. 1972. Ecological distribution of the fishes of the Moapa (Muddy) River in Clark County, Nevada. Transactions of the American fish society 101(3): 408-419.

Hubbs, C. L. and R. R. Miller. 1948. Two new, relict genera of cyprinid fishes from Nevada. University of Michigan Museum of Zoology Occasional Paper 507:1-30.

Ono, R. D., J. D. Williams, and A. Wagner. 1983. Vanishing fishes of North America. Stone Wall Press, Washington, D.C. 257 pages.

Resource Concepts, Inc. 2005. Biological assessment/biological evaluation, Coyote Springs Investment. Prepared for Coyote Springs Investment, LLC, Sparks, Nevada. 38 pages plus appendices.

Rinne, John N. and W.L. Minckley. 1991. Native fishes of arid lands: a dwindling resource of the desert southwest. General technical report RM-206. Fort Collins, Colorado; U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 45 pages.

Scoppettone, G. G., H. L. Burge, and P. L. Tuttle. 1992. Life history, abundance, and distribution of Moapa dace (*Moapa coriacea*). Great Basin Naturalist 52:216-225.

Scoppettone, G. G. 1993. Interactions between Native and Nonnative Fishes of the Upper Muddy River, Nevada. Transactions of the American Fisheries Society 122:599-608.

Service (Fish and Wildlife Service). 1995. Recovery plan for the rare aquatic species of the Muddy River Ecosystem. Portland, Oregon. 60 pages.

Service (Fish and Wildlife Service). 2006. Intra-Service programmatic biological opinion for the proposed Muddy River MOA regarding the groundwater withdrawal of 16,100 acre-feet per year from the regional carbonate aquifer in Coyote Spring Valley and California Wash Basins, and establish conservation measures for the Moapa Dace, Clark County, Nevada. Intra-Service biological opinion, File No. 1-5-05-FW-536. January 11, 2006.

Service (Fish and Wildlife Service). 1996. Recovery plan for the rare aquatic species of the Muddy River ecosystem. Service; Portland, Oregon. 60 pages.

APPENDIX A. REQUEST TO APPEND ACTION FORM

ACTION APPENDED TO THE BLM's SOUTHERN NEVADA DISTRICT PROGRAMMATIC BIOLOGICAL OPINION (File No. 84320-2010-F-0365)

This consultation consists of the programmatic biological opinion (PBO), BLM's request to append the proposed action to the PBO with project-specific information (Part A, below), and the Fish and Wildlife Service's response (Part B, below).

Fish and Wildlife Service File No. for Proposed Action:

____
(provided by Fish and Wildlife Service)

Part A: Information provided by the BLM

Date of request:		
BLM contact name: phone number:		
Project/action title:		
Proponent/applicant:		
Program:		
Species/critical habitat affected:		
No. of acres to be affected:	Non-critical:	Critical:

Description of Proposed Action:

- What is the Federal action (*e.g.*, right-of-way, permit, lease, etc.)?
- When would the action begin/end?
- What are the specific activities that would be implemented; how will they affect listed species and their critical habitat?
- How will access to work areas be accomplished?

Proposed Minimization Measures and Remuneration Fees:

[Terms and conditions for desert tortoise in the PBO may be referenced by number with a brief summary (*e.g.,* T&C 1.a. Designate and require a field contact representative); additional measures may be proposed by BLM beyond those in the PBO.]

Survey Summary and Results:

- Describe in detail, the pre-project survey results including description or condition of the habitat, dominant vegetation, and existing disturbance.
- Attach survey data sheets and maps.

Description of existing factors affecting the species in the project (action) area not discussed in the PBO:

- Describe current and prior human uses or activities in the action area. Include reference to previous consultations in the action area and reports of such actions submitted to the Service.

Part B: Fish and Wildlife Service Response File No.

Date received:
Date of response:

1. Environmental baseline

a. The status of the species and factors affecting the species in the action area are described in the PBO and information provided by the BLM (Part A).

b. See Part A for factors affecting the species in the action area. Table 3 in the PBO provides the maximum habitat disturbance thresholds for each program and sub-program; and Table 14 in the PBO provides the incidental take exemption limits.

2. Project-specific effects of proposed action

a. Reference the section and page numbers of the PBO that describe the effects that apply to the proposed appended action:

b. In addition to the general, programmatic-level effects described in the PBO, the proposed action is anticipated to result in the following effects:

- Adult/subadult tortoise:
- Juvenile tortoise:
- Non-critical habitat affected:
- Critical habitat and critical habitat unit affected:
- Other effects:

3. Conclusion

4. Project-level Incidental Take Statement (desert tortoise)

a. Amount or Extent of Take Exempted:

1) Based on the analysis of effects provided above, minimization measures, and anticipated project duration, implementation of the proposed project is anticipated to result in the following take of desert tortoise:

Exempted Mortality, Injury, and Destruction (eggs)			**Exempted Non-injury - Mortality**		**Anticipated Habitat Loss (acres)**	
Adult/subadult	Juvenile	Egg	Adult/subadult	Juvenile	Critical	Non-critical

2) In addition to the incidental take above, incidental take may occur as a result of indirect effects (*e.g.,* tortoises taken by ravens attracted to the project site or tortoises disturbed by noise and general project activities). The actual number of tortoises taken as a result of indirect effects is often estimated or stated as unknown due to the difficulty in quantifying such effects.

b. Project-Specific Reasonable and Prudent Measures and Terms and Conditions. Provide (cut and paste) complete list of measures to ensure that project biologists and monitors are provided all appropriate measures for the project. As a term and condition, BLM will report the status and effects of the appended project/action annually and upon completion for the project in accordance with the reporting requirements in the PBO.

Based on the information provided by the BLM and our analysis above, it is the Service's biological opinion that the proposed activity is within the scope of the PBO and is hereby appended.

Signature: ______________________________ ______________

Assistant Field Supervisor Date
Nevada Fish and Wildlife Office
Las Vegas, Nevada

cc:
Supervisory Biologist- Habitat, Nevada Department of Wildlife, Las Vegas, Nevada

APPENDIX B. FIGURES

Figure 1. USGS (2009) Modeled Desert Tortoise Habitat

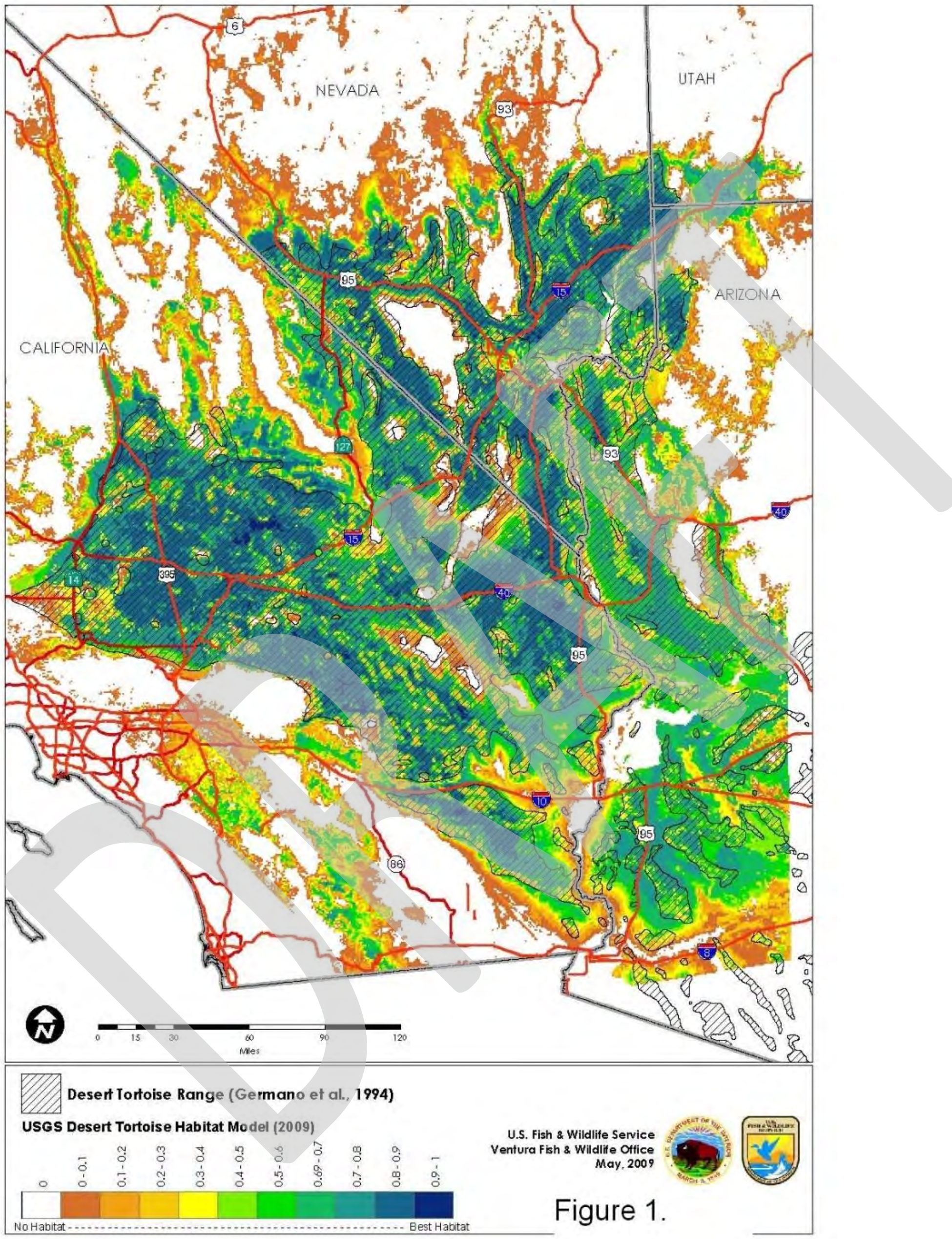


Figure 1.

Figure 2. Action Area

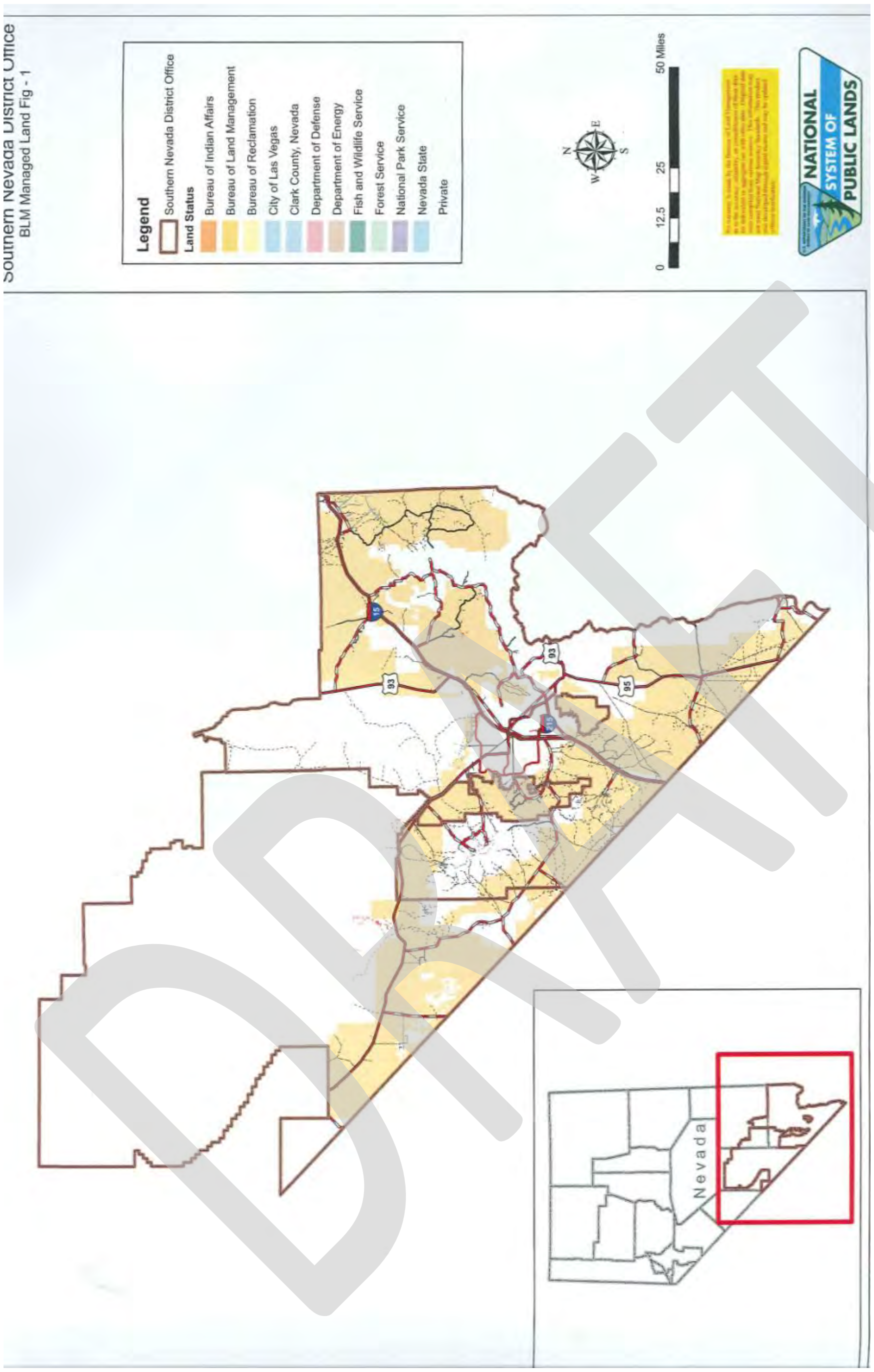


Figure 3. Locatable Minerals

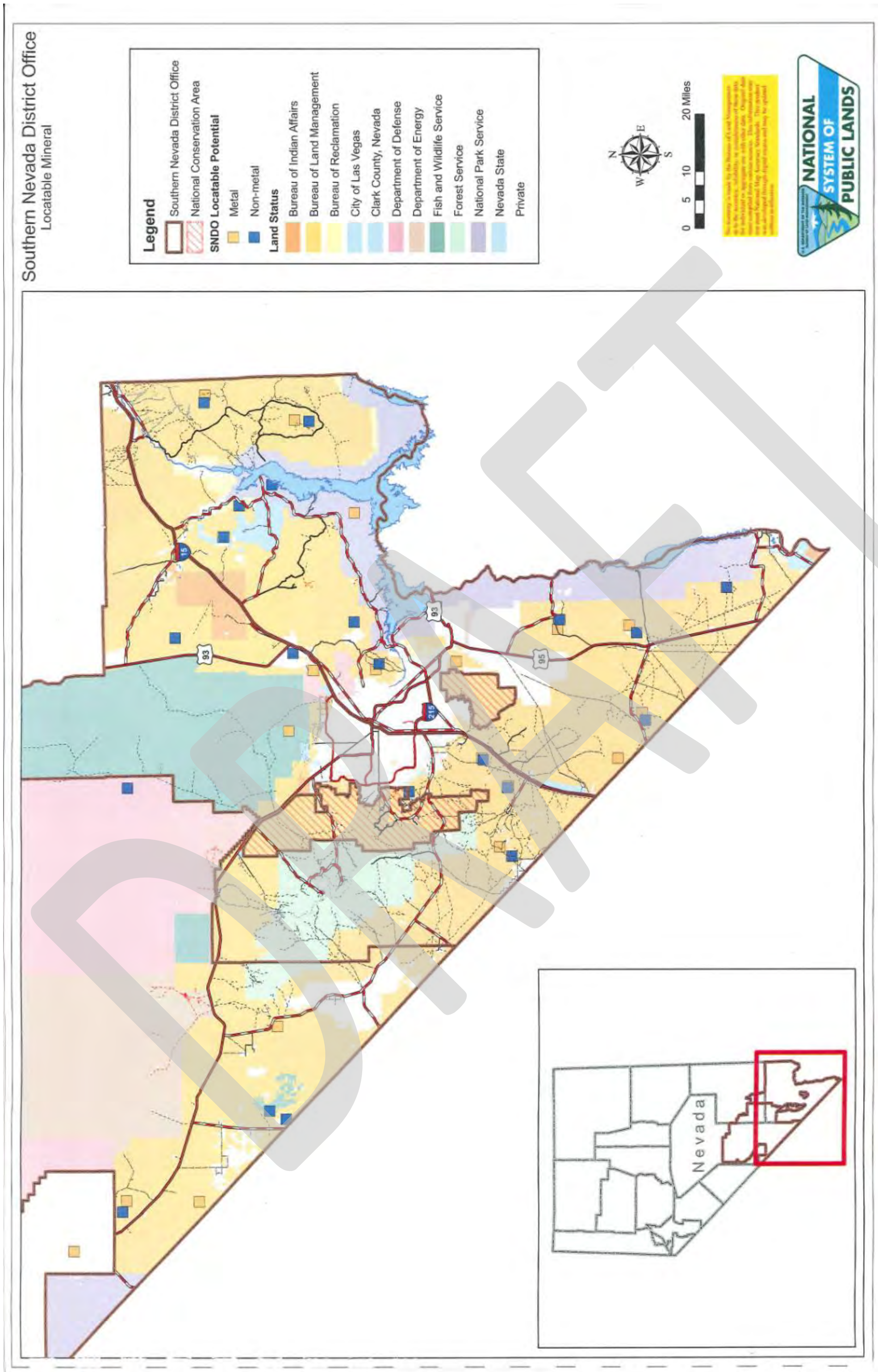


Figure 4. Muddy Mountain Race Courses

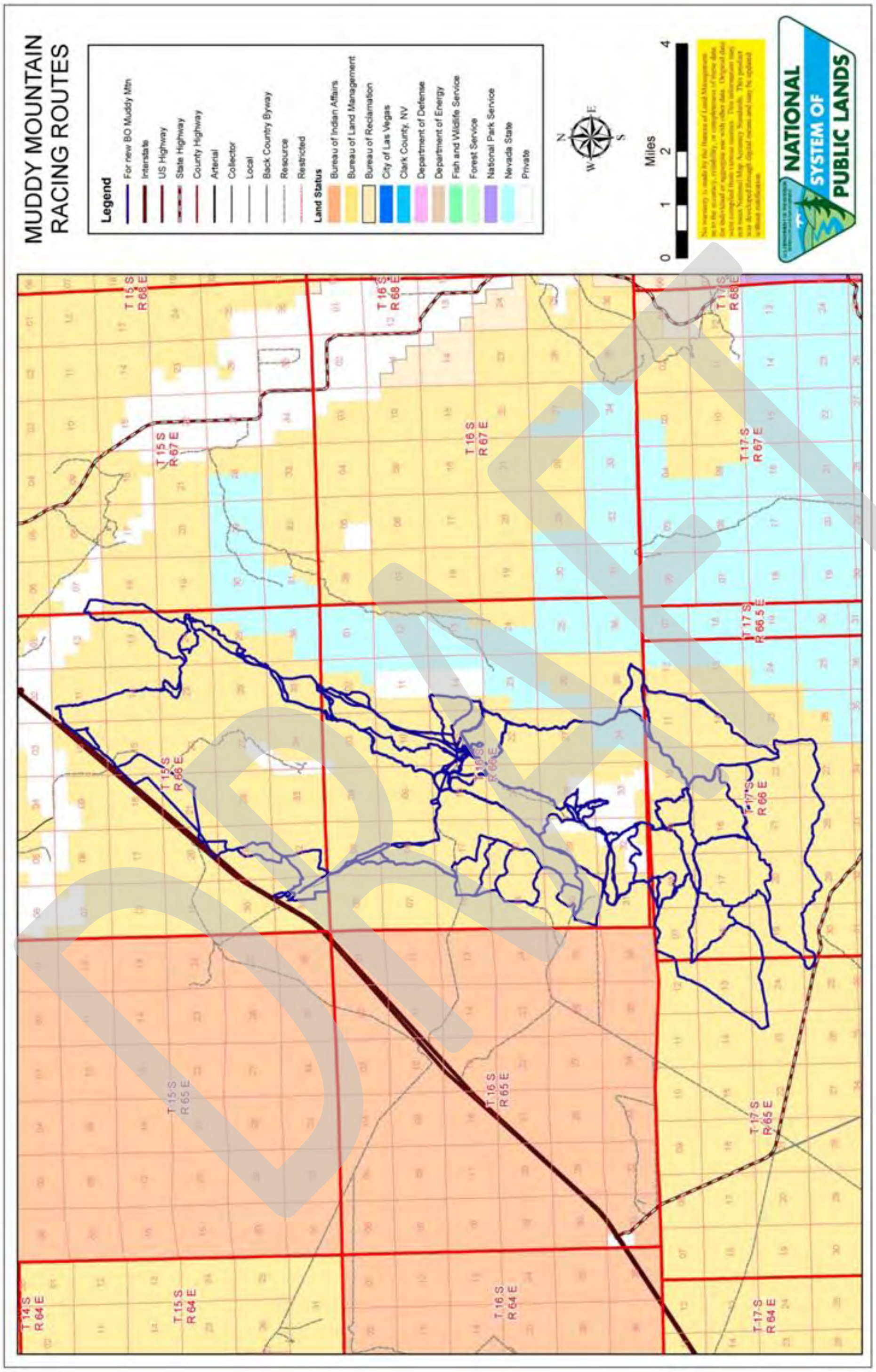


Figure 5. Bitter Springs Race Courses

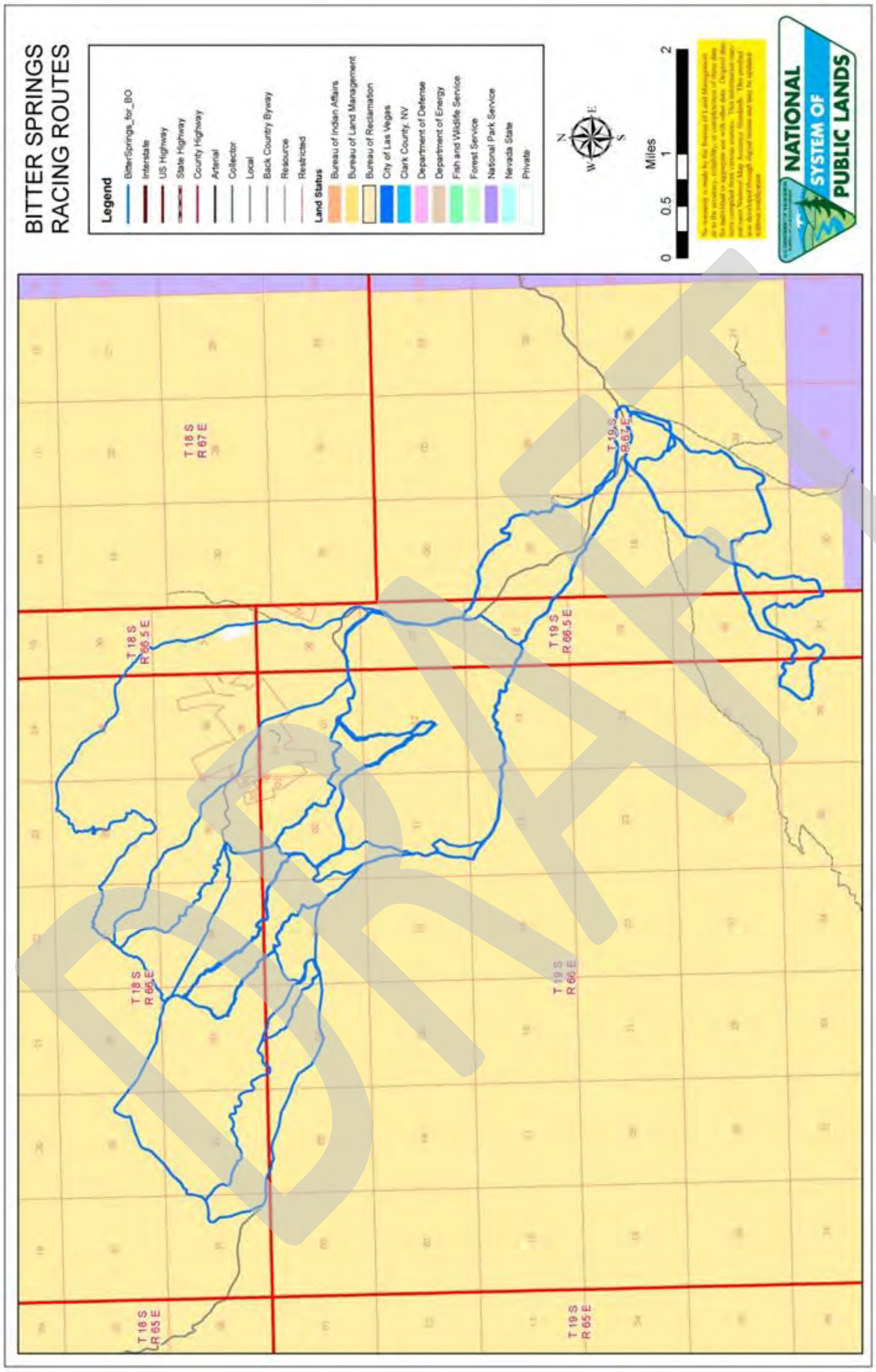


Figure 6. Goodsprings Motorcycle Race Courses

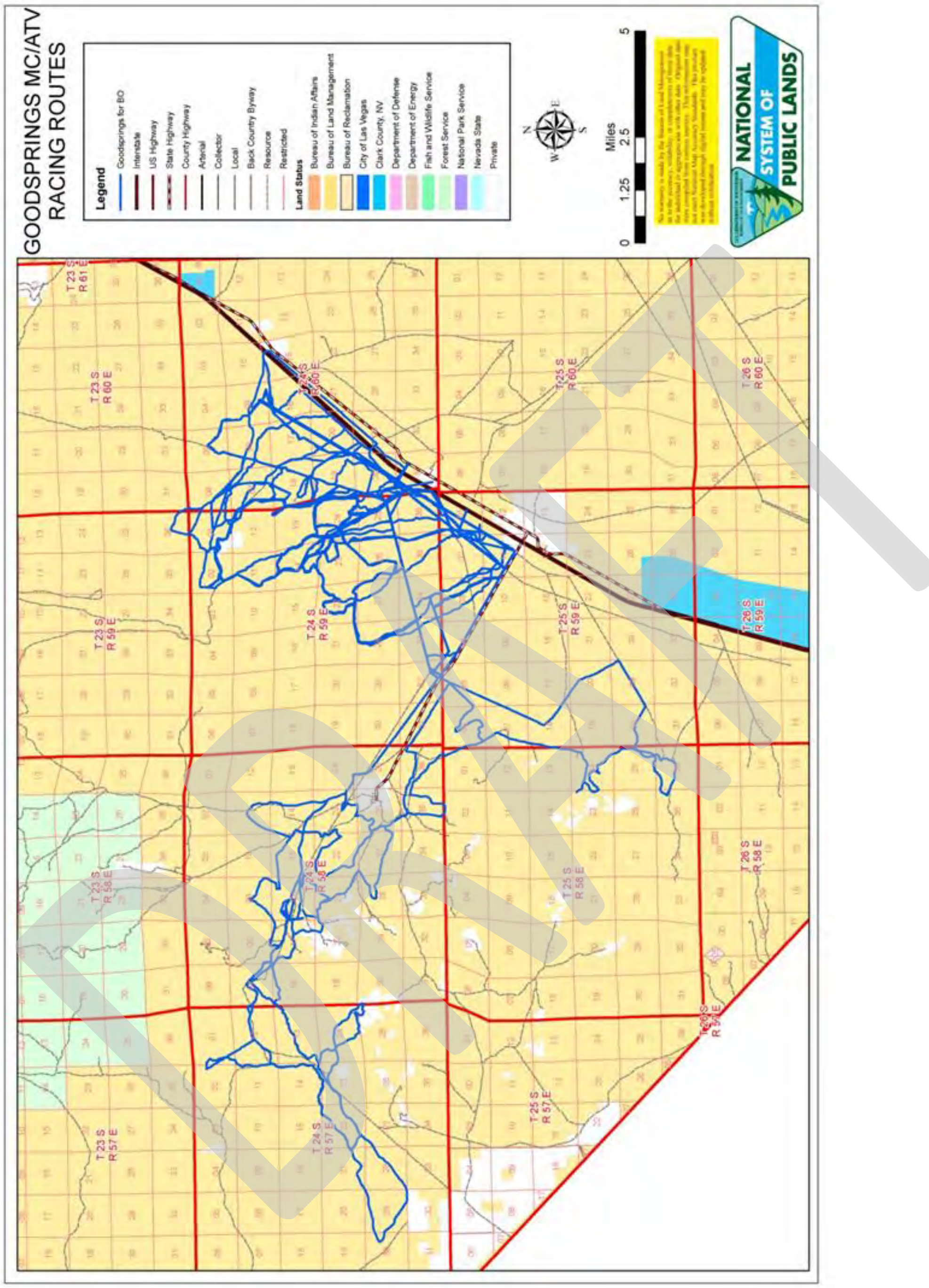


Figure 7. Jean Motorcycle Race Courses

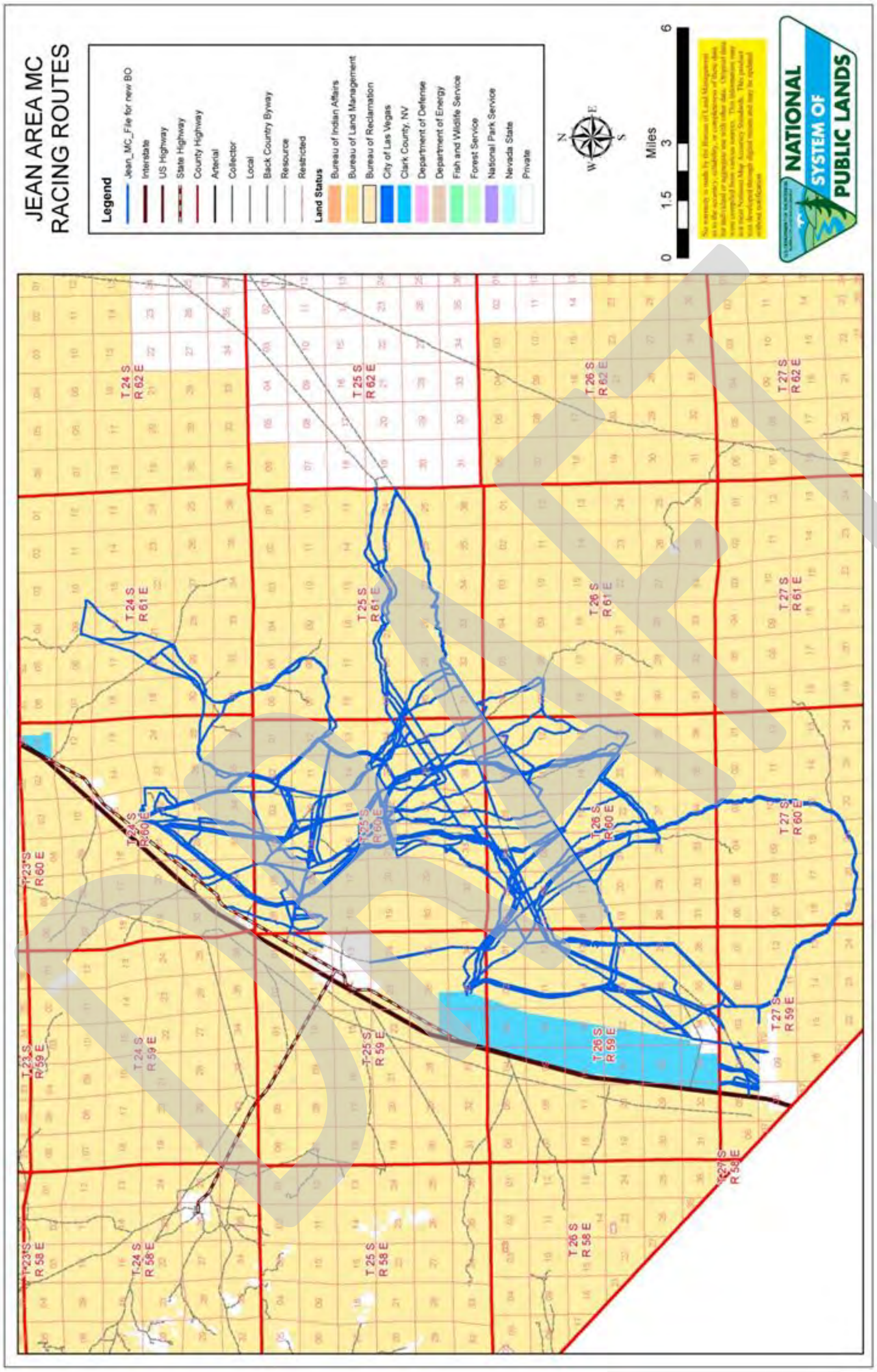


Figure 8. Jean Truck and Buggy Race Courses

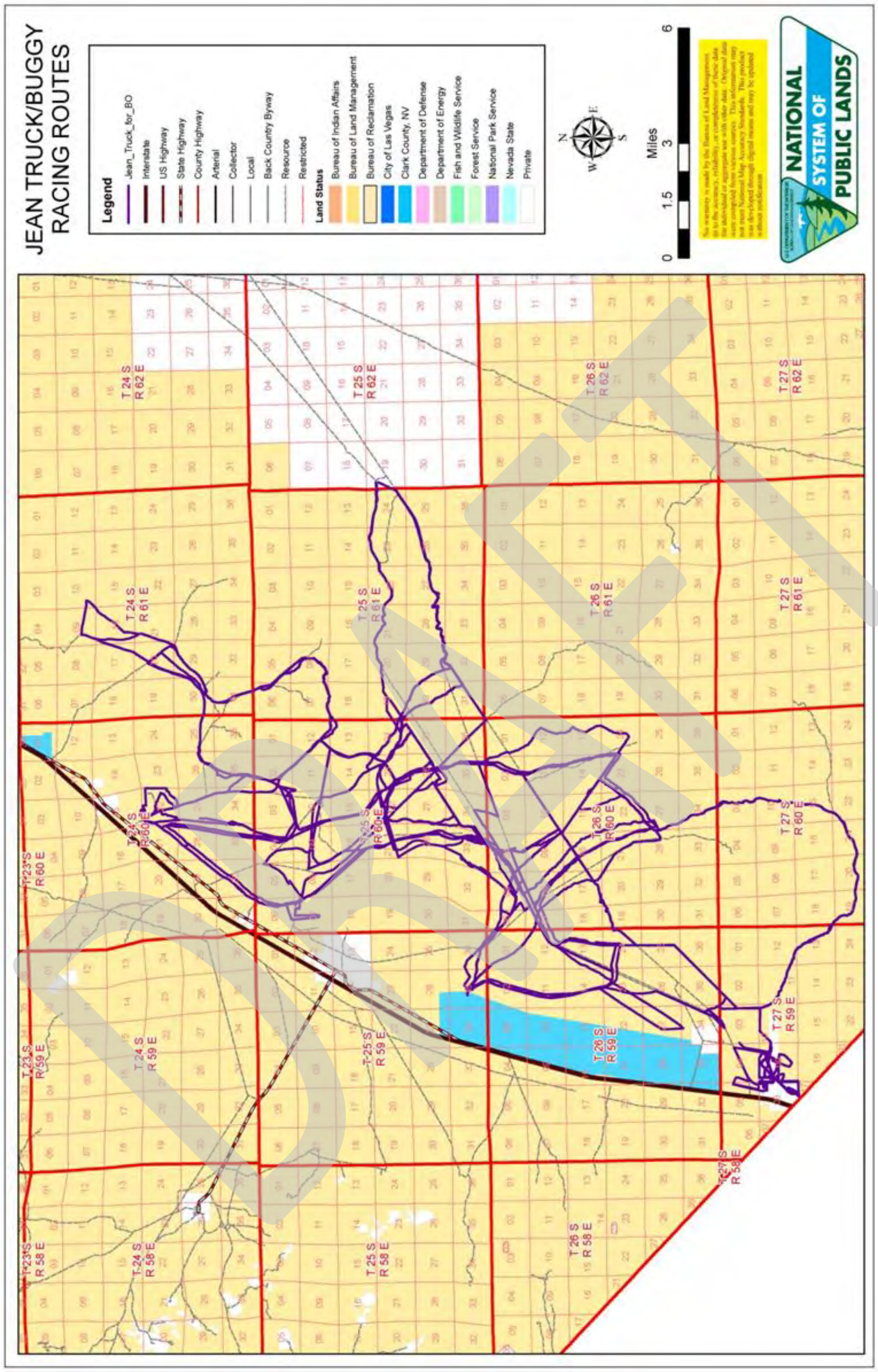


Figure 9. Nelson Hills Motorcycle Race Course

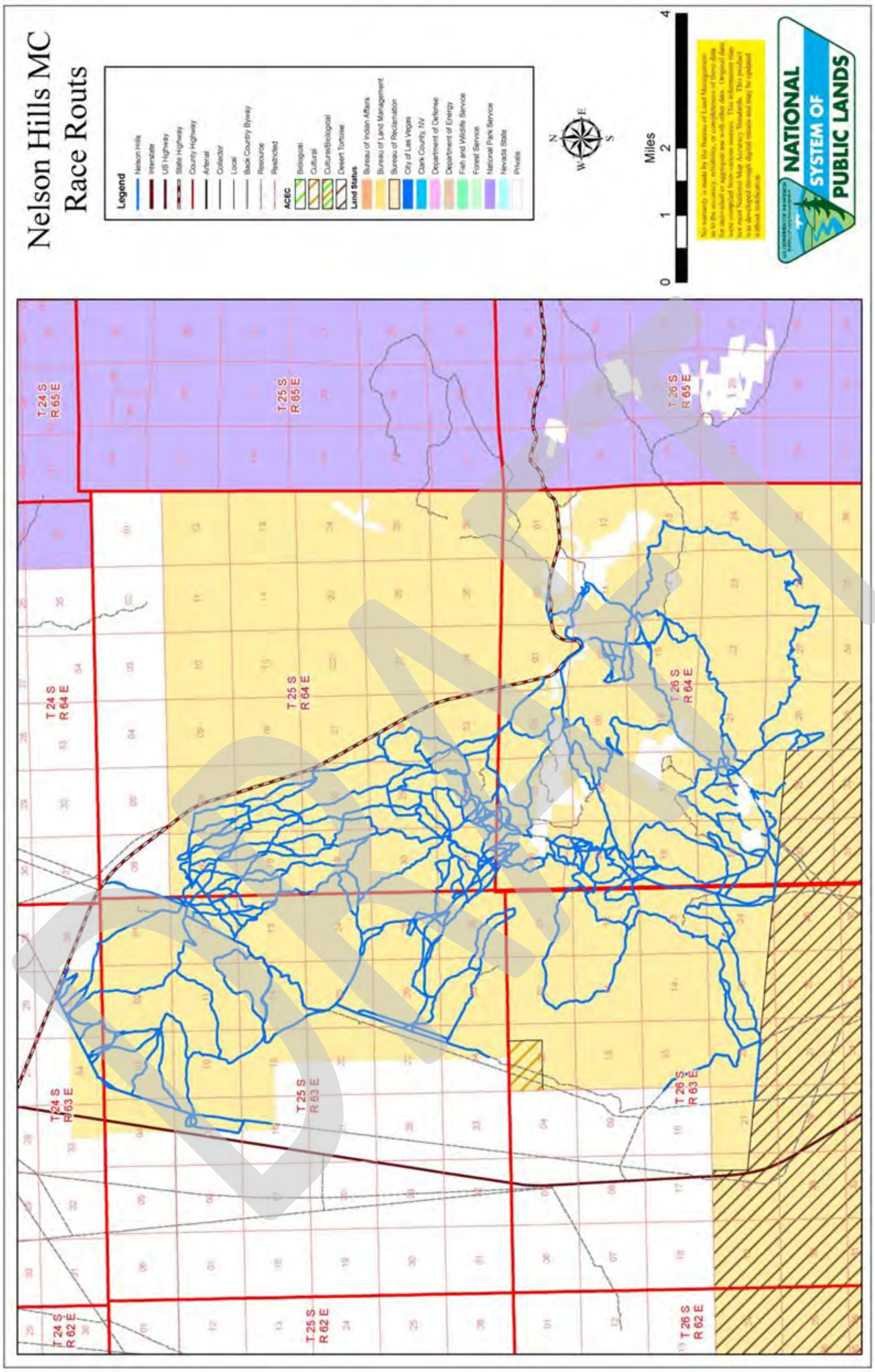

Nelson Hills MC
Race Routs
Legend
Nelson Hills
Interstate
US Highway
State Highway
County Highway
Arterial
Collector
Local
Back Country Byway
Resource
Restricted
ACEC
Biological
Cultural
Cultural/Biological
Desert Tortoise
Land Status
Bureau of Indian Affairs
Bureau of Land Management
Bureau of Reclamation
City of Las Vegas
Clark County, NV
Department of Defense
Department of Energy
Fish and Wildlife Service
Forest Service
National Park Service
Nevada State
Private
N
E
S
W
0
1
2
4
Miles
NATIONAL SYSTEM OF PUBLIC LANDS
T 24 S R 65 E
T 25 S R 65 E
T 26 S R 65 E
T 24 S R 64 E
T 25 S R 64 E
T 26 S R 64 E
T 24 S R 63 E
T 25 S R 63 E
T 26 S R 63 E
T 24 S R 62 E
T 25 S R 62 E
T 26 S R 62 E

Figure 10. Amargosa Valley Truck and Buggy Race Course

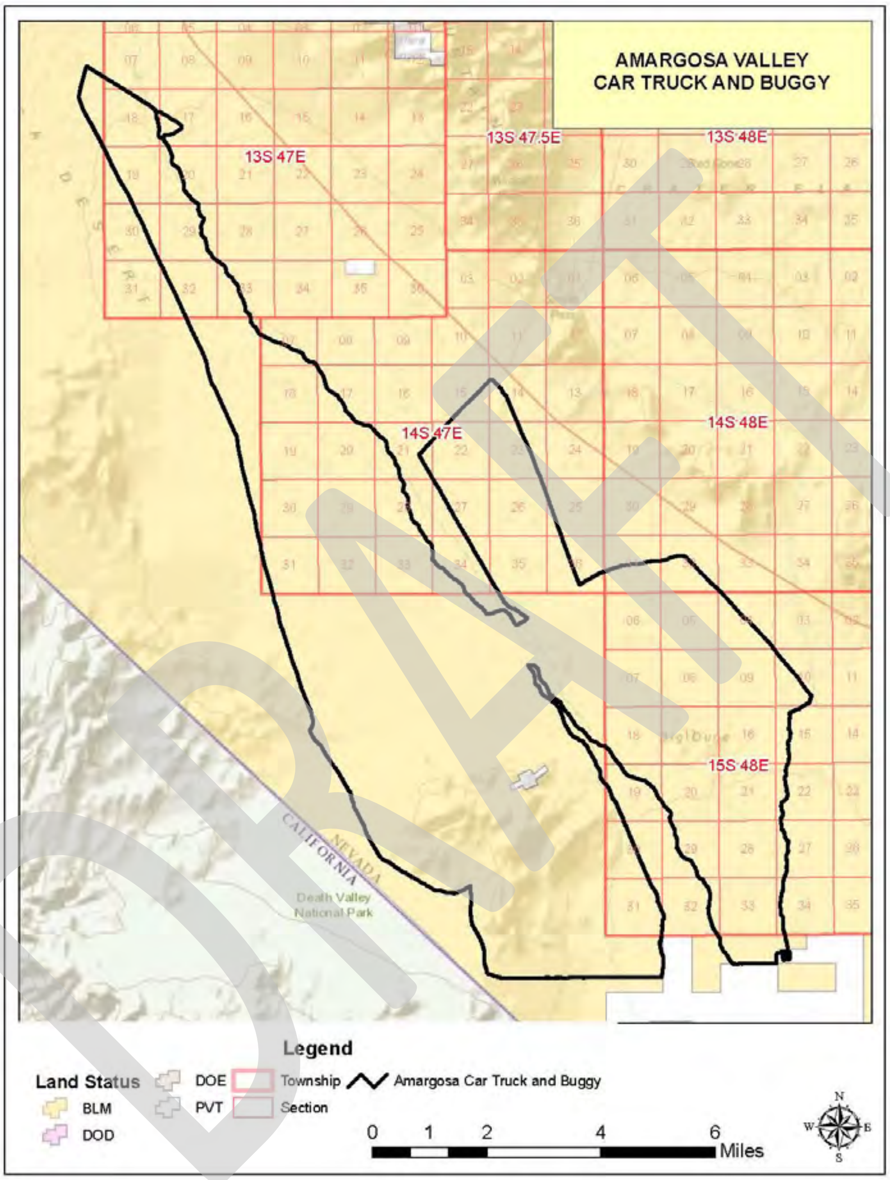


Figure 11. Crater Flat Motorcycle and ATV Race Course

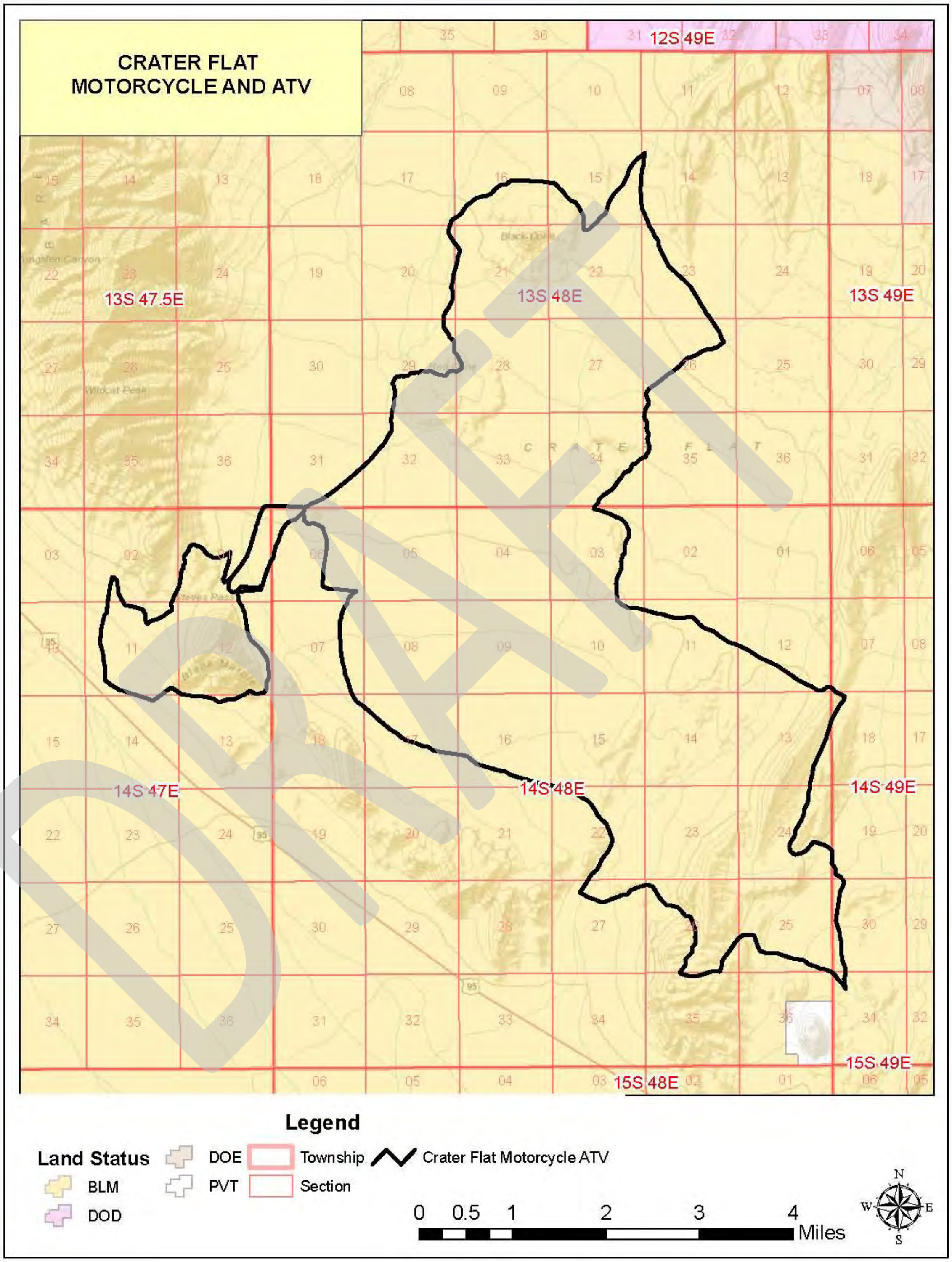


Figure 12. Last Chance Range Motorcycle and ATV Race Course

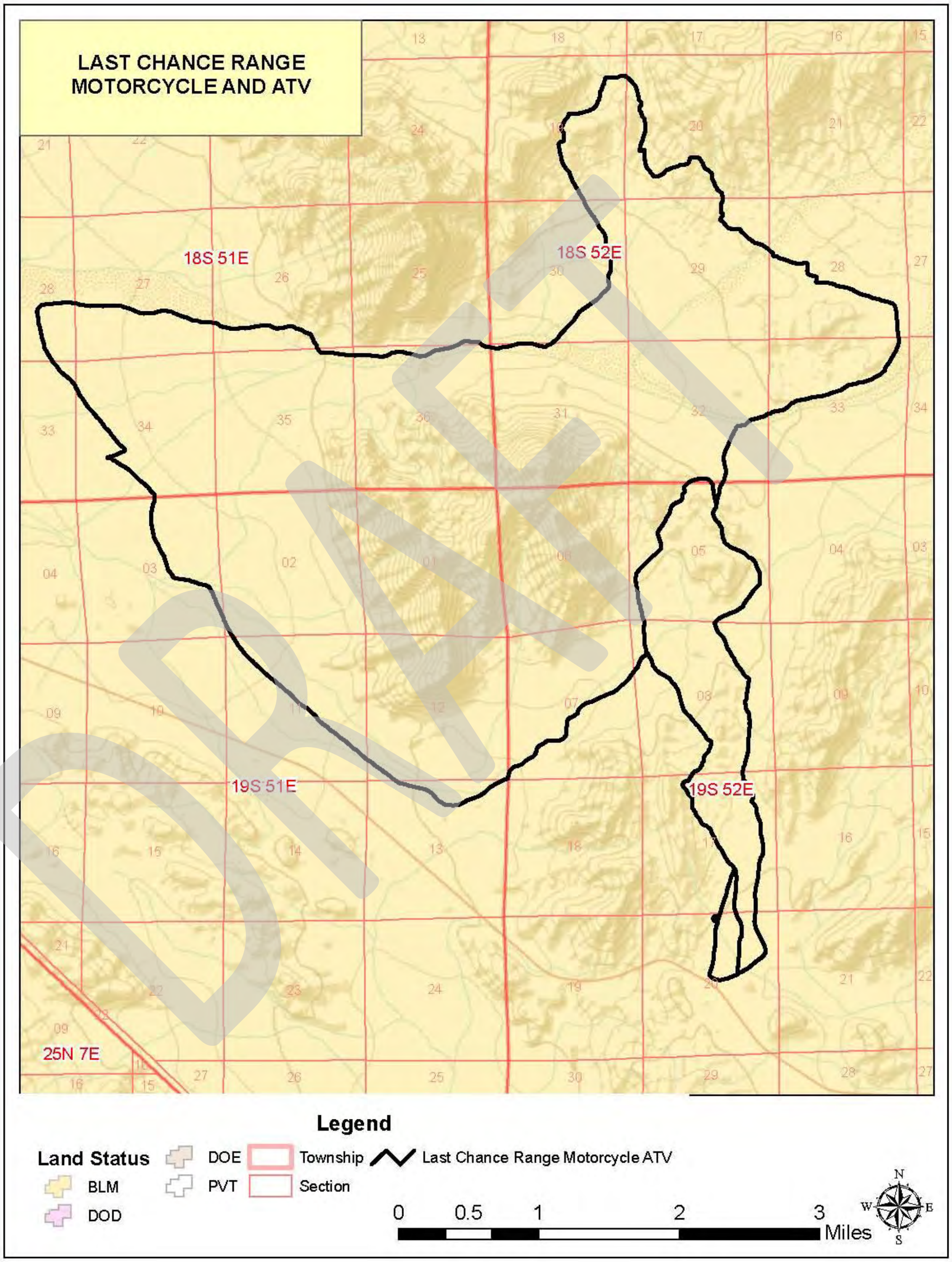


Figure 13. Laughlin Motorcycle Race Course

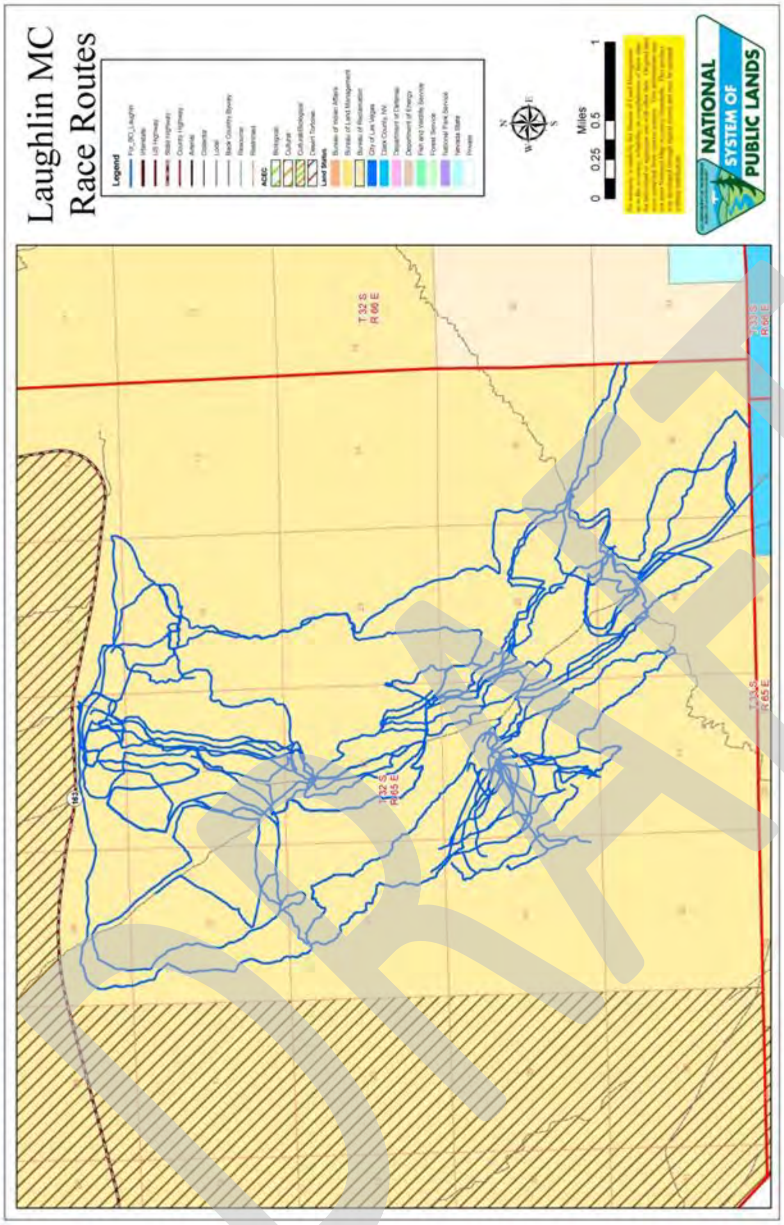


Figure 14. Crescent Peak Motorcycle Race Course

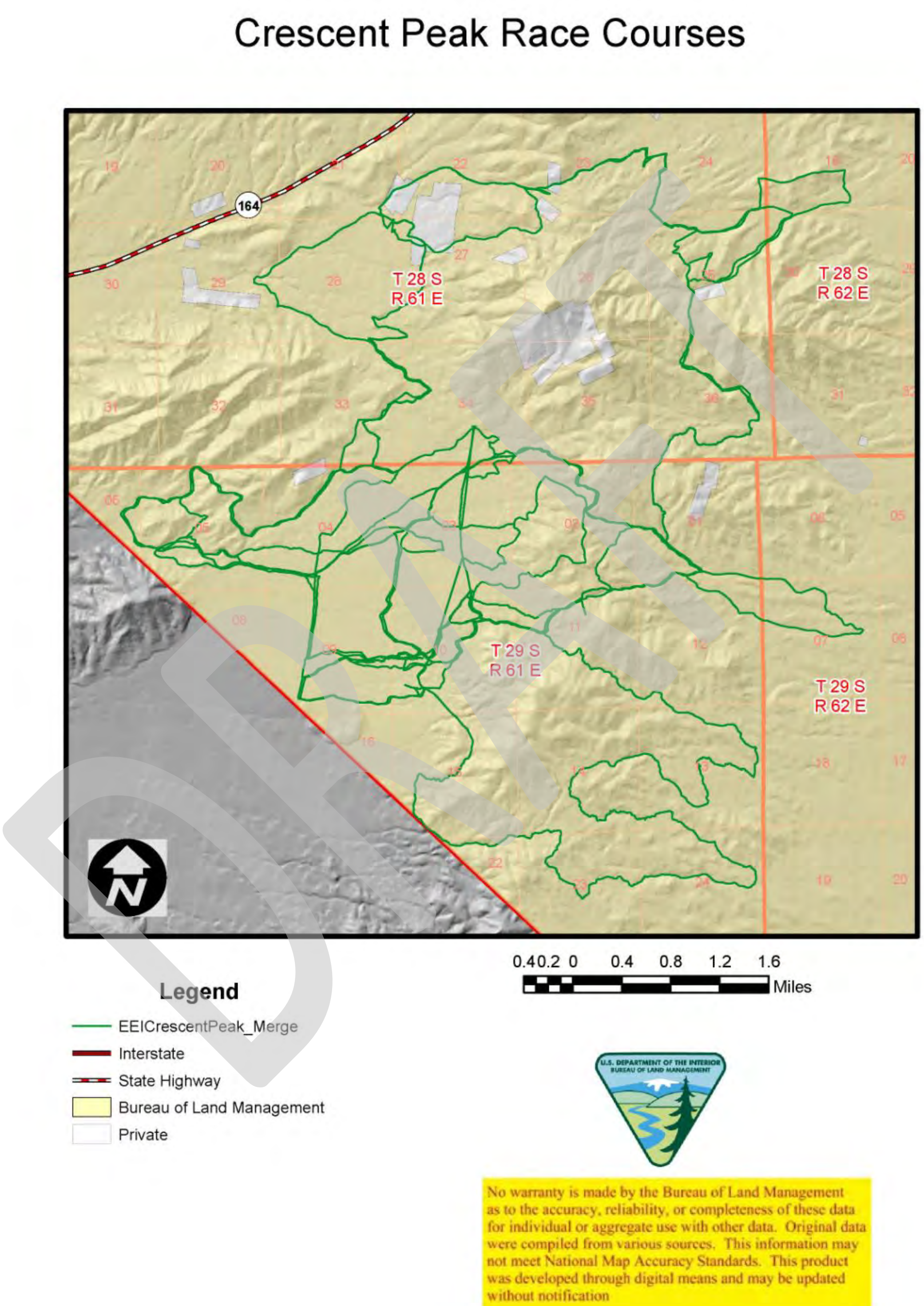


Figure 15. North Jean Pit OHV Area

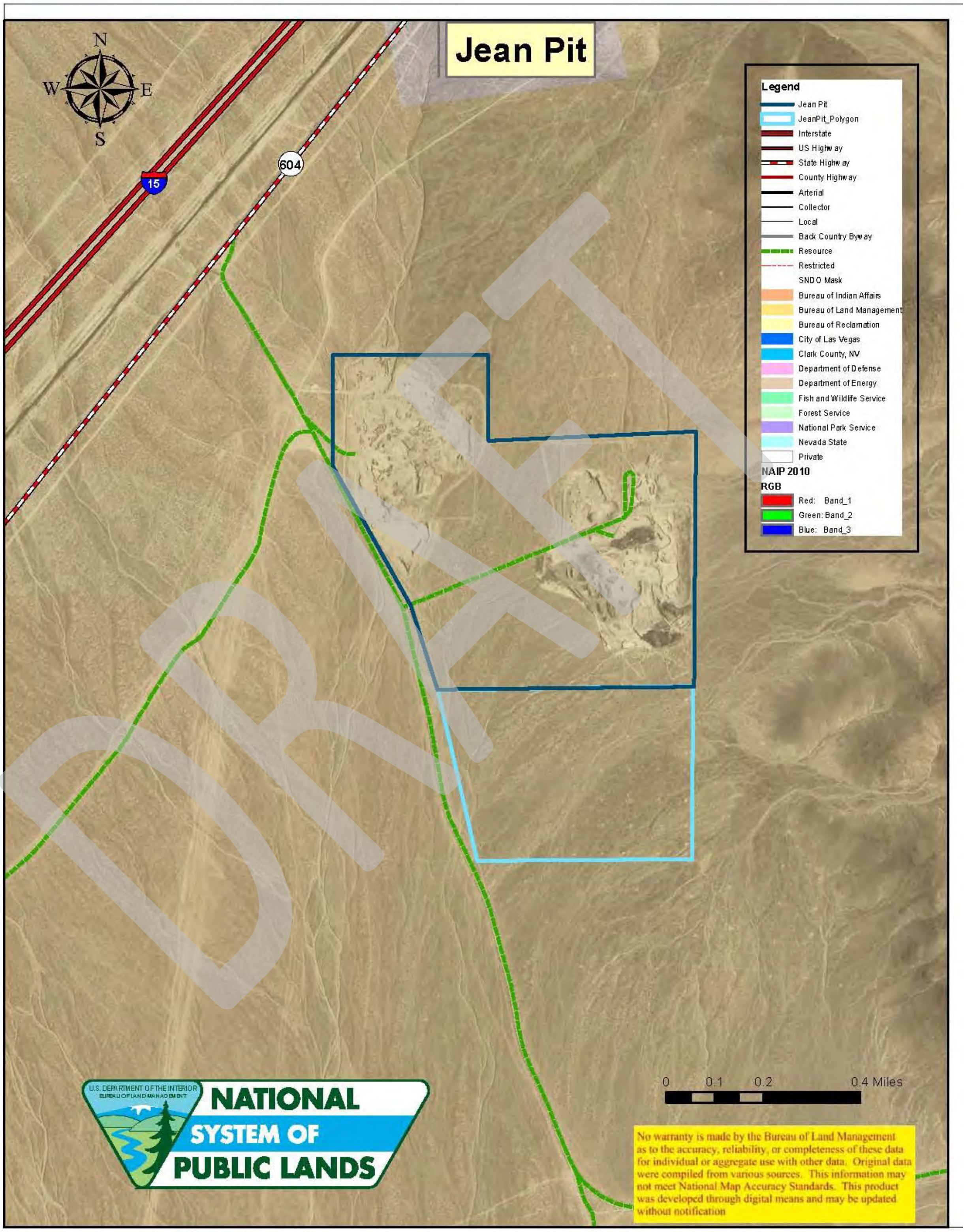


Figure 16. Laughlin OHV Area

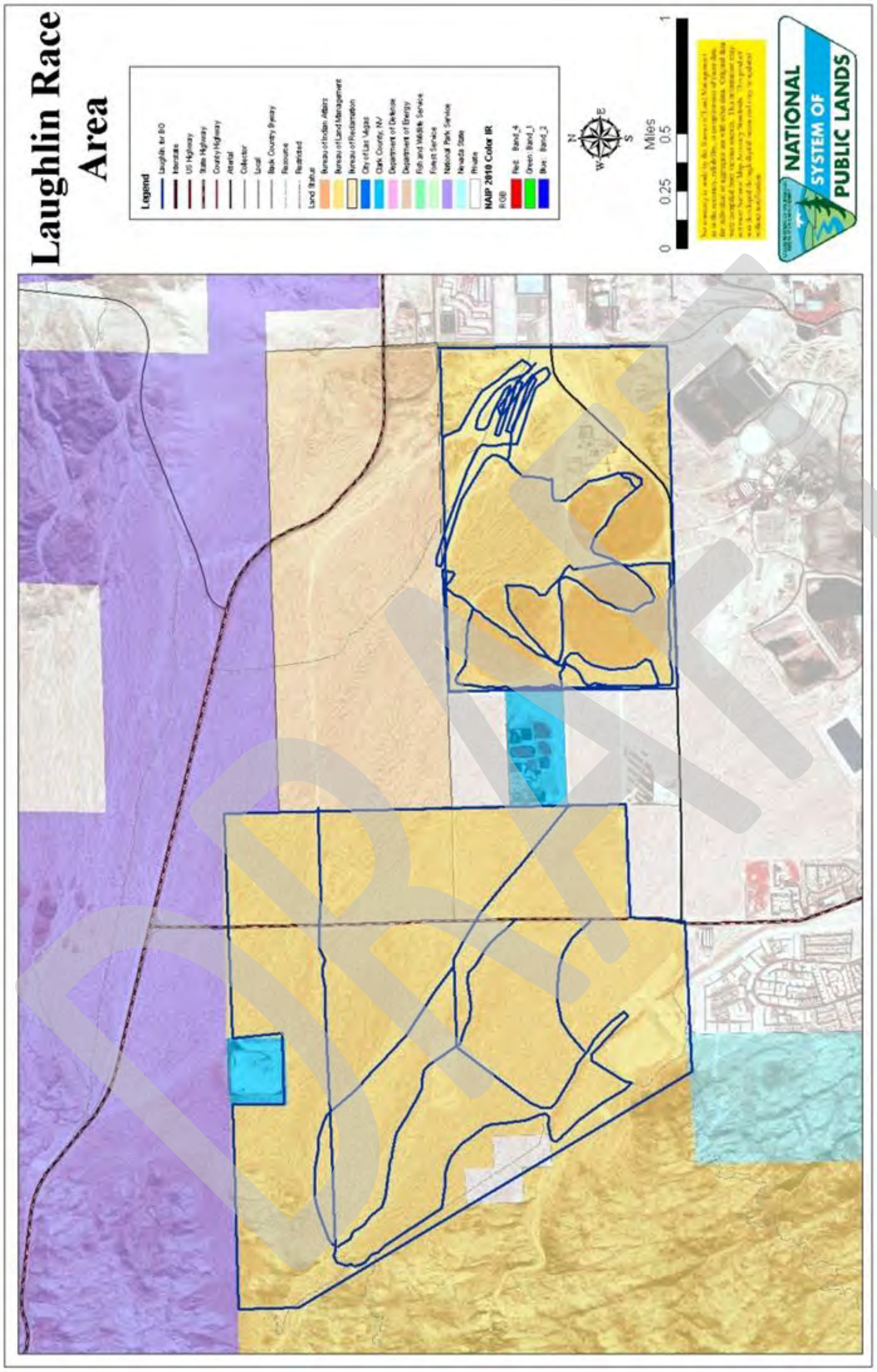


Figure 17. Jean Non-speed OHV Tour Routes

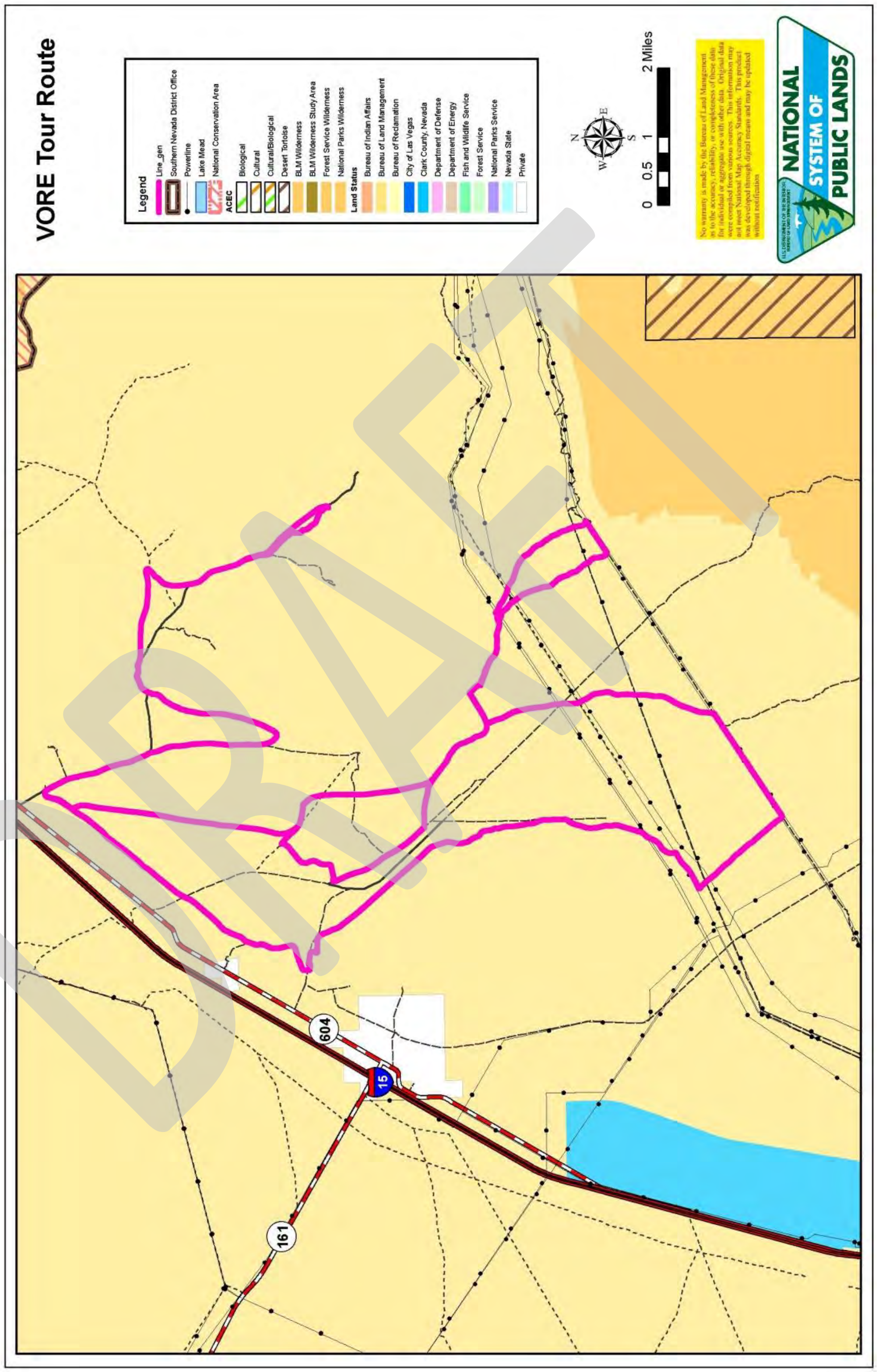


Figure 18. Pahrump Non-speed OHV Tours Course

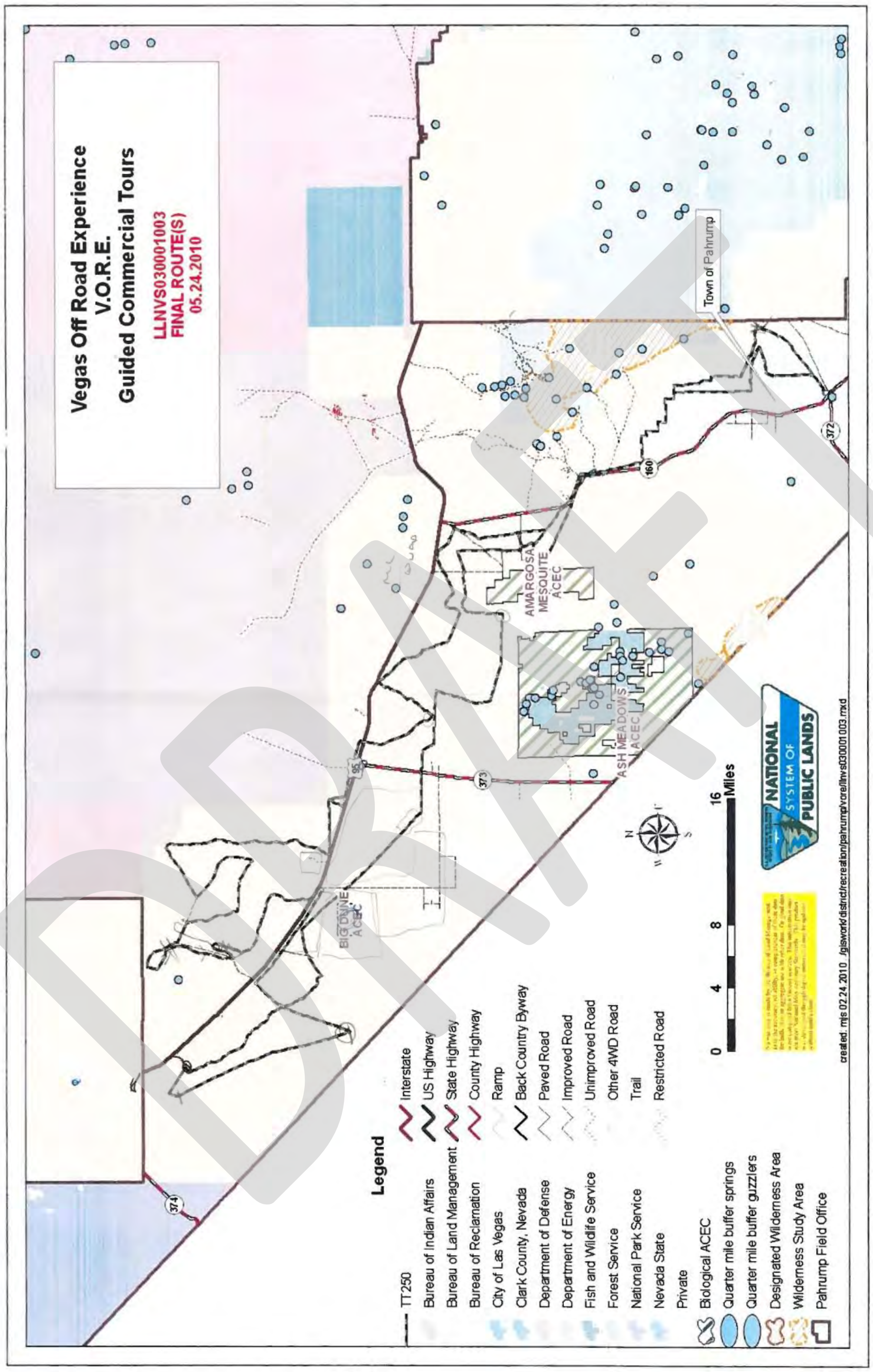


Figure 19. Active Grazing Allotments

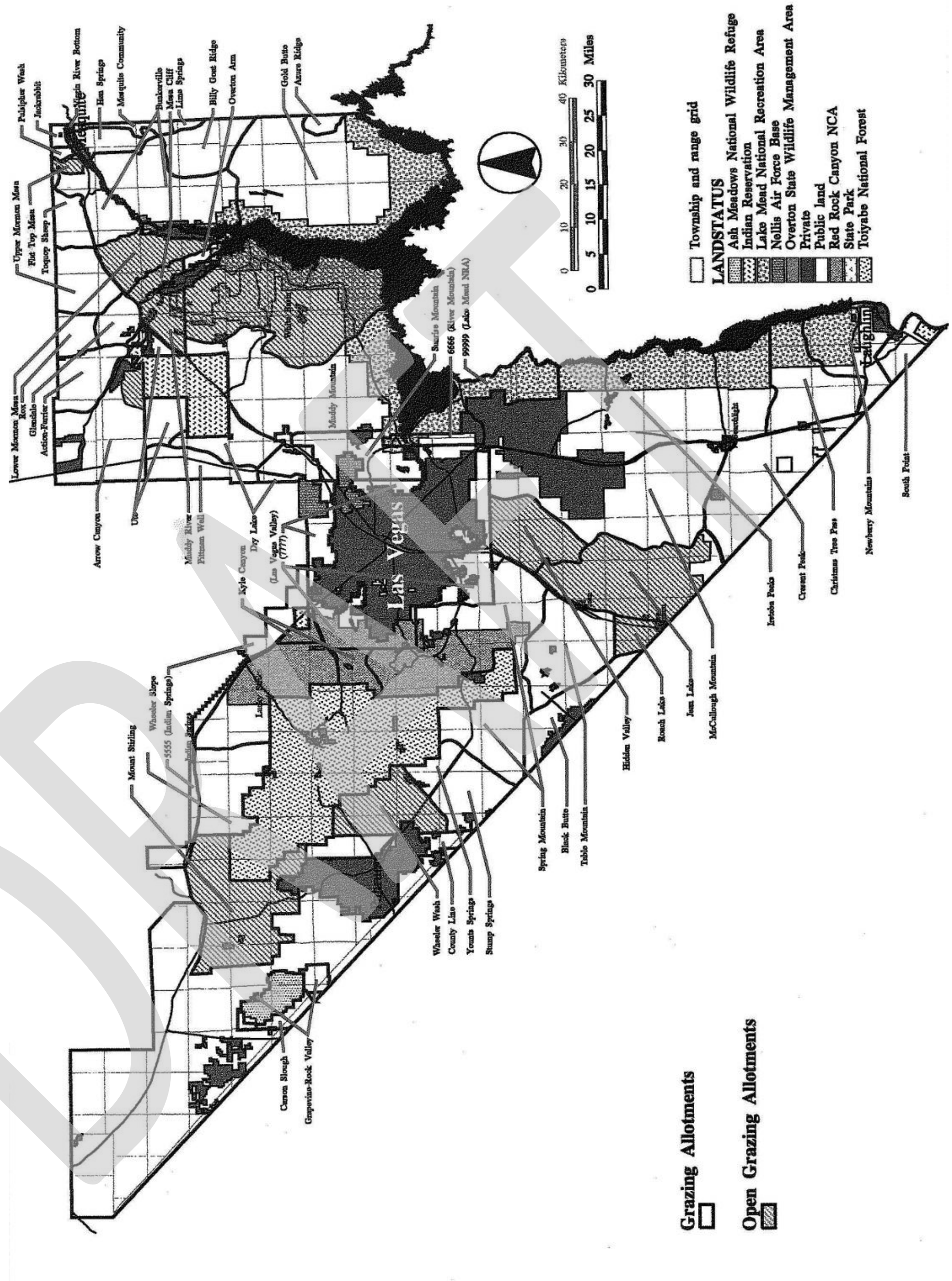


Figure 20. Desert Tortoise Habitat Linkages and High-value Habitat

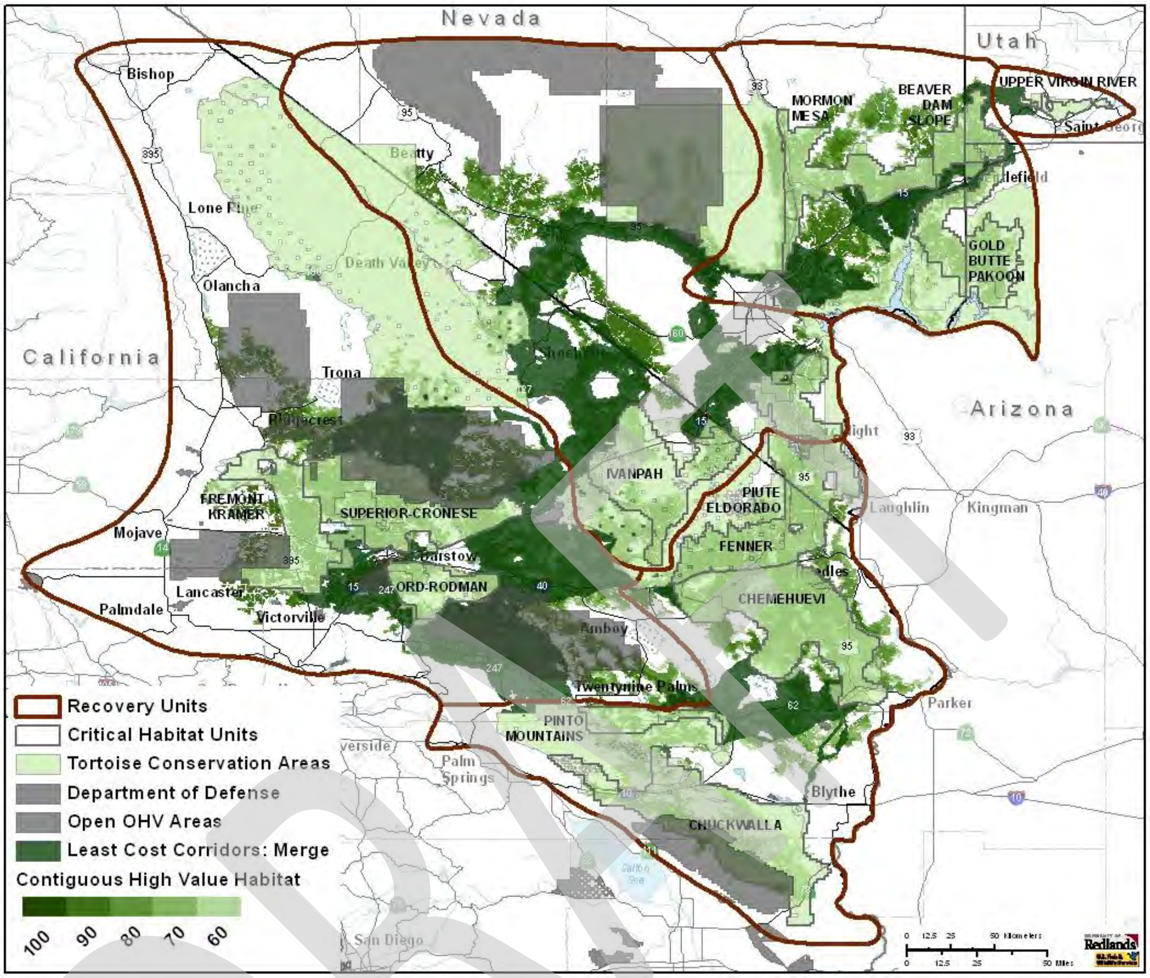
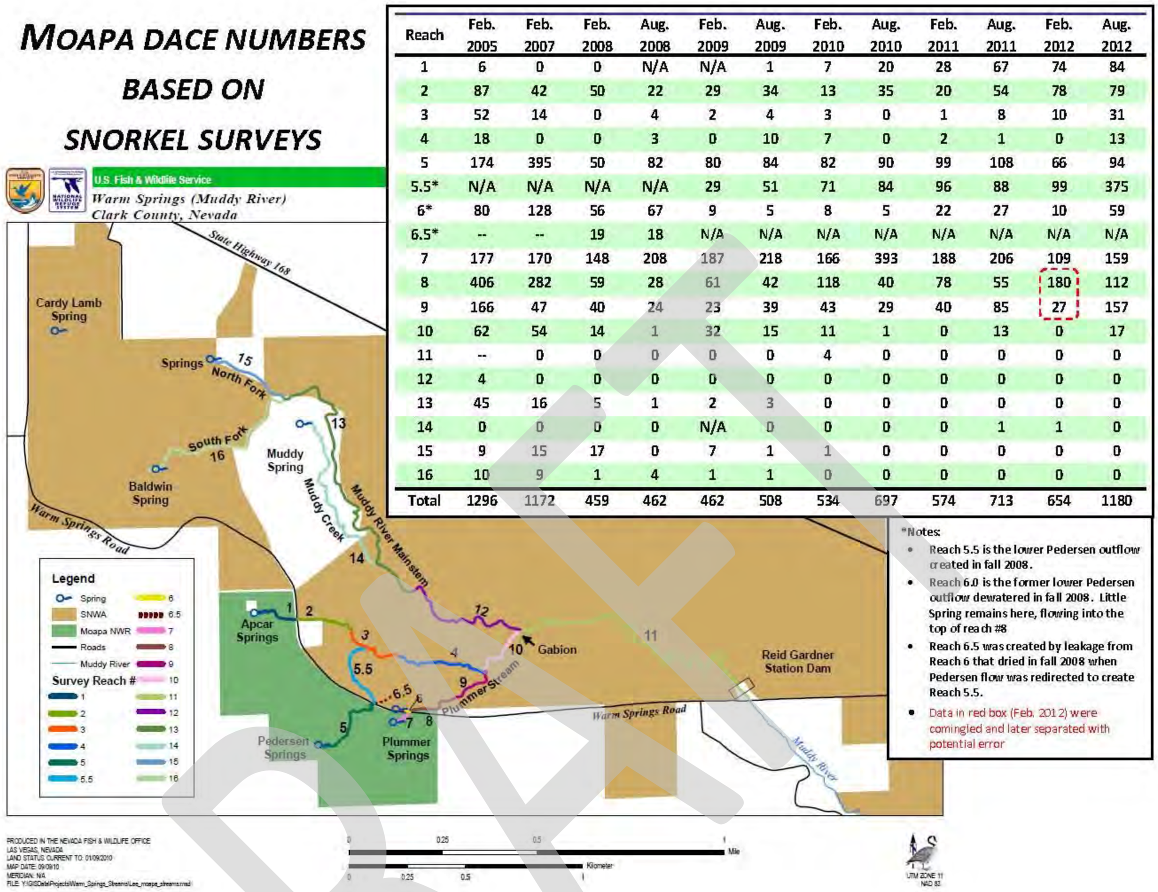


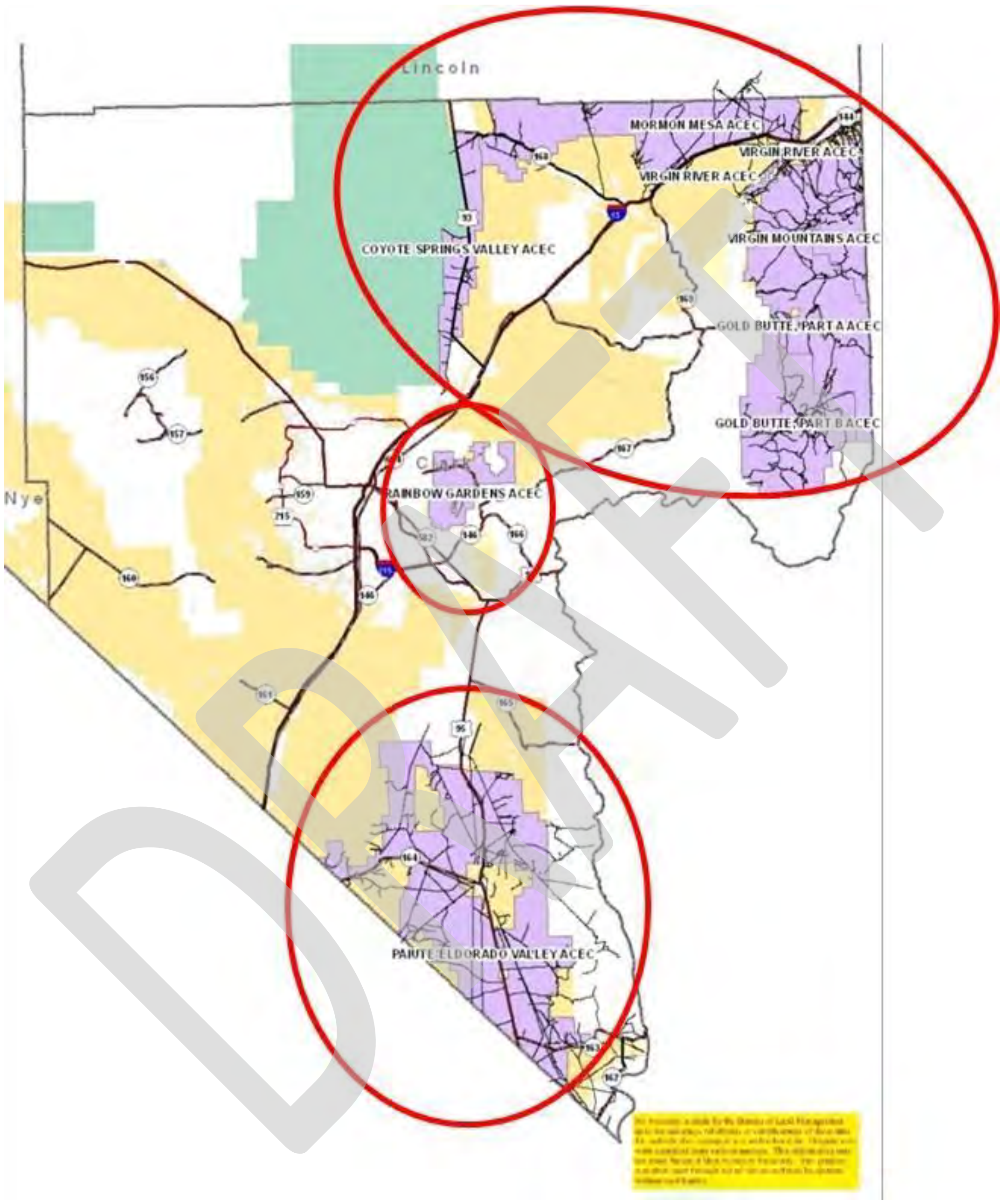
Figure 21. Moapa dace counts



Reach	Feb. 2005	Feb. 2007	Feb. 2008	Aug. 2008	Feb. 2009	Aug. 2009	Feb. 2010	Aug. 2010	Feb. 2011	Aug. 2011	Feb. 2012	Aug. 2012
1	6	0	0	N/A	N/A	1	7	20	28	67	74	84
2	87	42	50	22	29	34	13	35	20	54	78	79
3	52	14	0	4	2	4	3	0	1	8	10	31
4	18	0	0	3	0	10	7	0	2	1	0	13
5	174	395	50	82	80	84	82	90	99	108	66	94
5.5*	N/A	N/A	N/A	N/A	29	51	71	84	96	88	99	375
6*	80	128	56	67	9	5	8	5	22	27	10	59
6.5*	--	--	19	18	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7	177	170	148	208	187	218	166	393	188	206	109	159
8	406	282	59	28	61	42	118	40	78	55	180	112
9	166	47	40	24	23	39	43	29	40	85	27	157
10	62	54	14	1	32	15	11	1	0	13	0	17
11	--	0	0	0	0	0	4	0	0	0	0	0
12	4	0	0	0	0	0	0	0	0	0	0	0
13	45	16	5	1	2	3	0	0	0	0	0	0
14	0	0	0	0	N/A	0	0	0	0	1	1	0
15	9	15	17	0	7	1	1	0	0	0	0	0
16	10	9	1	4	1	1	0	0	0	0	0	0
Total	1296	1172	459	462	462	508	534	697	574	713	654	1180

*Notes:
- Reach 5.5 is the lower Pedersen outflow created in fall 2008.
- Reach 6.0 is the former lower Pedersen outflow dewatered in fall 2008. Little Spring remains here, flowing into the top of reach #8
- Reach 6.5 was created by leakage from Reach 6 that dried in fall 2008 when Pedersen flow was redirected to create Reach 5.5.
- Data in red box (Feb. 2012) were comingled and later separated with potential error

Figure 22. Areas with route designations



APPENDIX C. PREVIOUS CONSULTATIONS WITH SUBSTANTIAL EFFECTS TO THE DESERT TORTOISE

File Number	Date	Action Title	Anticipated Non-CH	Anticipated CH	Disturbance Non-CH	Disturbance (Acres) CH	Exempted Non-mortality-injury	Exempted Non-mortlaity-injuryYear	Exempted- all forms of take	Exempted Mortality-injury	Exempted Mortality-injury /Year	Reported Non-mortality-injury	Reported Mortality-injury
98-F-032	13-May-98	Touch America, Inc's FTV Western Build Fiber Optic Cable Installation Project in Box, Elder, Weber, Davis, Salt Lake, Utah, Juab, Miller, Beaver, Iron, and Washington Counties, Utah, and in Lincoln and Clark Counties, Nevada	153	142	153	142	50	0	0	4	0	50	4
98-F-053	18-Jun-98	Implementation of Proposed Actions in the Las Vegas District's Resource Management Plan/Final EIS Statement	23,530	1,500	3,315	0	35	15	0	6	12	0	3
98-F-312	31-Dec-98	Multi-Use Recreation Facility in Pahrump, Nevada	390	0	w/d	w/d	17	0	0	2	0	w/d	w/d
99-F-411	8-Dec-99	Construction of Nevada Segment of the Level 3 Communications Multi-Conduit Fiber-Optic Line in Lincoln and Clark Counties, Nevada	260	0	260	0	20	0	0	4	0	5	1
02-F-475	23-Sep-02	Table Mountain Wind Generating Facility, Clark County, Nevada	270	0	0	0	12	0	0	2	0	0	0

02-F-528	4-Apr-03	Plan of Operations for the Mojave Mineral Project for Rinker Materials West LLC, Sloan, Clark County, Nevada	563	0	w/d	w/d	5	0	0	1	0	w/d	w/d
03-F-502	17-Oct-03	Development of the Ivanpah Energy Center near Jean and Goodsprings, Clark County, Nevada	300	20			100	0	0	2	0		
04-F-412	28-Apr-04	Construction of the Harry Allen to Mead 500 kV Transmission Line, Clark County, Nevada	290	0	290	0	45	0	0	1	0	13	1
96-F-023R.3	20-Dec-04	Reinitiation for the Las Vegas Valley Programmatic	41,484	0	40,621	0	0	0	1,723	0	0	69	1
05-F-414	14-Jul-05	Sempra Energy's Eldorado Valley Extension Project, Clark County, Nevada	212	51	212	51	100	0	0	2	0	100	0
06-F-498	6-Jul-06	Widening of 23 Mi of SR 160 from Mountain Springs in Clark County into Nye County, Nevada	538	0	538	0	5	0	0	1	0	2	0
07-F-403	5-Mar-07	Material Site CL 82-03 to Provide Materials for Work on I-15, Clark County, Nevada	500	0			5	0	0	2	0		

07-F-458	7-May-07	Laughlin Regional Heritage Greenway Trail System in Clark County, Nevada	235	0	14	0	2	0	0	1	0	0	0
07-F-456	27-Jun-07	Stirling Mountain to Northwest Transmission Line Project, Clark and Nye Counties, Nevada	148	0	140	0	37	0	0	1	0	7	0
07-F-506	16-Aug-07	Expansion of Material Site CL 47-04 in Las Vegas, Clark County, Nevada (HENV-NV)	110	0			8	0	0	1	0		
08-F-050	21-Dec-07	Mesquite Regional Park, Clark County, Nevada	135	0	135	0	9	0	2	0	0	3	0
08-F-054	25-Feb-08	Reid Gardener Power Plant Expansion Project, Clark County, Nevada	444	0			25	0	0	4	0		
08-F-052	9-Apr-08	Reliant Energy Bighorn Plant to El Dorado Substation Transmission Interconnection Project, Clark County, Nevada	151	61			50	0	0	2	0		
08-F-053	19-Apr-08	Coyote Springs Transmission Line Project, Clark and Lincoln Counties, Nevada	4	169	0	18	25	0	0	2	0	0	0

08-F-469	5-Sep-08	Reinitiation for Water Conveyance System in Coyote Springs Valley, Clark County, Nevada	0	110	0	108	5	0	0	1	0	0	0
08-F-293	2-Oct-08	Reward Mine Plan of Operations, Nye County, Nevada	406	0			20	0	0	2	0		
08-F-429	30-Dec-08	Sunrise Tap Transmission Line Project, Clark County, Nevada	114	0			30	0	0	2	0		
02-F-447R	20-Nov-09	Reinitiation of widening of US Highway 95 from the US 93/95 Junction to the SR 163 Intersection, Clark County, Nevada	1,566	0	1,566	0	150	0	0	7	0	15	0
10-F-391	28-Jul-10	Reinitiation for Southwest Intertie Project (SWIP) to Include Additional Disturbance of Desert Tortoise Habitat	372	385			50	0	0	2	0	3	0
10-F-208	16-Sep-10	Silver State Solar Project (NextLight Renewable Power, LLC), Clark County, Nevada	2,966	0	427	0	123	0	0	8	1	7	1
10-F-285	27-Sep-10	Programmatic Activities Conducted by NDOT in Southern Nevada	4,468	1,170	103	0	80	0	0	6	0	0	0

10-F-476	15-Oct-10	Reinitiation for City of Mesquite's Replacement General Aviation Airport, Clark County, Nevada	792	0			10	0	0	1	0		
10-F-315	1-Nov-10	Amargosa Farm Road Solar Energy Project, Nye County, Nevada	6,320	0			4	0	0	1	0		
11-F-274	26-Apr-11	DesertXpress High-Speed Train Project, Victorville, California to Las Vegas, Nevada (8-8-11-F-10)	1,190	0			26	0	0	2	0		
10-F-448	29-Apr-11	Eldorado-Ivanpah Power Transmission Project, Clark County, Nevada and San Bernardino County, California	220	94			28	0	0	3	0		
11-F-337	28-Sep-11	Reinitiation for Operation and Maintenance of the Kern River and Mojave Gas Transmission Pipeline in Nevada, California, Utah, and Wyoming	1,204	557	1118	534	0	4	0	5	0	1	0
05-FW-536 Tier 5	7-Mar-12	K Road Moapa Solar Project, Moapa Indian Reservation, Clark County, Nevada	2,153	0			202	0	0	5	0		
12-F-023R	19-Apr-12	Reinitiation for Copper Mountain North Solar Project, Boulder City, Clark County, Nevada	1,459	0			5	0	0	0	0		

11-F-435	13-Nov-09, 1-Jul-11, 29-Sep-11	UNEV Pipeline Project (6-UT-09-F-023)	332	399			237	0	0	12	0	87	5
		TOTALS	93,279	4,658	48,892	853	1,520	19	1,725	95	13	362	16

APPENDIX D. SUMMARY OF MEASURES PROPOSED BY BLM TO MINIMIZE EFFECTS TO THE DESERT TORTOISE

Minimization Measures	Results of Implementation of Measures	Program/Activity
Report injuries/mortalities	Further take if injury/mortality source not evaluated	All
Designate FCR; notify BLM before commencement of activities	Provide oversight to ensure reporting and compliance; anticipated result; minimize all forms of take including habitat disturbance	Lands & Realty, ROW, Mining
Ensure proper tortoise handling	Injury; voiding bladder; stress	All
Provide authorized desert tortoise biologists and monitors	Implements or ensure all relevant measures are implemented including proper tortoise handling; tortoise in harm's way are located and moved; workers are informed of measures and the tortoise; information is collected and compiled the required reports;	All activities that anticipate encountering tortoises.
Tortoise awareness training	Inform workers of their responsibilities and consequences of non-compliance; ensure or maximize compliance with protective measures	All
Avoid tortoise burrows	Reduce risk of injury or mortality to tortoises that may occur in burrow; if burrows are damaged, tortoise sheltering habitat would be lost	All
Cease activities if a tortoise is in the area	Reduce risk of tortoises injury or mortality	All
Use previously disturbed areas or areas designated by an authorized biologist	Minimize habitat disturbance and chances of encountering desert tortoises	All
Mark or flag work areas	Minimize habitat disturbance and chances of encountering desert tortoises	All
Move tortoises from harm's way	Reduce risk of tortoises injury or mortality; move tortoises from isolated fragments	All
Install, inspect, and maintain tortoise exclusionary fencing	Exclude tortoises from harm's way	All at the discretion of the BLM and Service
Cover and inspect open trenches and excavations	Reduce risk to tortoises that may fall into trenches or excavations	Lands & Realty, ROW, Mining
Implement litter-control	Reduce resources for desert tortoise predators which may increase predator threat	All
Use raven deterrents	Reduce raven perching and nesting opportunities	Lands & Realty, ROW, Mining
Impose speed limits	Reduce injury and mortality of tortoise due to vehicle travel	All
Check underneath vehicles and equipment before moving them	Reduce injury and mortality of tortoises that shelter underneath vehicles and equipment	All

Limit the number, location, and timing of OHV events and number of participants	Reduce tortoise mortality; disruption of feeding, breeding, and sheltering behavior	Recreation
Minimization Measures	**Results of Implementation of Measures**	**Program/Activity**
During OHV events: Require disabled vehicles to be moved to areas along course to avoid habitat damage	Minimize or avoid habitat disturbance or crushing tortoises or their burrows	Recreation
Restrict OHV event spectators and pit crews to designated areas which have been marked or fenced	Minimize or avoid habitat disturbance or crushing tortoises or their burrows	Recreation
BLM will provide staff, including sufficient law enforcement, at OHV events; promoters will also provide event monitors	Ensure maximum compliance with protective measures; observe and report tortoise observations	Recreation
Disqualify OHV event participants if they fail to comply with required stipulations	Reduce habitat disturbance and risk to tortoises that may be encountered by event vehicles, participants, or spectators	Recreation
Restore habitat disturbance; collect fee	Reduce threat of nonnative plants, facilitate habitat recovery	All that involve habitat disturbance
BLM will conduct pre-event and post-event sweeps of OHV courses	Locate and move tortoises in harm's way or killed or injured as a result of the action	Recreation
Control vehicle passing during OHV events	Minimize or avoid habitat disturbance or crushing tortoises or their burrows	Recreation
Inform OHV event participants of stipulations before event	Ensure or maximize compliance with protective measures	Recreation
Restrict horse endurance rides to existing roads and trails outside ACECs	Avoid habitat damage	Recreation
Require certified weed-free hay; use only in corrals or similar enclosures (livestock)	Reduce habitat degradation due to presence of nonnative plants	Recreation (horse endurance rides), livestock grazing, and resource management (wild horse and burro management
Monitor livestock use and remove livestock if necessary to maintain management objectives	Avoid habitat damage and degradation	Livestock grazing
Manage for native species	Improve tortoise nutrition, reduce habitat degradation due to presence of nonnative plants	Livestock grazing
Promptly remove trespass livestock	Reduce habitat damage; enforce compliance	Livestock grazing

APPENDIX E. DESERT TORTOISE HANDLING AND TAKE REPORT

If a desert tortoise is killed or injured, immediately contact the U.S. Fish and Wildlife Service and BLM, by phone at the numbers below and complete Section 1 of the form.

Completed forms should be submitted to the BLM and Fish and Wildlife Service:

Bureau of Land Management
4701 North Torrey Pines Drive
Las Vegas, Nevada 89130
702-515-5000

U.S. Fish and Wildlife Service
4701 North Torrey Pines Drive
Las Vegas, Nevada 89130
702-515-5230

Project Name:	Report Date:
Fish and Wildlife Service Append File No.- 84320-	
Authorized Desert Tortoise Biologist: ______________________________________ Employed by:	
Section 1: Complete all information below if a desert tortoise is injured or killed in addition to initial contact described above.	
If tortoise was injured ☐ or killed ☐ (check appropriate box):	
Date and time found: ______________________________ Found by: ____ GPS location (NAD 83): easting: ____________________ northing: ____________________ No. of photos taken: _______ Disposition: ____ ____ ____ Attach report with photos that describe in detail, the circumstances and potential cause of injury or mortality. For injuries include name of veterinarian and detailed assessment of injuries.	

Section 2: Complete all information below for each desert tortoise handled.

All instances of desert tortoise handling must be reported in this section and be included in the quarterly, annual, and final project reports.

Desert tortoise number: __________________

Date and time found: ______________________________ Sex of tortoise: ________

Air temperature when found: __________ Air temperature when released: __________

Tortoise activity when found: ____

Handled by: _____________________________________ Approx. carapace length _________

GPS location (NAD 83) found: easting: _________________ northing: __________________

GPS location released: easting: _________________ northing: __________________

Approximate distance moved: __________________

Did tortoise void bladder; if so state approximate volume and actions taken:

____

____

Post handling or movement monitoring and observations:

____

____

____

Section 3: Complete for each tortoise burrow penned.

All instances of desert tortoise penning must be reported in this section and be included in the quarterly, annual, and final project reports.

Date and time of pen construction:

Began: ______________________________ Completed: _____________________________

Date and time pen removed: ____

Pen constructed by: ____

Why was tortoise penned? ____

How frequently was pen monitored? ____

Observations of desert tortoise behavior including time and date of observation:

____

____

____

____

____

Include photos of pen and burrow with report.

APPENDIX F. SECTION 7 FEE PAYMENT FORM

Biological Opinion File Number: ______________________________

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

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

Project Name: ______________________________

Project Proponent: ______________________________

Phone Number: ______________________________

Payment Calculations:	**Clark County**		**__________ County**		**__________ County**	
	Critical habitat	**Non-critical habitat**	**Critical habitat**	**Non-critical habitat**	**Critical habitat**	**Non-critical habitat**
# acres anticipated to be disturbed on federal land						
Fee rate (per acre)						
Subtotals						
Total cost per county						

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

Make check payable to: **Bureau of Land Management**

Deliver check to:

Physical Address

Bureau of Land Management

Attn: Information Access Ctr

1340 Financial Blvd.

Reno, NV 89502

PO Box

Bureau of Land Management

Attn: Information Access Ctr

PO Box 12000

Reno, NV 89520-0006

For BLM Public Room

Process check to:

Contributed Funds-All Other

WBS: LVTFF1000800

7122 FLPMA

All other Res. Dev. Project and Management

Remarks: LLNV9300000 L71220000.JP0000 LVTFF1000800 Desert Tortoise Conservation Program

Please provide a copy of this completed payment form and the payment receipt to NV-930, Attn: T&E Program Lead

*****T&E Program Lead will provide a copy to the appropriate District Office(s)***

APPENDIX G. PROGRAMMATIC BIOLOGICAL OPINION (FILE NO. 84320-2010-F-0365) REPORT TO THE FISH AND WILDLIFE SERVICE

The information below should be completed by BLM or the Authorized Desert Tortoise Biologist for the project/action. Reports for all appended actions are required annually (due March 1 of each year for prior calendar year activities) and upon completion of the project/action.

☐ Annual Report ☐ Project Completion Report

1. Date: ____________________

2. Fish and Wildlife Service File No (for appended actions): 84320-____________________

3. Species and critical habitat affected:

   ☐ Desert tortoise ☐ Desert tortoise critical habitat

   Other (identify):

4. Project/action status:

   ☐ Not begun ☐ In progress* ☐ Completed date ____________________

   If in progress, state approximate percent complete: ______________

5. Desert tortoise habitat disturbed:

Non-critical habitat		**Critical habitat**	
Proposed disturbance (ac)	Actual disturbance (ac)	Proposed disturbance (ac)	Actual disturbance (ac)

6. Habitat of other species disturbed (identify species, non-critical, and critical habitat affected below):

7. Summary of individual desert tortoises taken (appended action):

	Desert Tortoise:		
	Adults	**Juveniles**	**Eggs**
Exempted			
Actual			

Describe other individuals taken:

8. Name of authorized desert tortoise biologists and monitors on the project and the dates they were on the project.

9. Describe all non-compliance issues and events.

Appendix D-10

Burrowing Owl Survey Report

BURROWING OWL SURVEY REPORT

GALE TO PISGAH PROJECT

SAN BERNARDINO COUNTY, CALIFORNIA

Southern California Edison
IO # 3363333

Prepared For: **Southern California Edison**
2244 Walnut Grove Avenue
Rosemead, CA 91770
Contact: Lori Charpentier

Prepared By: **Environmental Intelligence**
1590 South Coast Highway, Suite 17
Laguna Beach, CA 92651
Contact: Travis Kegel

Date: August 1, 2017

TABLE OF CONTENTS

TABLES

APPENDICES

EXECUTIVE SUMMARY

Environmental Intelligence, LLC (EI) was retained by Southern California Edison (SCE) to conduct a habitat and resource assessment and focused surveys for western burrowing owl (*Athene cunicularia hypugea*) in support of the proposed Gale to Pisgah Project (Proposed Project) located in San Bernardino County, California. The survey was conducted in accordance with the California Burrowing Owl Consortium's *Burrowing Owl Survey Protocol and Mitigation Guidelines* (CBOC 1993), and the CDFW's updated *Staff Report on Burrowing Owl Mitigation* breeding season survey guidelines (CDFG 2012).

The Proposed Project is located in San Bernardino County, California, extending east-southeast from Gale Substation (approximately 1 mile ESE of Daggett and 9 miles ESE of Barstow) for approximately 29 miles to Pisgah Substation (Exhibit 1). The Proposed Project alignment passes through the following United States Geological Survey (USGS) 7.5-minute quadrangles: Minneola, Newberry Springs, Troy Lake, and Hector. Land surrounding the Proposed Project includes agricultural areas, off-highway vehicle recreation areas, and undisturbed desert scrub habitats. The Proposed Project alignment crosses lands owned by BLM and private landowners (Exhibit 1).

Burrowing owl surveys were conducted at the Proposed Project alignment and associated work areas (~919 acres) during peak burrowing owl breeding season (18 May to 21 July). Burrows sufficiently sized to support burrowing owls are present in the Project vicinity. No burrowing owls were observed during the 2017 survey season.

1.0 INTRODUCTION

Environmental Intelligence, LLC (EI) was retained by Southern California Edison (SCE) to conduct a Western Burrowing Owl (*Athene cunicularia hypugea*) Habitat Assessment and Focused Surveys in support of the proposed Gale to Pisgah Project (Proposed Project), located in San Bernardino County, California. All surveys, results, and conclusions herein were conducted based upon the most recent California Department of Fish and Wildlife (CDFW; formerly California Department of Fish and Game [CDFG]) *Staff Report on Burrowing Owl Mitigation* (2012) and The California Burrowing Owl Consortium's (CBOC 1993) *Burrowing Owl Survey Protocol and Mitigation Guidelines*.

The Proposed Project would involve installation of telecommunication all-dielectric self-supporting (ADSS) cable line from Gale Substation to Pisgah Substation along an existing SCE distribution line right-of-way. The purpose of these burrowing owl focused surveys is to support project planning and potential project licensing requirements. This report presents the findings of focused surveys for burrowing owls in suitable habitat within the Proposed Project area.

1.1 Project Location and Description

The Proposed Project is located in San Bernardino County, California, extending east-southeast from Gale Substation (approximately 1 mile ESE of Daggett and 9 miles ESE of Barstow) for approximately 29 miles to Pisgah Substation (Exhibit 1). The Proposed Project alignment passes through the following United States Geological Survey (USGS) 7.5-minute quadrangles: Minneola, Newberry Springs, Troy Lake, and Hector. Land surrounding the Proposed Project includes agricultural areas, off-highway vehicle recreation areas, and undisturbed desert scrub habitats.

The Proposed Project would involve installation of telecommunication all-dielectric self-supporting (ADSS) cable line from Gale Substation to Pisgah Substation along an existing SCE distribution line right-of-way. The Gale to Pisgah fiber optic interconnection will support the SCE communication system for the addition of renewable energy generation. This communication system is part of the larger SCE system that provides safe and reliable electrical service consistent with the North American Electric Reliability Corporation, Federal Energy Regulatory Commission, the California Independent System Operators, and SCE's planning design guidelines and criteria. The ADSS is necessary to ensure adequate communication facilities are in place for the Calcite Substation Project, Eldorado-Lugo-Mojave Project, and Lugo-Victorville 500kV Transmission Line Special Protection Scheme (SPS, also referred to herein as Remedial Action Scheme or "RAS") Project.

Overhead ADSS stringing includes all activities associated with the installation of cables onto cross arms on existing wood pole structures. This activity includes the installation of vibration dampeners and suspension and dead-end hardware assemblies. If the existing pole does not meet wind load or ground clearance requirements with the addition of the fiber cable, distribution line poles will be modified or interset poles will be installed.

Existing access roads will be used to the extent feasible for construction of the Proposed Project; where needed, these roads will be improved within the existing road prism. Existing access roads will be maintained to allow the use of construction equipment. Some road modifications to existing access roads may be required to allow safe use of heavy equipment. At the conclusion of Project construction, all roads utilized for construction purposes will be left in a condition similar to the condition that existed prior to the start of construction. Loose rock and slide material will be removed, if possible, from existing roads and used to construct road dikes, fill washouts, or flatten fill slopes. All washouts, ruts, and irregularities within the construction area will be filled or removed.

The Proposed Project Survey Area includes 488 existing distribution pole sites, two material laydown yards, and two existing substations (Exhibit 2).

1.2 Purpose and Need

The Proposed Project is located within the range of western burrowing owls, and they are known to occur (i.e. breed, winter, forage, migrate) within the Project survey area (BRC 2016b; CNDDB 2017). Approximately 919 acres of suitable burrowing owl habitat were surveyed for the Project alignment, construction areas, and their associated buffers. As such, the objectives of this study are to identify burrowing owls and their sign to help evaluate potential impacts to burrowing owls, assist in Project planning to minimize impacts to burrowing owl, and to recommend further studies or potential mitigation measures.

1.3 Western Burrowing Owl Background

The western burrowing owl is found throughout western North America, west of the Mississippi River, and south into Mexico. The species prefers flat or gently sloping grasslands with sparse shrub coverage. Burrowing owls are active both day and night, and may be seen perching conspicuously on fence posts or standing at the entrance of their burrows. In California, preferred habitat is generally open, treeless areas within grassland, steppe, and desert biomes; they are closely associated with California ground squirrels (*Spermophilus beecheyi*) and will renovate and maintain abandoned squirrel burrows (Poulin *et al*. 2011). In addition, burrowing owls may occur in some agricultural areas, ruderal grassy fields, vacant lots and pastures if the vegetation structure is suitable and there are useable burrows and foraging habitat in proximity.

In California, California ground squirrel and round-tailed ground squirrel (*Citellus tereticaudus*) burrows are frequently used by burrowing owls, but they may also use inactive dens or holes dug by other fossorial species, including American badger (*Taxidea taxus*), desert kit fox (*Vulpes macrotis*), desert tortoise (*Gopherus agassizii*) and coyote (*Canis latrans*). The entrance of the burrow is often adorned with animal dung, feathers, debris, and other small objects (CDFG 2012). They exhibit high nest fidelity and will return to the same burrow for multiple years. Natural rock cavities, debris piles, culverts, and pipes also are used for nesting and roosting. Burrowing owls may use “satellite” or non-nesting burrows, presumably to reduce risk of predation and possibly to avoid nest parasites (Dechant *et al.* 1999). Essential habitat for the burrowing owl in California must include suitable year-round habitat, primarily for breeding, foraging, wintering and dispersal habitat consisting of short or sparse vegetation (at least at some time of year), presence of burrows, burrow surrogates or presence of fossorial mammal dens, well-drained soils, and abundant and available prey within close proximity to the burrow (CDFW 2012).

The western burrowing owl is a CDFW Species of Special Concern, US Fish and Wildlife Service Bird of Conservation Concern, Bureau of Land Management Sensitive species, and protected by the Migratory Bird Treaty Act. In desert scrub habitat found within San Bernardino County, they are usually associated with California ground squirrel, fox, and coyote burrows found near washes with abundant small mammal activity.

The site contains suitable burrowing owl habitat with a few suitable ground squirrel and kit fox burrows along the Proposed Project area. The site exhibits varying levels of suitability, ranging from moderate sparse bush seepweed scrub with mounded or bermed micro-topography for nesting, to dense herbaceous cover and open sage scrub vegetation for occasional foraging. Suitable habitat remained relatively consistent throughout the surveys (May through July), as the majority of the vegetation consisted of perennial species with little seasonal variability.

Because the burrowing owl requires specific soil and micro-habitat conditions, it occurs in few locations within a broad habitat category, requires a relatively large home range to support its life history requirements, occurs in relatively low numbers, and is semi-colonial, the burrowing owl will require site-specific considerations and management conditions.

2.0 REGULATORY FRAMEWORK

The Gale to Pisgah Project will comply with applicable federal, state, and local laws, ordinances, regulations, and standards (LORS) throughout project construction. Potentially applicable LORS regarding burrowing owl are discussed in the following text.

2.1 Federal

2.1.1 MIGRATORY BIRD TREATY ACT

The protection of birds (including the burrowing owl) is regulated by the Migratory Bird Treaty Act (MBTA). Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the USFWS (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). The Carlsbad Fish and Wildlife Office oversees actions relative to migratory birds and eagles in the Project vicinity.

The MBTA makes it illegal for anyone to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or the parts, nests, or eggs of such a bird except under the terms of a valid permit issued pursuant to Federal regulations. The migratory bird species protected by the MBTA are listed in 50 CFR 10.13.

2.1.2 FISH AND WILDLIFE CONSERVATION ACT: BIRDS OF CONSERVATION CONCERN

The 1988 amendment to the Fish and Wildlife Conservation Act mandates the U.S. Fish and Wildlife Service (USFWS) to "identify species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the Endangered Species Act (ESA) of 1973." For avian species, the list of Birds of Conservation Concern (BCC; USFWS 2008) is the most recent effort to carry out this mandate. There are no legal requirements protecting species included on the list of BCC including burrowing owl. This list is meant to study and identify species that are potential candidates to be included under the federal ESA and guide other analyses (e.g., California Environmental Quality Act, See Section 2.2.2) pertaining to the species.

2.2 State

2.2.1 CALIFORNIA ENDANGERED SPECIES ACT

The California Endangered Species Act (CESA) states that all native species of fishes, amphibians, reptiles, birds, mammals, invertebrates, and plants, and their habitats, threatened with extinction and those experiencing a significant decline which, if not halted, would lead to a threatened or endangered designation, will be protected or preserved. This state law prohibits the "take" (defined as to hunt, pursue, catch, capture, or kill) of state-listed species except as otherwise provided in state law. CESA, administered by the CDFW, is similar to the federal ESA, although unlike the federal law, CESA applies incidental take prohibitions to species currently petitioned for state-listing status (i.e., candidate species). State lead agencies are required to consult with the CDFW to ensure that their authorized actions are not likely to jeopardize the continued existence of any state-listed species or result in the degradation of occupied habitat. Under Section 2081, CDFW authorizes "take" of state-listed endangered, threatened, or candidate species through incidental take permits or memoranda of understanding. These acts, which are otherwise prohibited, may be authorized through permits or memoranda of understanding if (1) the take is incidental to otherwise lawful activities, (2) impacts of the take are minimized and fully mitigated, (3) the permit is consistent with regulations adopted in accordance with any recovery plan for the species in question, and (4) the applicant ensures suitable funding to implement the measures required by the CDFW. Should a species be both federally and State-listed, and if the federal ESA authorization fulfills CESA requirements, CDFW may streamline the CESA permitting process by adopting a Consistency Determination (Section 2081.1), that concurs with the federal authorization. The CDFW Inland Deserts Region oversees actions relative to CESA in the project vicinity.

2.2.2 California Environmental Quality Act

The California Environmental Quality Act (CEQA) applies to "projects" proposed to be undertaken or requiring approval by state and/or local governmental agencies. "Projects" are activities that have the potential to have a physical impact on the environment. The purpose of CEQA is to: (1) disclose to the public the significant environmental effects of a proposed discretionary project, through the preparation of an Initial Study (IS), Negative Declaration (ND), or Environmental Impact Report (EIR); (2) prevent or minimize damage to the environment through development of project alternatives, mitigation measures, and mitigation monitoring; (3) disclose to the public the agency decision-making process utilized to approve discretionary projects through findings and statements of overriding consideration; (4) enhance public participation in the environmental review process through scoping meetings, public notice, public review, hearings, and the judicial process; and (5) improve interagency coordination through early consultations, scoping meetings, notices of preparation, and State Clearinghouse review.

2.2.3 Fish and Game Code and Title 14 Laws and Regulations

Fish and Game Code (FGC) Section 3503 states that it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by the Code or any associated regulation. Section 3503.5 makes it unlawful to take, possess, or destroy birds of prey. It also prohibits the take, possession, or destruction of nests or eggs of any bird of prey.

Title 14, California Code of Regulations (CCR) lists plant and animal species designated as threatened and endangered in California. California Species of Special Concern (SSC) is a category applied by CDFW to those species that are indicators of regional habitat changes or are considered potential future protected species. SSCs, including burrowing owl, do not have any special legal status, but are intended by CDFW for use as a management tool to take these species into special consideration when decisions are made concerning the future of any land parcel.

3.0 EXISTING CONDITIONS

3.1 Topography

The Gale to Pisgah Proposed Project lies within the western portion of the Mojave Desert geomorphic province, which is bound by the Garlock Fault to the north and the San Andreas Fault to the south. The Mojave Desert contains many isolated mountain ranges that are separated by large expanses of desert plains and playas. The Project area runs parallel to the Needles Freeway (I 40), and is located east of the City of Barstow, west of the Pisgah crater, at the south end of

Mojave Valley, and directly north of the Newbury Mountains. The Proposed Project alignment crosses lands owned by BLM and private landowners (Exhibit 1).

The topography along the Proposed Project is undulating, and relatively flat. Elevation ranges from approximately 1,780 feet in the center of the Proposed Project to 2,060 feet on the west end, and 2,080 feet in the east end.

3.2 Vegetation Communities / Land Cover Types

Eleven vegetation communities/land cover types, including three sensitive vegetation communities, one sensitive land cover type, and seven non-sensitive vegetation communities/land cover types were previously documented and mapped during habitat assessment studies (BRC 2016a). Descriptions of the communities can be found in the Manual of California Vegetation, 2nd Edition (Sawyer et al. 2009).

A summary of vegetation and land cover found within the Project area is provided in Table 2.

TABLE 1: VEGETATION COMMUNITY / LAND COVER TYPE AND RARITY

Vegetation Communities/Land Cover Type and Rarity[1]
Atriplex polycarpa (Allscale scrub) Shrubland Alliance – Desert Saltbush Scrub (36.340.00) G2 S2
Prosopis glandulosa (Mesquite thicket) Woodland Alliance (61.512.00) G5 S3
Suaeda moquinii (Bush seepweed scrub) Shrubland Alliance (36.200.00) G5 S3
Non-sensitive Vegetation Communities
Atriplex canescens (Fourwing saltbush scrub) Shrubland Alliance (36.310.00) G5 S4
Atriplex confertifolia (Shadscale scrub) Shrubland Alliance (36.320.00) G5 S4
Larrea tridentata (Creosote bush scrub) Shrubland Alliance (33.010.00) G5 S5
Larrea tridentata-Ambrosia dumosa (Creosote bush-white bursage scrub) Shrubland Alliance (33.140.00) G5 S5
Tamarix ssp. (Tamarisk thicket) Shrubland Semi-Natural Alliance (63.810.00)
Land Cover Types
Agriculture
Alkali Playa Community G4 S3
Developed

[1]Rarity and Global/State Ranks: One purpose of the vegetation classification is to assist in determining the level of rarity and imperilment of vegetation types. Ranking of alliances according to their degree of imperilment (as measured by rarity, trends, and threats) follows NatureServe's Heritage Methodology, in which all alliances are listed with a G (global) and S (state) rank. Alliances with State ranks of S1-S3 are considered to be highly imperiled.

Agriculture

Agricultural lands are used primarily for production of food and fiber. Such areas include croplands, pastures, orchards, groves, vineyards, nurseries, ornamental horticultural areas, confined feeding operations, and other agricultural land.

Alkali Playa Community

Alkali playa is a rare community of habitats that are intermittently flooded or saturated. Examples include dry lake beds and margins, hummocks, lagoon bars, old lake beds perched above current drainages, and seeps (Holland 1986).

Developed

Developed lands include urban or built-up areas with much of the land covered by structures. Such areas include cities, transportation, power and communications facilities, mills, shopping centers, and other buildings that may, in some cases, be separate from urban areas. Urban or built-up land may contain a wide variety of native and non-native, ruderal and ornamental plant species.

4.0 METHODS

4.1 Database Search and Literature Review

Prior to the initiation of field work, a review of pertinent literature was performed to verify known and reported burrowing owl use within 3 miles of the Proposed Project vicinity. Sources reviewed included the following:

- Special-status species lists from CDFW and USFWS;
- Database searches of the:
  - California Natural Diversity Database RareFind application (CDFW 2017)
  - USFWS Species Occurrence Data (USFWS 2017)
- The following biological reports were also reviewed:
  - BRC-Equals 3, Inc. 2016 *Habitat Assessment: Calcite Substation Project* (BRC 2016a)
  - BRC-Equals 3, Inc. 2016 *Burrowing Owl Focused Study: Calcite Substation Project* (BRC 2016b).

4.2 Burrowing Owl Habitat Assessment

EI's 2017 survey methodology followed the California Burrowing Owl Consortium's *Burrowing Owl Survey Protocol and Mitigation Guidelines* (CBOC 1993), and the CDFW's updated *Staff Report on Burrowing Owl Mitigation* breeding season survey guidelines (CDFG 2012).

The survey was conducted in two phases: a habitat assessment and focused surveys. The habitat assessment was conducted by qualified biologists Ron Clark, Kevin Thomas, Nicole Neshibal, Ben Madden, and Douglas Gordon-Blackwood. The Survey Area consisted of a 100-foot buffer around the Project alignment and included all proposed substations, disturbance areas, and tie-in locations along the existing SCE transmission line.

The habitat assessment involved identifying vegetation and habitat types that can support burrowing owls in the Proposed Project area and within 100-feet around the Project boundary to determine areas of suitable habitat. Habitats favored by burrowing owls consist of short vegetation, open areas, and burrows (>11 cm in diameter and >150 cm in depth) in sandy soils, and they avoid tall, dense vegetation (Zarn 1974, Rosenberg *et al*. 1998). Burrowing owl habitat was assessed based on three suitability categories (high, medium, and low) to determine areas for focused surveys:

- High – Highly suitable habitat includes the presence or sign (molted feathers, cast pellets, prey remains, eggshell fragments, or excrement) of burrowing owls at the entrance of natural or artificial burrows.
- Medium – Moderately suitable habitat consists of short, sparse vegetation with few shrubs, level to gentle topography, level to gentle topography, well-drained soils, fossorial burrows

(>11 cm diameter and > 150 cm in depth), and an abundant prey base within close proximity to the burrow.

- Low – Marginally suitable habitat consists of burrows suitable for burrowing owl use, but it lacks vegetation, topographic features, or a prey base found in moderately suitable habitat.

4.3 Burrowing Owl Focused Surveys

The timing and number of visits for focused surveys were based on the recommendations in the *Staff Report on Burrowing Owl Mitigation* (CDFW 2012). The Staff Report recommends conducting at least one habitat assessment and 4 focused surveys. Timing of the focused surveys should occur with at least one site visit between February 15 and April 15, two surveys between April 15 and June 15, and one survey between June 15 and July 15. All focused surveys should also be separated by at least 2 weeks. Daily timing of the surveys took place between morning civil twilight and 10:00 am, and was extended during suitable weather conditions. Surveys were conducted during weather that was conducive to observing owls outside their burrows and detecting burrowing owl sign. Surveys were not conducted during rain, high winds (> 20 mph), or dense fog. Temperatures for the duration of the surveys ranged from 53 – 100°F, and none of the surveys were conducted within five days of measurable precipitation.

The first focused survey was conducted concurrently with a focused desert tortoise survey and documented all potential burrow and refuge sites. Linear transects were walked approximately 10-meters (30 feet) apart to provide 100 percent coverage of suitable habitat on the site. Potential burrows and refuge sites were inspected for burrowing owl use and indicative sign (i.e. pellets, scat, feathers and bone fragments). Potentially suitable burrow locations and refuge sites were recorded with handheld GPS units. Additionally any indicative sign would be photographed and removed to ascertain presence during subsequent surveys.

The Survey Area was walked in its entirety and areas of suitable habitat were identified and systematically searched for potentially suitable burrows for burrowing owl. Focused attention, including the use of denser transect lines, were given to areas with higher potential for burrowing owl occurrence (i.e., dense ground squirrel burrows, sparse vegetation, culverts, etc.).

TABLE 2: SURVEY DATES, TIMES AND WEATHER CONDITIONS

Date	Time	Biologist(s)*	Weather Conditions	Survey
April 25, 2017	07:00-17:00	RC, BM, KT, NN	65-77°F, clear, light wind	Habitat Assessment
April 26, 2017	07:00-17:00	RC, BM, KT, NN	70-85°F, clear, light wind	Habitat Assessment
April 27, 2017	07:00-17:00	RC, BM, KT, NN	70-84°F, partly cloudy, light wind	Habitat Assessment
April 28, 2017	07:00-17:00	DGB, BM, KT, NN	68-77°F, partly cloudy, light wind	Habitat Assessment
May 18, 2017	0530-1000	MD, MZ, RH, RS, TH, TT	53-78°F, partly cloudy, light wind	Focused Survey #1
May 19, 2017	0530-1000	MD, MZ, RH, RS, TH, TT	51-80°F, partly cloudy, light wind	Focused Survey #1
May 22, 2017	0530-1000	MD, MZ, RH, RS, TH, TT	70-97°F, partly cloudy, light wind	Focused Survey #1
May 23, 2017	0530-1000	MD, MZ, RH, RS, TH, TT	73-98°F, partly cloudy, light wind	Focused Survey #1

May 24, 2017	0530-1000	MD, MZ, RH, RS, TH, TT	73-98°F, partly cloudy, light wind	Focused Survey #1
June 5, 2017	0530-1000	SD, BM	73-100°F, partly cloudy, light wind	Focused Survey #2
June 6, 2017	0530-1000	SD, BM	71-99°F, partly cloudy, light wind	Focused Survey #2
June 7, 2017	0530-1000	SD, BM	71-99°F, partly cloudy, light wind	Focused Survey #2
June 26, 2017	0530-1000	MD, RM	75-92°F, clear, light wind	Focused Survey #3
June 27, 2017	0530-1000	MD, RM	79-96°F, clear, moderate wind	Focused Survey #3
July 20, 2017	0530-1000	MD, RM	83-98°F, clear skies, moderate wind	Focused Survey #4
July 20, 2017	0530-1000	MD, RM	83-98°F, clear skies, moderate wind	Focused Survey #4

* MD – Minh Dao, MZ – Mike Zerwekh, RH – Ryan Hilgris, RM – Rachel MacNutt, RS – Randy Sisk, SD – Scott Duff, DGB – Doug Gordon Blackwood, NN – Nicole Neshibal, BM - Ben Madden, TH – Terry Hurt, and TT – Tracy Treybig

5.0 RESULTS

5.1 Database Search and Literature Review

BRC-Equals3 conducted a burrowing owl habitat assessment for the Proposed Project in 2016 and determined medium quality habitat for burrowing owls was present throughout the Project vicinity (BRC 2016b). The 2016 BRC habitat assessment identified four potential burrows along the alignment, but no live owls were observed during the survey. Historical records indicate three burrowing owl sightings within 3-miles of the Project location (CNDDB 2017) (Exhibit 3: *Literature Review*).

5.2 Habitat Assessment

Topography, soils, vegetation communities, land cover types, burrows, and prey density were evaluated during EI's habitat assessment surveys. Since the Project site primarily consists of undisturbed creosote bush and *Atriplex* shrubland on relatively flat, open ground, and contains suitable ground squirrel burrows and desert kit fox dens distributed throughout, it is classified as medium-quality habitat. Areas with low quality habitat included rock outcroppings, steep slopes, and dry lake beds.

5.3 Focused Surveys

No burrowing owls or indicative sign were observed during focused surveys. Four (4) burrows suitable for burrowing owl were identified during survey efforts (Exhibit 4). Two of these burrows were determined to be active kit fox burrows during the course of the surveys.

Eight vertebrate species were either directly observed or detected through the presence of sign during surveys. These included 3 species of reptiles, 4 birds, and 1 mammal. Burrowing owl prey species detected included great basin whiptail (*Aspidoscelis tigris tigris*), western side-blotched lizard (*Uta stansburiana elegans*), and western zebra-tailed lizard (*Callisaurus draconoides rhodostictus*). The full list of vertebrate species observed during surveys is included in Appendix C.

6.0 DISCUSSION

The proposed Gale to Pisgah Project is located on land containing medium quality burrowing owl habitat. Review of species databases concluded burrowing owls have the potential to occur within the Project and vicinity; however, no burrowing owls or burrowing owl burrows with diagnostic sign were observed during the CDFW-protocol habitat assessment and focused surveys conducted in spring and summer 2017. Based on the results of this report, the Project is unlikely to have a substantial adverse effect on the burrowing owl, either directly or through habitat modification.

ENVIRONMENTAL INTELLIGENCE

Travis Kegel – Project Manager

7.0 REFERENCES

BRC Equals 3, Inc. (BRC). 2016a. Habitat Assessment: Calcite Substation Project San Bernardino County, California. Prepared for Southern California Edison, June 3, 2016.

BRC Equals 3, Inc. (BRC). 2016b. Burrowing Owl Focused Study: Calcite Substation Project San Bernardino County, California. Prepared for Southern California Edison, June 3, 2016.

CNDDB. California Department of Fish and Game. The California Natural Diversity Database (CNDDB) (http://www.dfg.ca.gov/biogeodata/cnddb/), Sacramento, California, USA.

California Burrowing Owl Consortium. 1993. Burrowing Owl Survey Protocol and Mitigation Guidelines. April 1993.

California Department of Fish and Wildlife. 2012. Staff Report on Burrowing Owl Mitigation. Unpublished report, Dated March 7, 2012. Sacramento, California.

Dechant, J. A., M. L. Sondreal, D. H. Johnson, L. D. Igl, C. M. Goldade, P. A. Rabie, and B. R. Euliss. 1999 (revised 2002). Effects of management practices on grassland birds: Burrowing owl. Northern Prairie Wildlife Research Center, Jamestown, ND. 33 pages.

Rosenberg, D. K., Gervais, J. A., Ober, H., and DeSante, D. S. 1998. An adaptive management plan for the burrowing owl population at Naval Air Station Lemoore, California. Publication 95, Institute for Bird Populations, P.O. Box 1346, Pt. Reyes Station, CA 94956

Sawyer, J. O., T. Keeler- Wolf, and J. M. Evens. 2009. A manual of California vegetation, 2nd edition. California Native Plant Society: Sacramento, CA.

United States Fish and Wildlife Service (USFWS). 2008. Birds of Conservation Concern 2008. United States Department of Interior, Fish and Wildlife Service, Division of Migratory Bird Management, Arlington, Virginia. 85 pp. [Online version available at <http://www.fws.gov/migratorybirds/>]

United States Fish and Wildlife Service (USFWS). 2017. Information, Planning, and Conservation System Trust Resources lists.

Zarn, M. 1974. Burrowing owl. U.S. Department of Interior, Bureau of Land Management. Technical Note T-N 250.Denver, Colorado. 25 p.

APPENDIX A:

EXHIBITS

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community Copyright:© 2013 National Geographic Society, i-cubed

Environmental Intelligence. Date: 7/20/2017. Q:\SCE\Large Cap On-Call\CWA_Projects\005_Gale_Pisgah\02_GIS_Data\maps\2017\BUOW Report\Exh_0301_LiteratureReview_CNDDB_EI01_20170720.mxd

Survey Area

N W E S

0 5 10 Miles

1:480,000 1 in = 8 miles

EI

Exhibit 1: Project Location

Gale to Pisgah Project | San Bernardino County, California

Exhibit 2. Project Description Page 1 of 25

Gale To Pisgah Project | San Bernardino County, CA

Legend

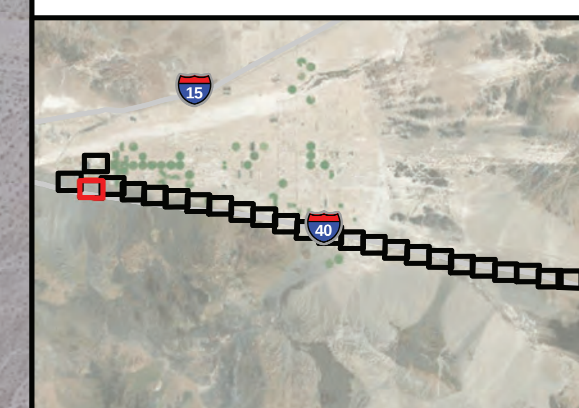
Survey Area

Project Components

Pole Work Areas

Pull Sites

Underground Work Area



Environmental Intelligence. Date: 7/25/2017. Q:\SCE\Large Cap On-Call\LCWA_Projects\005_Gale_Pisgah\02_GIS_Data\maps\2017\BUOW Report\Exh_02_Project_Description_EI01_20170724.mxd

Exhibit 2. Project Description Page 2 of 25

Gale To Pisgah Project | San Bernardino County, CA

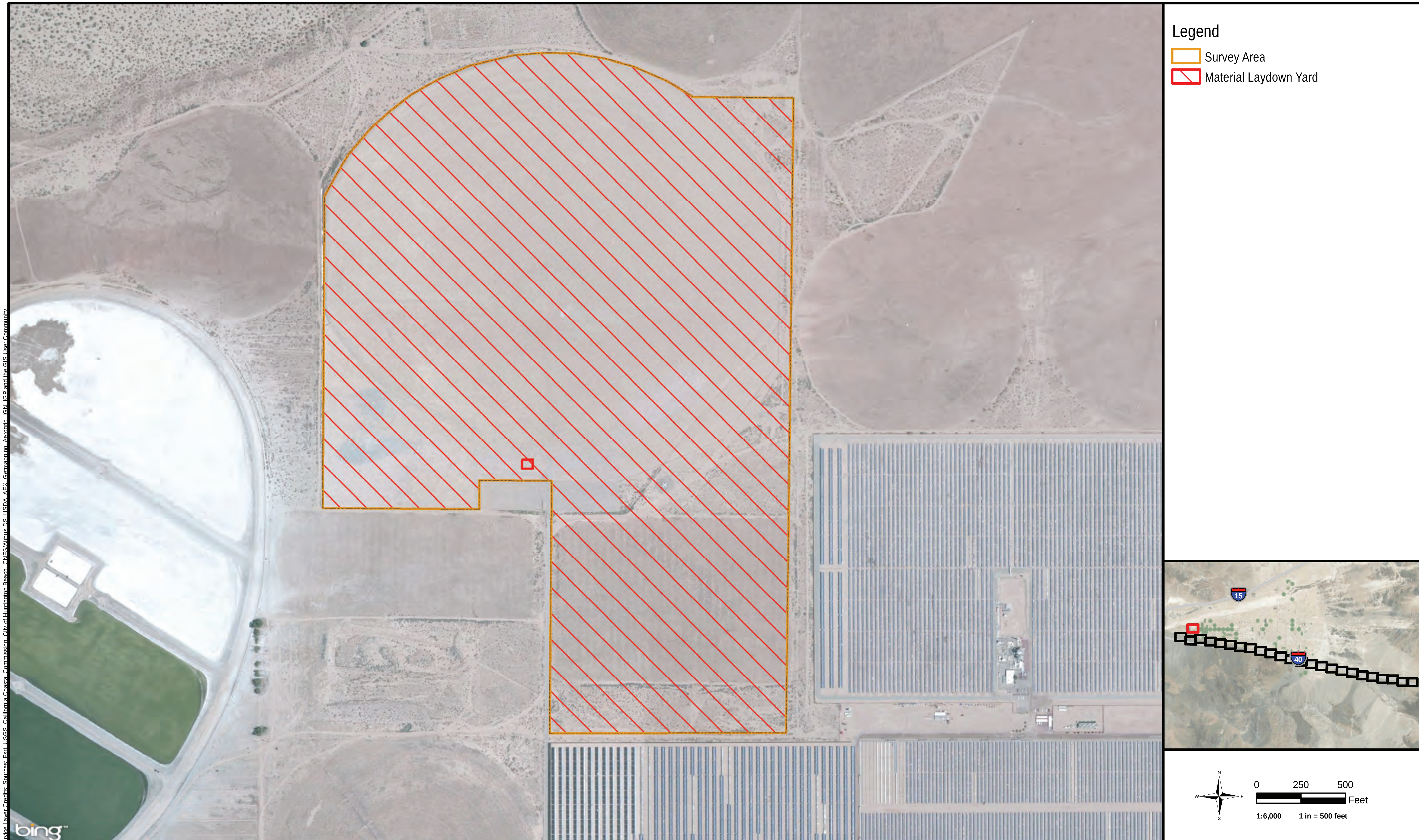


Exhibit 2. Project Description Page 3 of 25

Gale To Pisgah Project | San Bernardino County, CA

Exhibit 2. Project Description Page 4 of 25

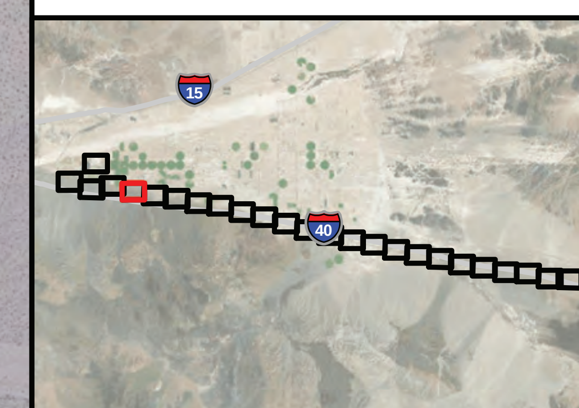
Gale To Pisgah Project | San Bernardino County, CA

Legend

Survey Area

Project Components

Pole Work Areas



N W E S

0 250 500 Feet

1:6,000 1 in = 500 feet

Service Layer Credits: Sources: Esri, USGS, California Coastal Commission, City of Huntington Beach, CNES/Airbus DS, USDA, AEX, Getmapping, Aerogrid, IGN, IGP and the GIS User Community

Environmental Intelligence. Date: 7/25/2017. Q:\SCE\Large Cap On-Call\LCWA_Projects\005_Gale_Pisgah\02_GIS_Datamaps\2017\BUOW Report\Exh_02_Project_Description_EI01_20170724.mxd

EI

EXHIBIT 2. PROJECT DESCRIPTION PAGE 5 OF 25

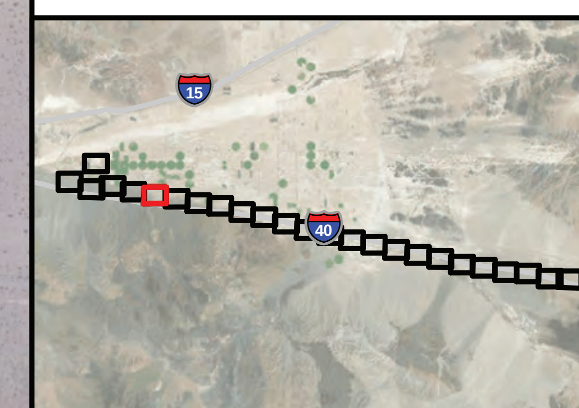
GALE TO PISGAH PROJECT | SAN BERNARDINO COUNTY, CA

Legend

Survey Area

Project Components

Pole Work Areas



N S E W

0 250 500 Feet

1:6,000 1 in = 500 feet

Environmental Intelligence. Date: 7/25/2017. Q:\SCE\Large Cap On-Call\LCWA_Projects\005_Gale_Pisgah\02_GIS_Data\maps\2017\BUOW Report\Exh_02_Project_Description_EI01_20170724.mxd

Exhibit 2. Project Description Page 6 of 25

Gale To Pisgah Project | San Bernardino County, CA

Exhibit 2. Project Description Page 7 of 25

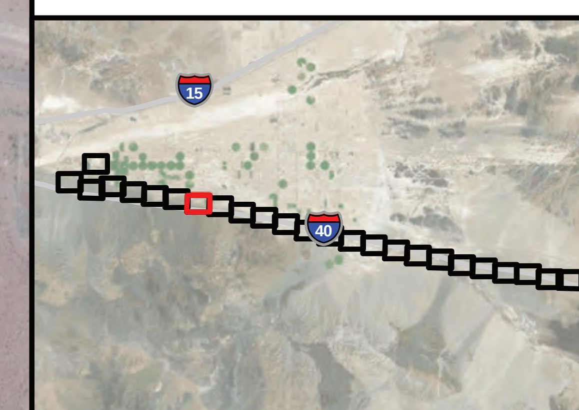
Gale To Pisgah Project | San Bernardino County, CA

Legend

Survey Area

Project Components

Pole Work Areas



N
W E
S
0 250 500
Feet
1:6,000 1 in = 500 feet

Service Layer Credits: Sources: Esri, USGS, California Coastal Commission, City of Huntington Beach, CNES/Airbus DS, USDA, AEX, Getmapping, Aerogrid, IGN, IGP and the GIS User Community

Environmental Intelligence. Date: 7/25/2017. Q:\SCE\Large Cap On-Call\LCWA_Projects\005_Gale_Pisgah\02_GIS_Datamaps\2017\BUOW Report\Exh_02_Project_Description_EI01_20170724.mxd

EXHIBIT 2. PROJECT DESCRIPTION PAGE 8 OF 25

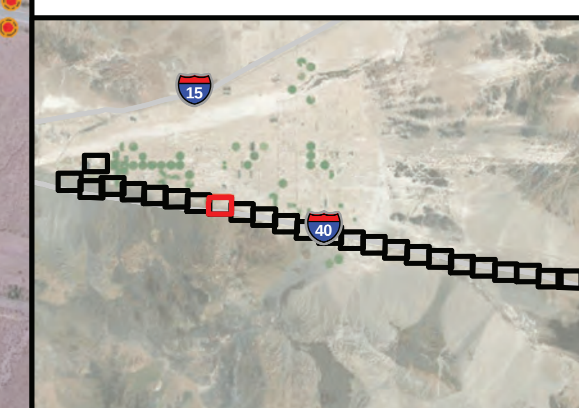
GALE TO PISGAH PROJECT | SAN BERNARDINO COUNTY, CA

Legend

Survey Area

Project Components

Pole Work Areas



0 250 500 Feet

1:6,000 1 in = 500 feet

Environmental Intelligence. Date: 7/25/2017. Q:\SCE\Large Cap On-Call\LCWA_Projects\005_Gale_Pisgah\02_GIS_Data\maps\2017\BUOW Report\Exh_02_Project_Description_EI01_20170724.mxd

Exhibit 2. Project Description Page 9 of 25

Gale To Pisgah Project | San Bernardino County, CA

Service Layer Credits: Sources: Esri, USGS, California Coastal Commission, City of Huntington Beach, CNES/Airbus DS, USDA, AEX, Getmapping, Aerogrid, IGN, IGP and the GIS User Community

Environmental Intelligence. Date: 7/25/2017. Q:\SCE\Large Cap On-Call\LCWA_Projects\005_Gale_Pisgah\02_GIS_Datamaps\2017\BUOW Report\Exh_02_Project_Description_EI01_20170724.mxd

EI

Exhibit 2. Project Description Page 10 of 25

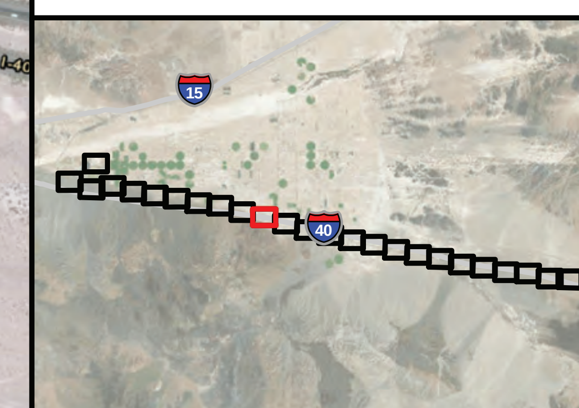
Gale To Pisgah Project | San Bernardino County, CA

Legend

Survey Area

Project Components

Pole Work Areas



N
W E
S

0 250 500 Feet

1:6,000 1 in = 500 feet

Environmental Intelligence. Date: 7/25/2017. Q:\SCE\Large Cap On-Call\LCWA_Projects\005_Gale_Pisgah\02_GIS_Datamaps\2017\BUOW Report\Exh_02_Project_Description_EI01_20170724.mxd

Exhibit 2. Project Description Page 11 of 25

Gale To Pisgah Project | San Bernardino County, CA

Exhibit 2. Project Description Page 12 of 25

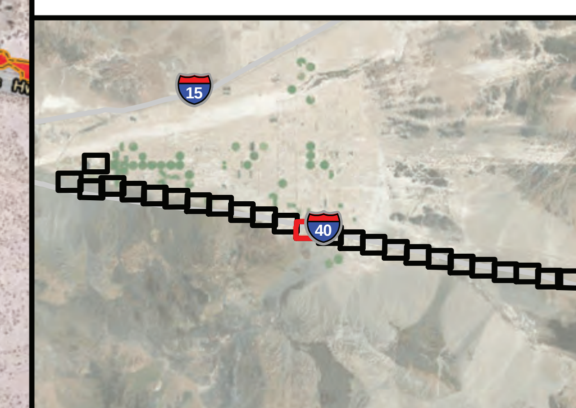
Gale To Pisgah Project | San Bernardino County, CA

Legend

Survey Area

Project Components

Pole Work Areas



N
W E
S

0 250 500 Feet

1:6,000 1 in = 500 feet

Service Layer Credits: Sources: Esri, USGS, California Coastal Commission, City of Huntington Beach, CNES/Airbus DS, USDA, AEX, Getmapping, Aerogrid, IGN, IGP and the GIS User Community

Environmental Intelligence. Date: 7/25/2017. Q:\SCE\Large Cap On-Call\LCWA_Projects\005_Gale_Pisgah\02_GIS_Datamaps\2017\BUOW Report\Exh_02_Project_Description_EI01_20170724.mxd

Exhibit 2. Project Description Page 13 of 25

Gale To Pisgah Project | San Bernardino County, CA

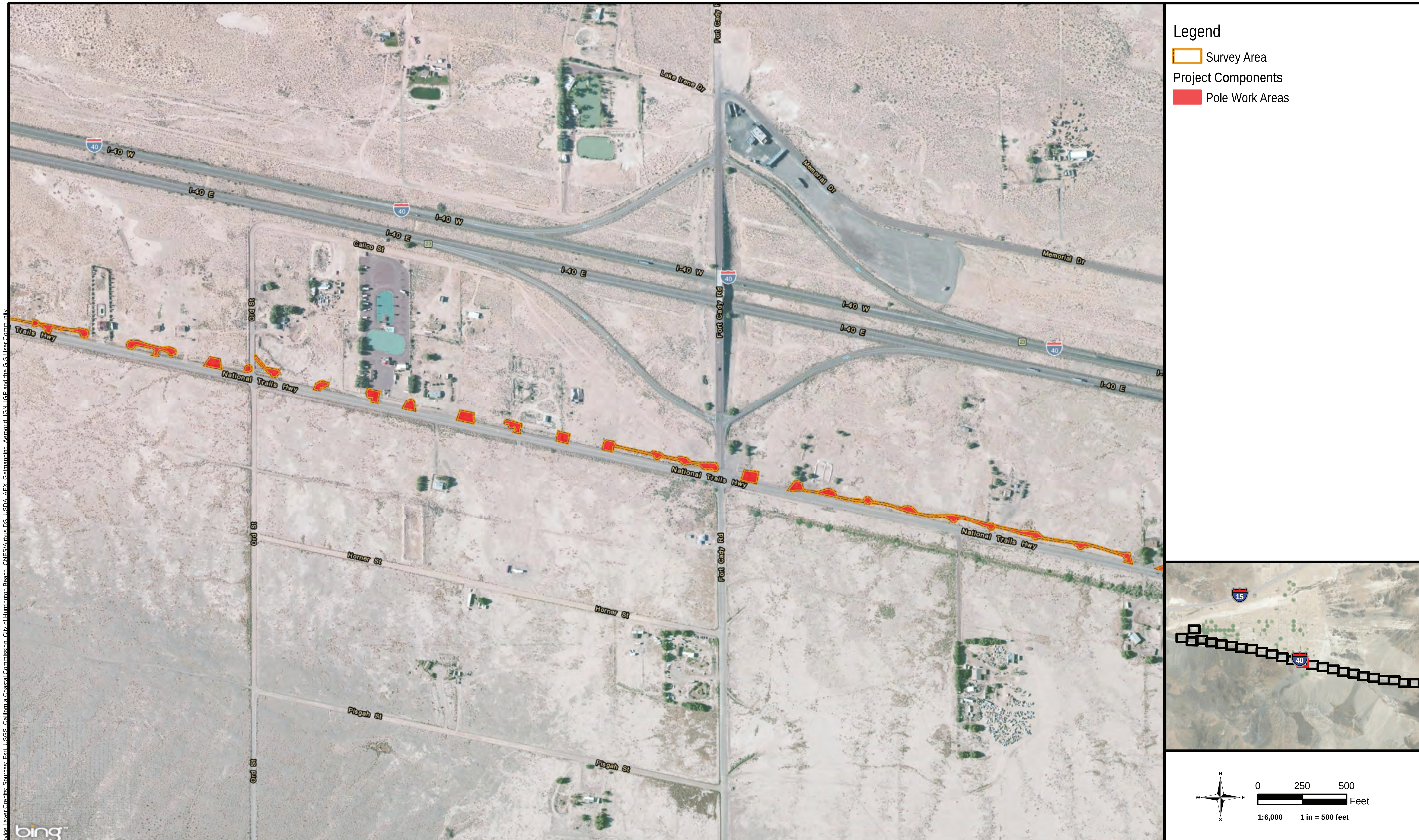


Exhibit 2. Project Description Page 14 of 25

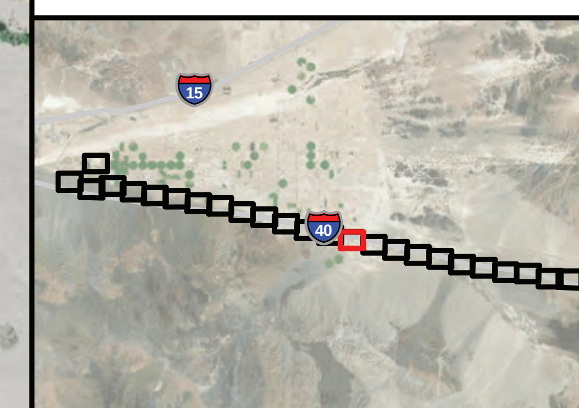
Gale To Pisgah Project | San Bernardino County, CA

Legend

- Survey Area

Project Components

- Pole Work Areas
- Pull Sites
- Underground Work Area



N S E W

0 250 500 Feet

1:6,000 1 in = 500 feet

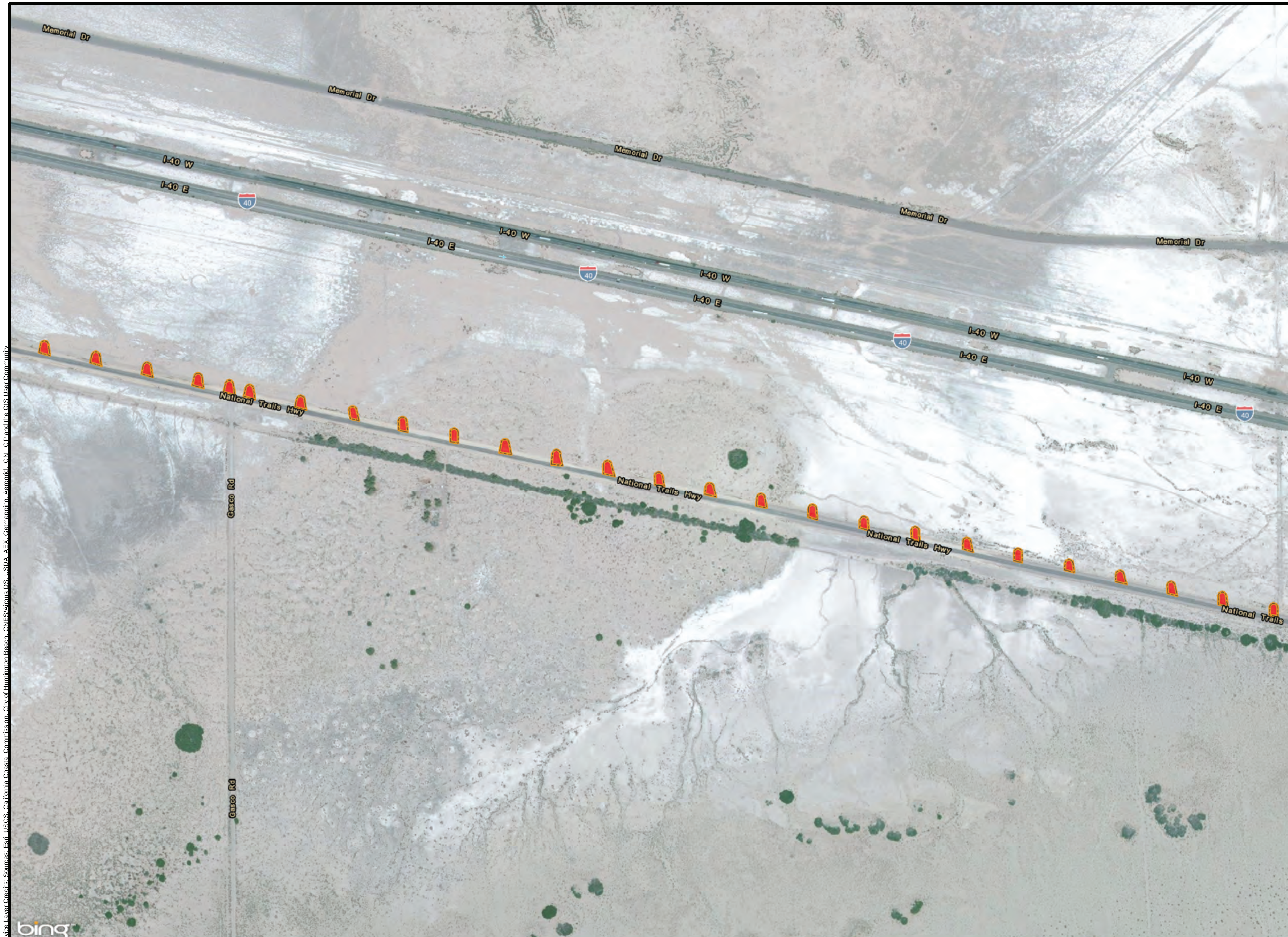
Environmental Intelligence. Date: 7/25/2017. Q:\SCE\Large Cap On-Call\LCWA_Projects\005_Gale_Pisgah\02_GIS_Data\maps\2017\BUOW Report\Exh_02_Project_Description_EI01_20170724.mxd

EXHIBIT 2. PROJECT DESCRIPTION PAGE 15 OF 25

GALE TO PISGAH PROJECT | SAN BERNARDINO COUNTY, CA

Exhibit 2. Project Description Page 16 of 25

Gale To Pisgah Project | San Bernardino County, CA

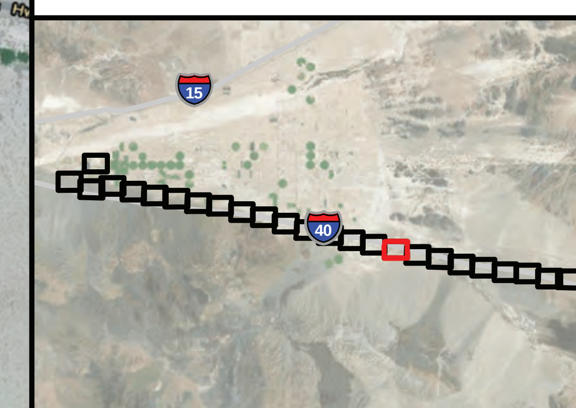


Legend

Survey Area

Project Components

Pole Work Areas



N S E W

0 250 500

Feet

1:6,000 1 in = 500 feet

Service Layer Credits: Sources: Esri, USGS, California Coastal Commission, City of Huntington Beach, CNES/Airbus DS, USDA, AEX, Getmapping, Aerogrid, IGN, IGP and the GIS User Community

Environmental Intelligence. Date: 7/25/2017. Q:\SCE\Large Cap On-Call\LCWA_Projects\005_Gale_Pisgah\02_GIS_Datamaps\2017\BUOW Report\Exh_02_Project_Description_EI01_20170724.mxd

EXHIBIT 2. PROJECT DESCRIPTION PAGE 17 OF 25

GALE TO PISGAH PROJECT | SAN BERNARDINO COUNTY, CA

Exhibit 2. Project Description Page 18 of 25

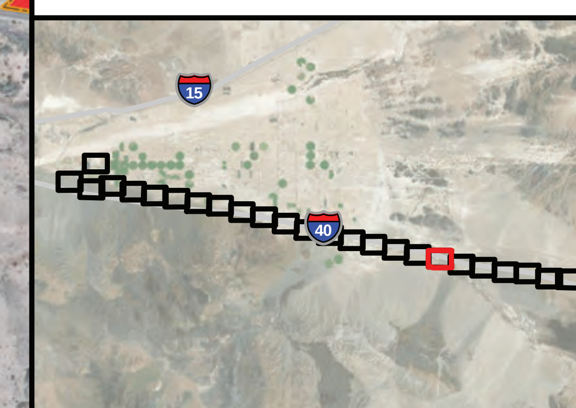
Gale To Pisgah Project | San Bernardino County, CA

Legend

- Survey Area

Project Components

- Pole Work Areas
- Pull Sites
- Pedestrian Access Structure Work Area



N
W E
S

0 250 500 Feet

1:6,000 1 in = 500 feet

Service Layer Credits: Sources: Esri, USGS, California Coastal Commission, City of Huntington Beach, CNES/Airbus DS, USDA, AEX, Getmapping, Aerogrid, IGN, IGP and the GIS User Community

Environmental Intelligence. Date: 7/25/2017. Q:\SCE\Large Cap On-Call\LCWA_Projects\005_Gale_Pisgah\02_GIS_Datamaps\2017\BUOW Report\Exh_02_Project_Description_EI01_20170724.mxd

EI

Exhibit 2. Project Description Page 19 of 25

Gale To Pisgah Project | San Bernardino County, CA

Exhibit 2. Project Description Page 20 of 25

Gale To Pisgah Project | San Bernardino County, CA

Legend

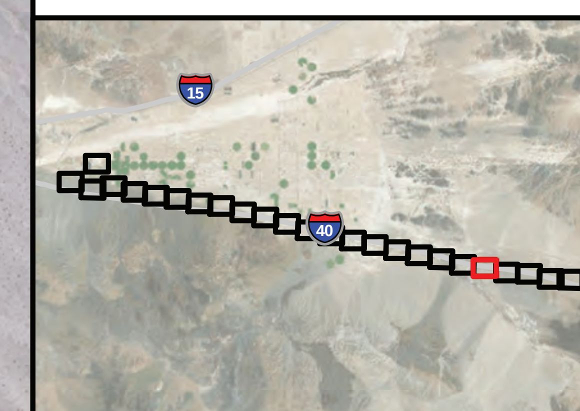
Survey Area

Project Components

Pole Work Areas

Pull Sites

Pedestrian Access Structure Work Area



N
W E
S

0 250 500
Feet

1:6,000 1 in = 500 feet

Environmental Intelligence. Date: 7/25/2017. Q:\SCE\Large Cap On-Call\LCWA_Projects\005_Gale_Pisgah\02_GIS_Datamaps\2017\BUOW Report\Exh_02_Project_Description_EI01_20170724.mxd

EI

Exhibit 2. Project Description Page 21 of 25

Gale To Pisgah Project | San Bernardino County, CA

Exhibit 2. Project Description Page 22 of 25

Gale To Pisgah Project | San Bernardino County, CA

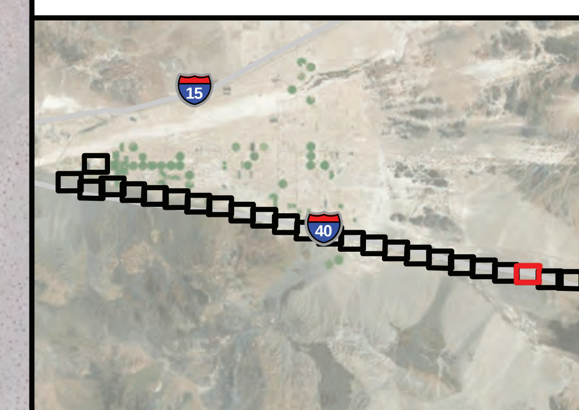
Legend

Survey Area

Project Components

Pole Work Areas

Pedestrian Access Structure Work Area



N S E W

0 250 500 Feet

1:6,000 1 in = 500 feet

Service Layer Credits: Sources: Esri, USGS, California Coastal Commission, City of Huntington Beach, CNES/Airbus DS, USDA, AEX, Getmapping, Aerogrid, IGN, IGP and the GIS User Community

Environmental Intelligence. Date: 7/25/2017. Q:\SCE\Large Cap On-Call\LCWA_Projects\005_Gale_Pisgah\02_GIS_Datamaps\2017\BUOW Report\Exh_02_Project_Description_EI01_20170724.mxd

Exhibit 2. Project Description Page 23 of 25

Gale To Pisgah Project | San Bernardino County, CA

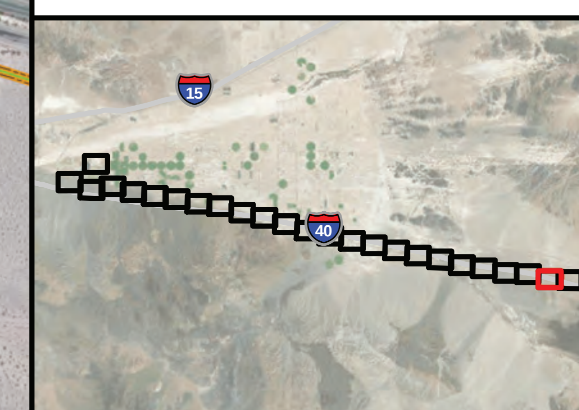
Legend

Survey Area

Project Components

Pole Work Areas

Pedestrian Access Structure Work Area



N W E S

0 250 500 Feet

1:6,000 1 in = 500 feet

Service Layer Credits: Sources: Esri, USGS, California Coastal Commission, City of Huntington Beach, CNES/Airbus DS, USDA, AEX, Getmapping, Aerogrid, IGN, IGP and the GIS User Community

Environmental Intelligence. Date: 7/25/2017. Q:\SCE\Large Cap On-Call\LCWA_Projects\005_Gale_Pisgah\02_GIS_Data\maps\2017\BUOW Report\Exh_02_Project_Description_EI01_20170724.mxd

EXHIBIT 2. PROJECT DESCRIPTION PAGE 24 OF 25

GALE TO PISGAH PROJECT | SAN BERNARDINO COUNTY, CA

Exhibit 2. Project Description Page 25 of 25

Gale To Pisgah Project | San Bernardino County, CA

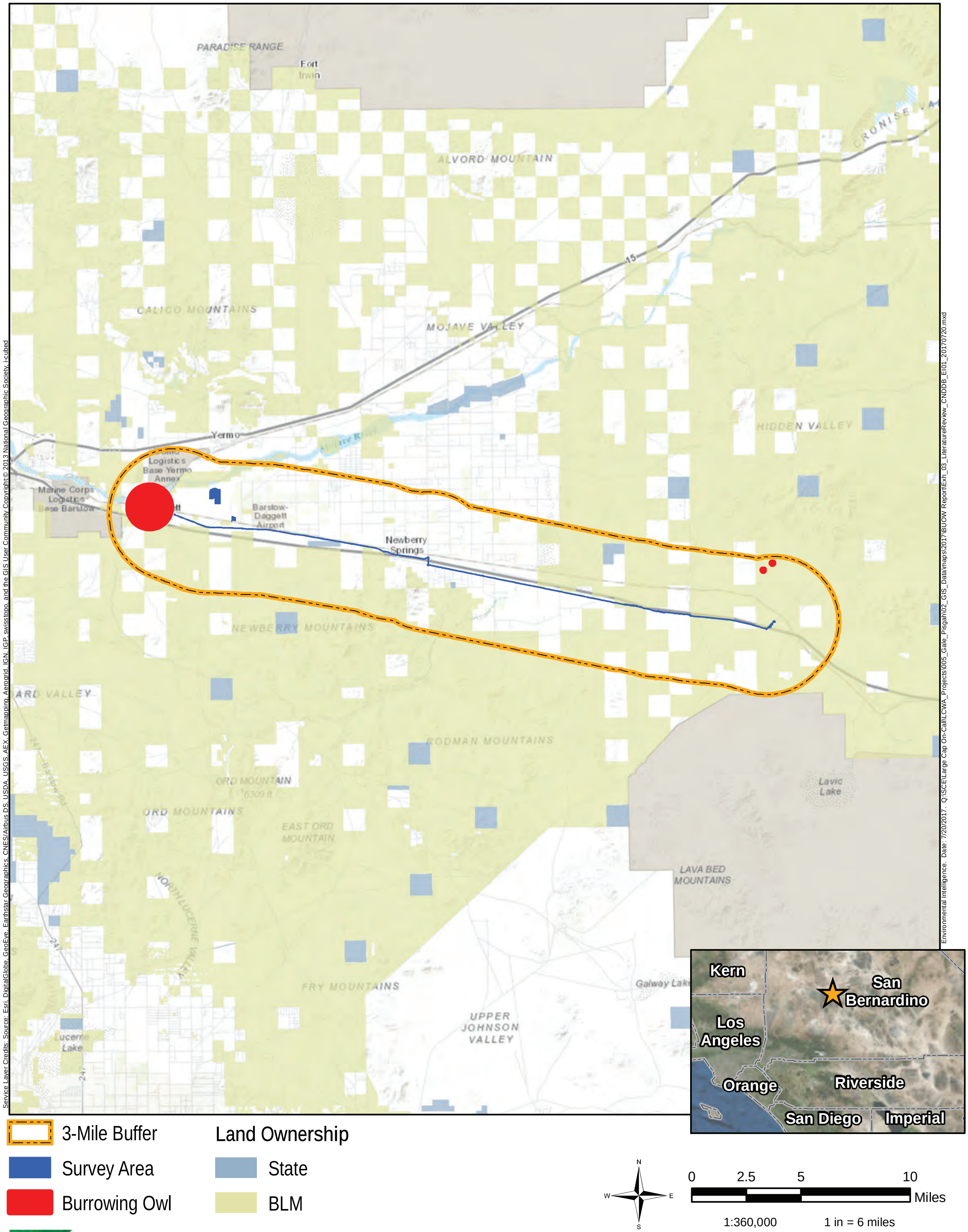


Exhibit 3: Literature Review

Gale to Pisgah Project | San Bernardino County, California

Exhibit 4: Burrowing Owl Focused Survey Results (Page 1 of 3)

Gale to Pisgah Project | San Bernardino County, California

Survey Area

Potential burrowing owl burrow

Active kit fox den

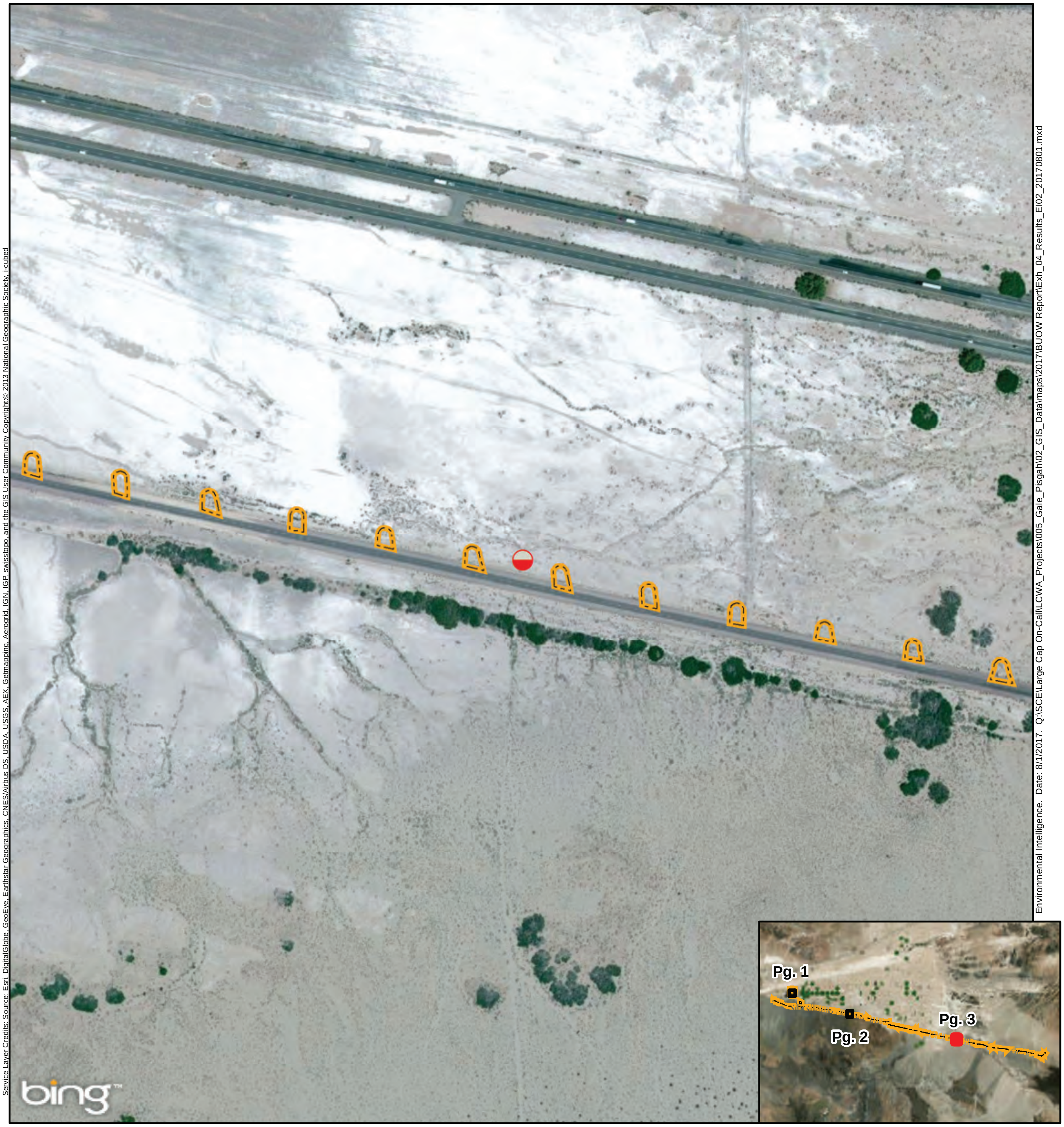
N W E S

0 200 400 Feet

1:4,800 1 in = 400 feet

EXHIBIT 4: BURROWING OWL FOCUSED SURVEY RESULTS (PAGE 2 OF 3)

GALE TO PISGAH PROJECT | SAN BERNARDINO COUNTY, CALIFORNIA



Environmental Intelligence. Date: 8/1/2017. Q:\SCE\Large Cap On-Call\LCWA_Projects\005_Gale_Pisgah\02_GIS_Data\maps\2017\BUOW Report\Exh_04_Results_EI02_20170801.mxd

Survey Area
Potential burrowing owl burrow
Active kit fox den

N W E S

0 200 400 Feet

1:4,800 1 in = 400 feet

EI

Exhibit 4: Burrowing Owl Focused Survey Results (Page 3 of 3)

Gale to Pisgah Project | San Bernardino County, California

APPENDIX B:

SITE PHOTOGRAPHS

Photo 1:

Photo of *Atriplex* sp. within project survey area. *Atriplex* cover is sparse and short providing suitable burrowing owl habitat.

Photo 2:

Marginally suitable burrowing owl habitat. Native sparse and low growing creosote shrubland.

Photo 3:

View of potential burrow location.

Photo 4:

View of Burrow determined to be an active kitfox burrow.

APPENDIX C:

FAUNAL COMPENDIUM

SCIENTIFIC NAME	**COMMON NAME**
AVES - BIRDS	
ORDER PASSERIFORMES – PERCHING BIRDS	
ALAUDIDAE	
Eremophila alpestris	Horned lark
CORVIDAE	
Corvus corax	Common raven
EMBERIZIDAE	
Melozone crissalis	California towhee
FRINGILLIDAE	
Haemorhous mexicanus	House Finch
MAMMALIA - MAMMALS	
ORDER CARNIVORA – CARNIVORES	
CANIDAE	
Vulpes macrotis arsipus (den)	Desert kit fox
REPTILIA - REPTILES	
ORDER SQUAMATA – LIZARDS/SNAKES	
PHRYNOSOMATIDAE	
Callisaurus draconoides rhodostictus	Western zebra-tailed lizard
Uta stansburiana elegans	Western side-blotched lizard
TEIIDAE	
Aspidoscelis tigris tigris	Great basin whiptail

Appendix D-11

Golden Eagle Survey Report

Golden Eagle (*Aquila chrysaetos*) Survey Report, Lugo-Victorville Remedial Action Scheme Project, San Bernardino County, California and Clark County, Nevada

Spring 2021

Prepared for:
Southern California Edison
2244 Walnut Grove Avenue
GO-1, Quad 2C
Rosemead, CA 91770

On behalf of:
Rincon Consultants, Inc.
1980 Orange Tree Lane, Suite 105
Redlands, CA 92374

Prepared by:
EnviroPlus Consulting, LLC
P.O. Box 1
Tehachapi, CA 93581

June 8, 2021

Table of Contents

Tables

Figures

Photographs

EXECUTIVE SUMMARY

This Golden Eagle (*Aquila chrysaetos*) Survey Report (Report) provides the results of a Phase 1 occupancy survey for golden eagles performed for Southern California Edison's (SCE) Lugo-Victorville 500 kilovolt (kV) Transmission Line Remedial Action Scheme Project (LVRAS or Project) in San Bernardino County, California and Clark County, Nevada. Survey methodologies followed a modified approach of the U.S. Fish and Wildlife Service's (USFWS) *Interim Golden Eagle Inventory and Monitoring Protocols; and Other Recommendations* (Protocol) (Pagel et al., 2010). The survey area encompassed suitable golden eagle nesting habitat within two miles of the project alignment, an area of approximately 323,711 acres. EnviroPlus Consulting, LLC (EPC) golden eagle biologists conducted an aerial helicopter survey of all suitable eagle nesting habitat within the survey area on March 22 and March 23, 2021. This survey focused on locating golden eagle nests within the survey area and determining nest occupancy and status.

Three golden eagle nesting territories containing a total of five nest structures were identified. Evidence of occupancy during the current nesting season was documented in two of the three nesting territories. Of the three active nests, only one was occupied at the time of the survey. The occupied nest was located approximately 2.55 miles south of the project alignment in the Newberry Mountains. The two other active nests were unoccupied at the time of the survey and were 0.75 miles south and 2.22 miles northwest of the alignment, respectively. The two inactive nests were in deteriorated condition and located 1.15 miles north and 2.31 miles northwest of the alignment, respectively. All golden eagle nests were associated with rocky cliff habitats. No golden eagle nests were observed on transmission structures within the survey area. The presence of high-quality golden eagle nesting habitat, including [large rocky outcrops and vertical cliff structures], within 1-mile of the alignment was limited.

Forty-five red-tailed hawk (*Buteo jamaicensis*), 36 common raven (*Corvus corax*), five golden eagle, two prairie falcon (*Falco mexicanus*), and one unknown falcon nests were located and mapped during the survey. In addition, incidental non-nest associated observations were made of 32 red-tailed hawks, 11 bighorn sheep (*Ovis canadensis*), six turkey vultures (*Cathartes aura*), five prairie falcons, three golden eagles, one American kestrel (*Falco sparverius*), and one short-eared owl (*Asio flammeus*).

INTRODUCTION

Project Location and Description

The Project is located within SCE's existing right-of-way (ROW) and extends from SCE's Gale Substation in San Bernardino County, California (1 mile east of Daggett), through SCE's Pisgah Substation (Interstate 40 near Ludlow, California), to near Nipton Road (Joshua Tree Highway) within Clark County, Nevada. The Project includes two segments: Segment 1 (Gale to Pisgah), which extends for approximately 29 miles between SCE's Gale Substation and SCE's Pisgah Substation, and Segment 2 (Pisgah to Nipton), which continues from SCE's Pisgah Substation for 84 miles to a transmission tower located in Nevada, approximately 1.8 miles east of the state line (Figure 1). The Project is required to reliably interconnect and integrate multiple renewable generation projects in eastern California and southern Nevada into SCE's electrical power grid. The primary function of the Project is to prevent thermal overloading on the existing jointly owned Lugo-Victorville 500-kV Transmission Line, which is a major power transfer path between SCE and the Los Angeles Department of Water and Power (BLM, 2020). The installation of a new telecommunication path in the existing utility corridor, including the replacement of optical ground wire, optical fiber nonconducting riser cable, and/or all-dielectric self-supporting fiber-optic cable between the existing Eldorado Substation in Nevada and the Cima, Pisgah, and Gale substations in California will provide reliable communication with generators so that they can be safely taken off-line in a timely manner to prevent thermal overload of the Lugo-Victorville 500kV transmission line by tripping generation in the event of loss of the

Eldorado-Lugo 500kV transmission line, or both this line and the Lugo-Mohave 500kV transmission line.

Regulatory Setting

Golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. Section 668), which prohibits the "take" (to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt any such activity) of golden eagles. More specifically, the Bald and Golden Eagle Protection Act protects against agitating an eagle to the degree that causes or is likely to cause (1) injury to an eagle, (2) decreased productivity as a result of interfering with normal breeding, feeding, or sheltering habits, or (3) nest abandonment as a result of interfering with normal breeding, feeding, or sheltering behavior (Pagel et al., 2010). Golden eagles are also traditionally protected by the Migratory Bird Treaty Act (Title 16 of the United States Code [U.S.C.] Sections 703–711).

Golden eagles are a Fully Protected Species in California. California Fish and Game Code Sections 3511, 4700, 5050, and 5515 list the bird, mammal, reptile, amphibian, and fish species that are identified as "fully protected." Fully protected wildlife may not be harmed, taken, or possessed. The classification of "fully protected" was California's initial effort to identify and provide additional protection to those wildlife species that were rare or faced possible extinction. Some fully protected species, but not the golden eagle, have also been listed as threatened or endangered species under California's more recent endangered species laws and regulations.

Title I of National Environmental Policy Act (NEPA) (42 U.S.C. Section 4321) requires federal agencies to incorporate environmental considerations in their planning and decision-making processes. Federal agencies are to prepare detailed statements, Environmental Impact Statements and Environmental Assessments, assessing the environmental impact of and alternatives to federal actions with the potential to significantly affecting the environment. Title II of NEPA established the Council on Environmental Quality (CEQ) (40 Code of Federal Regulations Parts 1500-1508) to oversee NEPA implementation by ensuring that federal agencies meet their obligations under NEPA, overseeing federal agency implementation of the environmental impact assessment process, and issuing regulations and other guidance to federal agencies regarding NEPA compliance. The LVRAS project is subject to assessment pursuant to NEPA; the Bureau of Land Management is the lead federal agency. It is anticipated that the NEPA document may include protective measures addressing golden eagles.

The California Environmental Quality Act (CEQA) (Public Resources Code Section 15000, et seq.) requires identification of significant environmental effects of proposed projects (including impacts on biological resources) and avoidance (where feasible) or mitigation of the significant effects. CEQA applies to "projects" proposed to be undertaken or requiring approval by state and/or local governmental agencies. "Projects" are activities that have the potential to have a physical impact on the environment (Section 21065). Pursuant to Section 15063 of Title 14 of the California Code of Regulations, if the Lead Agency determines that any aspect of the project, individually or cumulatively, may cause a significant environmental impact, an Environmental Impact Report must be prepared. However, if the Lead Agency finds the project would not result in significant environmental impacts, either as proposed or modified to include mitigation measures identified in the Initial Study, a Negative Declaration or Mitigated Negative Declaration, as appropriate, will be prepared instead. The LVRAS project is under review pursuant to CEQA; California Department of Fish and Wildlife (CDFW) is the lead state agency. It is anticipated that the resulting CEQA document will include protective measures addressing golden eagles.

Golden Eagle Natural History

Golden eagles are large aerial predators that live in a wide range of diverse habitats, including grasslands, open tundra, islands, forested mountains, arid deserts, and chaparral woodlands (Kochert et al., 2002; Pagel et al., 2010). They prey mainly on small rodents, reptiles, and birds, and larger prey including black-tailed jackrabbits (*Lepus californicus*), foxes (*Vulpes* sp.), coyotes (*Canis latrans*), mule deer (*Odocoileus hemionus*), and elk (*Cervus canadensis*) fawns (Olendorff, 1976; Collins and Latta, 2009). (Carnie, 1954; Bloom and Hawks, 1982), but are also well-known scavengers (Kochert et al., 2002).

Golden eagles are sensitive to many anthropogenic pressures (Palmer, 1988) and nesting territories are typically located in open to semi-open habitats away from urban settings (McIntyre, 1995; Pagel et al., 2010). Mated pairs typically build large stick nests on rocky cliffs, in the upper portions of large trees, on protected shelves of steep canyon walls, and on well-elevated man-made structures (e.g. transmission towers and windmills; Kochert et al., 2002). Nest locations typically provide an unobstructed view of the surrounding habitat. Multiple nests within a single active nesting territory are common (Palmer, 1988) and nesting site fidelity is high (Collins and Latta, 2009). Nests are often found in highest densities in open habitats.

Courtship behaviors, including display flights, vocalizations, and stick carrying, indicate the onset of the golden eagle reproduction season (Ellis, 1979). In southern California, golden eagles typically commence breeding in January. Egg laying occurs in early spring (February–March), egg hatching in late spring to early summer (April–May), rearing of chicks in summer (May–June), and fledging in late summer (June–July; B. Latta, 2012, pers. comm.; Hoechlin, 1976; Hunt et al., 1997). Adults continue to provide food for fledged chicks and teach them to hunt well into the fall months (B. Latta, 2012, pers. comm.)

Factors negatively affecting golden eagles in California include anthropogenic mortality and nest failure and population declines associated with habitat loss and degradation (Bittner et al., 2003; Pagel et al., 2010; Lovich, 2015).

METHODS

Survey Area

The survey area consisted of a buffer extending two miles from the LVRAS project alignment, including Segment 1 (Gale to Pisgah) and Segment 2 (Pisgah to Nipton), but excluding lengthy existing unpaved access roads to the alignment from paved public roads, as the project would only use those roads for ingress/egress. The survey area included portions of the Devils Playground, Cady Mountains, Bristol Mountains, Mojave Valley, and Mojave National Preserve (Figure 1).

Terrain is variable across the survey area and includes expansive areas of sandy creosote bush (*Larrea tridentate*) flats, with intervening rocky desert foothills, cliff ecosystems, and dry alluvial arroyos. Elevations within the survey area ranges from approximately 1,985 feet above mean seas level (AMSL) in the southwest, to approximately 4,140 feet AMSL in the northeast.

The southwestern half of the survey area intersects and is adjacent to numerous rocky mountain ranges, including the Newberry and Rodman mountains south of Segment 1, the Cady Mountains north of the intersection of Segment 1 and Segment 2, and the Bristol Mountains south of the western portion of Segment 2, which provide excellent golden eagle nesting habitats. Segment 2 passes over the southern finger of the Old Dad Mountains. The northeastern half of the survey area traverses the Ivanpah Valley, which predominately features open sandy flats. Suitable golden eagle nesting habitats in the northeastern half of the project area were primarily located outside of the survey limits in the Ivanpah and New York mountains. The project alignment is immediately adjacent to several transmission lines, and although not common when higher-quality cliff habitat is located in the vicinity, golden eagles are known to nest on large flat transmission structures platforms.

Pre-survey Literature Review and Habitat Assessment

EPC reviewed the USFWS Protocol (Pagel et al., 2010) and numerous other relevant references related to golden eagle nesting ecology, nesting phenology, chick development, feeding ecology, and population trends (see *References*) prior to the field survey. Potential golden eagle nesting habitat within and adjacent to the survey area was determined through review of aerial imagery, land cover data maps, and digital GIS databases, including Google Earth. Historic records provided by USFWS and records from the California Natural Diversity Database (CNDDB; CDFW, 2021) were reviewed for reference; however, the survey was conducted objectively, with the intention of establishing a fresh baseline.

Field Methods

Survey Protocol Requirements

The following helicopter survey protocol, based on the USFWS Protocol (Pagel et al., 2010), was used to determine the presence and activity of nesting golden eagles within the survey area:

- The survey was performed by qualified observers with experience conducting golden eagle aerial surveys.
- All potential suitable nesting habitats within the survey area was surveyed.
- Timing of the Phase 1 occupancy survey coincided with late egg laying and the presence of early-stage chicks.
- The survey was be limited to weather conditions favorable for aerial surveys, golden eagle activity, and preferably during morning hours.
- Active nests, occupied territories, and alternate nests were documented and reported along with pertinent Global Positioning System (GPS) data.
- Cliff nesting habitats were approached from the front rather than from behind or overhead.
- Hovering at a nest did not exceed 30 seconds and was at least 66 horizontal feet from the nest during data collection.

Survey Timing

The aerial survey for this project was planned to coincide with known nesting stages of breeding golden eagles in southern California (Hoechlin, 1976; Bittner et al., 2011, Meador et al., 2013). Specifically, the Phase 1 nest occupancy survey was scheduled to coincide with late egg laying and the presence of early-stage chicks (Pagel et al., 2010). A phase 2 productivity survey was not completed as part of the aerial survey (see *Limitations*).

Occupancy Survey

On March 22 and 23, 2021, EPC conducted a Phase 1 aerial occupancy survey of the survey area (Figure 2) to detect and document golden eagles and their nests. The visual-encounter survey was performed using a Bell 429 helicopter owned and operated by SCE. Dr. Eric Dugan (Observer 1; front left seat) served as navigator for the survey and primary observer for the left side of the helicopter. Dave Lohr (Observer 2; back right seat) served as the primary observer for the right side of the helicopter and the survey photographer. Helicopter pilot Hakon Satvedt has extensive experience performing eagle and aerial wildlife surveys.

The survey team visited all suitable golden eagle nesting habitats within the survey area. Generally, the flight path followed the existing transmission corridor until suitable habitat was observed adjacent to either side of the project alignment. At that point, suitable habitats were surveyed prior to the helicopter returning to the transmission corridor. Multiple passes at different elevations were flown to view nesting habitats associated with steep cliff ecosystems. Nests were approached briefly and at a distance close enough to allow the observers to photograph and determine the status of each nest but without disturbing the nest. Nests located on transmission structures were viewed from above using binoculars to determine species association and status. If incubating adults were observed, the survey team avoided approaching those locations and viewed those nests from a distance.

Positional Data and Photography

Location-specific data were recorded with a Samsung hand-held tablet (SM-T500) with a typical accuracy of about four meters. Each observation was assigned a sequential and unique identifier. Flight tracks were recorded using a Lowrance iFinder Pro and Garmin GPSMAP 78, both accurate to approximately four meters 95% of the time.

Photographs were taken with a Nikon D300 digital camera fitted with a 70x210 millimeter optical telephoto lens. The telephoto lens allowed for quality images to be collected from a distance, thereby limiting disturbance to nesting raptors and sensitive wildlife. Subsequent review of the images in the office provided additional data regarding species identification, and nesting status.

Data Collected

The survey area boundaries and historic golden eagle nests and nesting territories were downloaded to tablet and GPS units and appeared on each unit's screen. The survey team used headset communication during the entirety of the survey to facilitate efficiency and accuracy of observations, resolving questions or problems, and reporting significant findings in real time.

Data collected for each nest included the following (based on Pagel et al., 2010):

- Date
- Location of observation (Universal Transverse Mercator [UTM], WGS84, Zone 11)
- Species
- Nest condition
    - Good — Nest maintained or added to within the last 1 to 2 years; nest containing a bowl made of yucca or other new nesting materials
    - Fair — No evidence of recent use; no sign of recent maintenance; nest not used within the last 1 to 2 years
    - Poor — Currently inactive; deteriorated condition; extensive signs of weathering; significant slumping of parts of the nest; significant decomposition of nest material
- Nest status

  - Occupied — A nest being used in the current year; adult, eggs, and/or young observed at the nest; considered occupied throughout the egg-laying to post-fledging dependency stages
  - Active — Evidence of fresh nesting material in the nest; the presence of a newly constructed bowl; any other signs of preparation for egg-laying; active nests may not end up being occupied in a given year
  - Inactive — Not currently being used; lacking evidence of recent maintenance, adults, eggs, chicks, and dependent young; inactive have the potential of becoming active in subsequent breeding seasons

- Nest aspect
- Nest type (e.g., stick nest, scrape)
- Nest substrate (e.g., cliff, tree, structure)
- Nest height
- Number of eggs (when possible)
- Number of chicks (when possible)
- Age class of raptors if determinable
- Behavior of species observed
- Pertinent notes

Weather conditions were recorded at the start and end of each flight. Weather conditions included the shaded air temperature at five feet, wind speeds and direction, and relative humidity. Wind speeds were measured with a Kestrel® 4000 Pocket Weather Tracker Measurements were taken until average wind speed stabilized.

While the survey methodology focused primarily on detection of nesting golden eagles, opportunistic observations of other nesting raptors and notable wildlife were recorded.

Survey Personnel

The aerial survey was conducted by experienced raptor and golden eagle biologists Dr. Eric Dugan and Dave Lohr. Dr. Dugan and Mr. Lohr meet the Observer Qualifications recommended for "helicopter-borne raptor surveys around cliff ecosystems" as presented in the USFWS Protocol (Pagel et al., 2010). A brief summary of their eagle survey experience (Attachment 1) and their curriculum vitae (Attachment 2) are provided.

RESULTS

Weather Conditions

The March 22, 2021 survey was conducted during ideal weather conditions for observation of golden eagles (Table 1). Light north and west winds were prevalent during the survey with wind speed of six miles per hour (mph) at the start of the survey (1030 hours) and 16 mph at the end of the survey (1620 hours). The temperatures ranged from 54 degrees Fahrenheit (°F) at 0845 hours to 66°F at end of the survey (Table 1) and were within accepted standards (Pagel et al., 2010). No precipitation fell during the survey.

The March 23, 2021 survey was conducted during good weather conditions for observation of golden eagles (Table 1). Light west-southwest and north-northwest winds were prevalent during the survey with wind speed of eight mph at the start of the survey (0840 hours) and 15 mph at the end of the survey (1415 hours). The temperatures ranged from 48°F at 0840 hours to 64°F at end of the survey (Table 1) and were within accepted standards (Pagel et al., 2010). No precipitation fell during the survey.

Excessive winds and downdrafts were not a significant issue during the majority of the survey. Gusting winds did prevent close approaches to some cliff and canyon habitats; however, all of the aforementioned nesting habitat features were surveyed from a distance that allowed for high visual acuity while minimizing the potential for disturbing the nests. Surveyors were afforded access to all suitable nesting habitats within the survey area.

Flight Tracks

A complete flight track for the survey is shown in Figure 3. The flights departed from and returned to the Chino Airport, Chino, California. The survey and transit flight time required a total of 12.25 flight hours.

Occupancy Survey

Three golden eagle nesting territories containing a total of five nests were identified during the survey (Photographs 1 to 3, Figure 2, Table 2). All golden eagle nests were associated with rocky cliff habitats. No golden eagle nests were observed on transmission structures within the survey area. Evidence of occupancy during the current nesting season was noted in two of the three nesting territories.

Newberry Mountains Nesting Territory

Two active nests were observed in the Newberry Mountains nesting territory. One nest was occupied at the time of the observation. The occupied nest is located 2.55 miles south of the alignment and contained an adult female incubating eggs or brooding young during the observation (Photograph 1, Nest #28, Figure 2, Table 2). A second active, but unoccupied nest, was observed 0.75 miles south of the alignment. This nest showed signs of nest decoration and maintenance during the current nesting season (Photograph 2, Nest #30, Figure 2, Table 2). Based on the proximity of the two nests, the second nest is believed to be an alternate nest associated with the aforementioned pair incubating or brooding eggs.

Cady Mountains Nesting Territory

Two unoccupied golden eagle nests were observed just beyond the survey buffer in the Cady Mountains nesting territory. One active nest was observed 2.22 miles northwest of the alignment and had signs of recent use, including abundant whitewash and fresh nesting material (Nest #38). A second nest located 2.31 miles northwest of the alignment was inactive, in deteriorating condition, and showed no signs of recent use (Nest #37).

Old Dad Mountain Nesting Territory

A large golden eagle nest was observed 1.15 miles north of the alignment in the Old Dad Mountain nesting territory (Photograph 3, Nest #26, Figure 2, Table 2). The nest was unoccupied and in deteriorated condition. Old Dad Mountain contains abundant suitable and high-quality golden eagle nesting habitats, and additional nests may be present within this territory. Due to gusting winds and associated safety concerns, the helicopter was not able to maintain a hover long enough to support prolonged searches of several potential nesting habitat features.

Four adult golden eagles were observed (Figures 2 and 4, Table 3). These included the previously noted adult female incubating the occupied nest in the Newberry Mountains nesting territory (Photograph 1), an adult pair perched next to each other on a transmission structure (Photograph 4), and a lone male perched on a transmission structure (Photograph 5). None of the three golden eagles observed perched on transmission structures were associated with a nesting territory identified within the survey area.

Additionally, 45 red-tailed hawk (*Buteo jamaicensis*), 36 common raven (*Corvus corax*), two prairie falcon (*Falco mexicanus*), and one unknown falcon nests were located and mapped during the survey (Figure 2, Table 4). Of these, 41 red-tailed hawk and 30 common raven nests were observed on transmission structures along the existing LVRAS utility corridor. Many active red-tailed hawk and common raven nests were observed to be in the late nest building and early incubation stages.

The presence of eggs or chicks could not be confirmed in the majority of nests with incubating adults present. The surveyors limited hovering time in the vicinity of nests containing adults and therefore did not have the opportunity to inspect the nests for eggs or young. Due to the timing of the survey, golden eagles, raptors, and common ravens observed on nests were presumed to be incubating eggs or brooding very young chicks.

Incidental observations (i.e., not associated with a nest) were made of 32 red-tailed hawks, 11 bighorn sheep (*Ovis canadensis*) (observations were made from altitudes that avoided significantly disturbing the sheep), six turkey vultures (*Cathartes aura*), five prairie falcons, one American kestrel (*Falco sparverius*), and one short-eared owl (*Asio flammeus*) (Figure 4, Table 5).

Limitations

Due to contracting, scheduling, and access delays, the Phase 1 occupancy surveys were conducted later in the protocol period than desired. In addition, to avoid bighorn sheep lambing, which may occur in the mountain ranges within the project area beginning in April, no Phase 2 productivity surveys were conducted. It is possible that nests found to be unoccupied had been occupied and abandoned or failed early in the current nesting season. However, the surveyors were able to document valuable data such as the condition of existing nests, presence of new nesting material, presence of recent whitewash, and other indicators of recent nesting attempts.

While not the focus of the survey, it is relevant to note that aerial surveys are known to result in underrepresentation of smaller raptors and ground-dwelling species (e.g., burrowing owl [*Athene cunicularia*], sharp-shinned hawk [*Accipiter striatus*], and American kestrel). Surveyors are primarily focused on detecting golden eagle nesting features further adding to the likelihood of not detecting smaller species. Additionally, crepuscular and nocturnal raptors and mammals are unlikely to be detected. Observations of species other than golden eagles were recorded incidental to the focused survey for golden eagle presence and nesting.

SUMMARY AND CONCLUSIONS

Three golden eagle nesting territories containing a total of five nests were observed. Evidence of occupancy during the current nesting season was noted in two of the three nesting territories. Of the three active nests, only one was occupied. The occupied nest (Nest #28) was located approximately 2.55 miles south of the project alignment in the Newberry Mountains. The two other active nests were unoccupied at the time of the survey and were 0.75 miles south (Nest #30) and 2.22 miles northwest (Nest #38) of the alignment, respectively. The two inactive nests were both in deteriorated condition and located 1.15 miles north (Nest #26) and 2.31 miles northwest (Nest #37) of the alignment. All golden eagle nests were associated with rocky cliff habitats. No golden eagle nests were observed on transmission structures within the survey area.

In addition to golden eagles, three cliff-nesting species, including 45 red-tailed hawk, 36 common raven, two prairie falcon, and one unidentified falcon nests were observed during the survey. Fifty-six incidental observations were made of species not associated with nests, including 32 red-tailed hawks, 11 bighorn sheep, six turkey vultures, five prairie falcons, one American kestrel, and one short-eared owl.

One mile is the current accepted standard avoidance buffer for active golden eagle nests for transmission line projects. One golden eagle nest (Nest #30) was observed within one mile of the alignment, in the Newberry Springs Mountains nesting territory. That nest, which showed recent signs of nest decoration and maintenance, likely represents an alternate nest location for the nearby pair observed incubating or brooding young in Nest #28 during the survey. Generally speaking, the presence of suitable golden eagle nesting habitat within one mile of the alignment is limited. However, future ground surveys should be conducted in the Newberry Mountain, Old Man Mountain, and Cady Mountain nesting territories to determine occupancy and productivity of those nesting territories.

REFERENCES

California Department of Fish and Wildlife (CDFW). 2021. RareFind: California Natural Diversity Database (CNDDB). Accessed March 10, 2021.

Bittner, J. D., J. L. Lincer, C. Meador, J. Newland, D. Palmer, K. Quint, R. Rivard, B. Schlotfeldt. 2011. Golden eagle surveys for the Devers Palo Verde 2 project in Riverside County, California. Southern California Edison.

Bittner, J. D., J. Oakley, J. Hannan, J. L. Lincer, N. Muscolino, and R. Domenech. 2003. Reproduction of golden eagles in a drought period. Paper presented at the Raptor Research Foundation's Annual Scientific Conference. Anchorage, Alaska.

Bloom, P. H. and S. J. Hawks. 1982. Food habits of nesting golden eagles in Northeast California and Northwest Nevada. Raptor Research 16(4):110-115.

Bureau of Land Management (BLM). 2020. Environmental Assessment Southern California Edison Lugo-Victorville 500 kV Transmission Line Action Remedial Scheme. September. Accessed online at https://eplanning.blm.gov/eplanning-ui/project/1502126/570

Carnie, K. S. 1954. Food habits of nesting golden eagles in the Coast Ranges of California. The Condor 56(1):3-12.

Collins, P. W. and B. C. Latta. 2009. Food Habits of Nesting Golden Eagles (*Aquila chrysaetos*) on Santa Cruz and Santa Rosa Islands, California. Proceedings of the 7th California Islands Symposium. Institute for Wildlife Studies, Arcata, CA. Pages 255–268 in Damiani, C.C. and D.K. Garcelon (eds.).

Ellis, D. H. 1979. Development of behavior in the golden eagle. Wildlife Monographs No. 43.

Hoechlin, D. R. 1976. Development of golden eagles in southern California. Western Birds 7:137-152.

Kochert, M. N., K. Steenhof, C. L. McIntyre, and E. H. Craig. 2002. Golden eagle (*Aquila chrysaetos*). In A. Poole and F. Gill (eds.). The Birds of North America, #684. The Birds of North America, Inc. Philadelphia, Pennsylvania.

Latta, B. C., Senior Raptor Biologist, BioResource Consultants, Inc. 2012. Personal communication (blatta333@gmail.com) with Eric Dugan, Dugan Biological Services. April, 2012.

Lovich, J. E. 2015. Golden eagle mortality at a wind-energy facility near Palm Springs, California. Western Birds 46:76-80.

McIntyre, C. L. 1995. Nesting ecology of migratory golden eagles (*Aquila chrysaetos*) in Denali National Park, Alaska. M.S. Thesis, University of Alaska, Fairbanks.

Meador, C., J. D. Bittner, M. Collado, K. Quint, and R. Rivard. 2013. Golden eagle (*Aquila chrysaetos*) survey report for the West of Devers project in Riverside and San Bernardino Counties, California. Southern California Edison.

Olendorff, R. R. 1976. The food habits of North American golden eagles. American Midland Naturalist 96:231-236

Pagel, J. E., D. M. Whittington and G. T. Allen. 2010. Interim golden eagle inventory and monitoring protocols; and other recommendations. Division of Migratory Birds Management, U.S. Fish and Wildlife Service.

Palmer, R. S. 1988. Golden eagle. In R. S. Palmer (ed). Handbook of North American birds. Yale University Press.

This page intentionally left blank.

TABLES

Table 1. Personnel and weather data for aerial golden eagle surveys for the LVRAS project (Spring, 2021)

Date	Observer 1	Observer 2	Pilot	Start Time (PDT)	End Time (PDT)	Start Temp (°F)	End Temp (°F)	Start Wind Speed (mph)	End Wind Speed (mph)	Start Precipitation (in.)	End Precipitation (in.)
3/22/21	Eric Dugan	Dave Lohr	Hakon Satvedt	1030	1620	54	66	6	16	0	0
3/23/21	Eric Dugan	Dave Lohr	Hakon Satvedt	0840	1415	48	64	8	15	0	0

PDT = Pacific Daylight Time
°F = degrees Fahrenheit
mph = miles per hour
in. = inches

Table 2. Aerial golden eagle survey nest data for the LVRAS project (March 22-23, 2021)

Bird Nest ID[1]	Species	Nest Status	UTM Zone 11S Meters E	UTM Zone 11S Meters N	Nest Site Description	Nest Activity	No. of Eggs	No. of Chicks	Nest Condition
26	Golden eagle	Inactive	604254.1	3884446.2	Cliff	Unknown	0	0	Poor
28	Golden eagle	Occupied	524386.5	3851041.7	Cliff	Incubation	Unknown	Unknown	Good
30	Golden eagle	Active	527771.6	3853146.2	Cliff	Nest Building	0	0	Good
37	Golden eagle	Inactive	559490.9	3857317.1	Cliff	Unknown	0	0	Poor
38	Golden eagle	Active	559235.1	3857319.7	Cliff	Nest Building	0	0	Good

Footnotes:
1 Bird nest IDs are not sequential because the IDs were assigned in chronological order of observation. See also Table 4.

ID = identification

UTM = Universal Transverse Mercator

Table 3. Golden eagle observations for the LVRAS project (March 22-23, 2021)

ID	Species	Number of individuals	UTM Zone 11S Meters E	UTM Zone 11S Meters N	Notes
9	Golden eagle	2	647783.2	3913156.7	Pair perched together on transmission tower
45	Golden eagle	1	625573.8	3896523.5	Adult male perched on transmission tower
51	Golden eagle	1	524386.5	3851041.7	Incubating female in nest

Table 4. Aerial survey nest data for the LVRAS project (March 22-23, 2021)

Bird Nest ID[1]	Species	Nest Status	UTM[2] Zone 11S Meters E	UTM[2] Zone 11S Meters N	Nest Site Description	Nest Activity	No. of Eggs	No. of Chicks	Nest Condition
1	Red-tailed hawk	Inactive	660636.7	3923690.4	Cliff	Unknown	0	0	Good
2	Red-tailed hawk	Inactive	660603.7	3923693.8	Cliff	Unknown	0	0	Good
3	Common raven	Inactive	663474.1	3923631.6	Cliff	Unknown	0	0	Good
4	Red-tailed hawk	Active	669360.0	3933352.5	Utility Structure	Nest Building	0	0	Good
5	Red-tailed hawk	Inactive	668606.1	3932288.9	Utility Structure	Unknown	0	0	Good
6	Red-tailed hawk	Active	668279.1	3932055.9	Utility Structure	Nest Building	0	0	Good
7	Common raven	Active	667844.0	3931260.8	Utility Structure	Nest Building	0	0	Good
8	Red-tailed hawk	Active	667426.9	3930853.3	Utility Structure	Nest Building	0	0	Good
9	Common raven	Occupied	666464.9	3930064.3	Utility Structure	Incubation	n/a	n/a	Good
10	Red-tailed hawk	Occupied	665757.4	3929639.3	Utility Structure	Incubation	n/a	n/a	Good
11	Common raven	Inactive	665726.5	3929327.4	Utility Structure	Unknown	0	0	Good
12	Common raven	Inactive	663819.2	3927655.3	Utility Structure	Unknown	0	0	Good
13	Red-tailed hawk	Active	663423.0	3927291.6	Utility Structure	Nest Building	0	0	Good
14	Red-tailed hawk	Inactive	662579.6	3926730.3	Utility Structure	Unknown	0	0	Good
15	Red-tailed hawk	Active	662152.9	3926111.5	Utility Structure	Nest Building	0	0	Good
16	Red-tailed hawk	Occupied	644900.2	3910531.9	Utility Structure	Incubation	n/a	n/a	Good
17	Red-tailed hawk	Inactive	643170.2	3909083.8	Utility Structure	Unknown	0	0	Good
18	Red-tailed hawk	Inactive	643418.1	3909127.8	Utility Structure	Unknown	0	0	Good
19	Red-tailed hawk	Active	639806.4	3905870.9	Utility Structure	Nest Building	1	0	Good
20	Red-tailed hawk	Inactive	632944.9	3900577.3	Utility Structure	Unknown	0	0	Good
21	Red-tailed hawk	Active	627811.6	3897689.4	Utility Structure	Nest Building	0	0	Good
22	Red-tailed hawk	Inactive	627299.8	3894342.1	Outcrop	Unknown	0	0	Good
23	Common raven	Active	626347.5	3894016.2	Outcrop	Nest Building	0	0	Good
24	Common raven	Occupied	624215.1	3895851.1	Utility Structure	Incubation	n/a	n/a	Good
25	Red-tailed hawk	Inactive	622742.0	3893327.9	Cliff	Unknown	0	0	Poor
27	Common raven	Inactive	605174.2	3883635.3	Cliff	Unknown	0	0	Good
29	Prairie Falcon	Active	527769.8	3853087.6	Cliff	Nest Building	0	0	Good

Bird Nest ID[1]	Species	Nest Status	UTM[2] Zone 11S Meters E	UTM[2] Zone 11S Meters N	Nest Site Description	Nest Activity	No. of Eggs	No. of Chicks	Nest Condition
31	Common raven	Occupied	554075.8	3845527.5	Utility Structure	Incubation	n/a	n/a	Good
32	Red-tailed hawk	Active	557528.2	3850123.3	Utility Structure	Nest Building	0	0	Good
33	Unknown Falcon	Active	563216.6	3852402.3	Cliff	Nest Building	0	0	Good
34	Prairie Falcon	Active	563404.0	3854120.4	Cliff	Nest Building	0	0	Good
35	Common raven	Occupied	563391.7	3854000.9	Cliff	Incubation	n/a	n/a	Good
36	Common raven	Active	560514.2	3855774.5	Cliff	Nest Building	0	0	Good
39	Common raven	Inactive	559202.2	3856052.2	Cliff	Unknown	0	0	Good
40	Red-tailed hawk	Inactive	607407.0	3884902.6	Utility Structure	Unknown	0	0	Poor
41	Red-tailed hawk	Inactive	609054.3	3886141.2	Utility Structure	Unknown	0	0	Good
42	Common raven	Inactive	611682.4	3887871.9	Utility Structure	Unknown	0	0	Poor
43	Common raven	Active	614822.8	3889923.5	Utility Structure	Nest Building	0	0	Good
44	Red-tailed hawk	Inactive	615948.9	3890647.3	Utility Structure	Unknown	0	0	Good
45	Common raven	Inactive	616153.2	3890703.9	Utility Structure	Unknown	0	0	Poor
46	Red-tailed hawk	Occupied	616778.7	3891035.2	Utility Structure	Incubation	n/a	n/a	Good
47	Red-tailed hawk	Occupied	618753.5	3892427.2	Utility Structure	Incubation	n/a	n/a	Good
48	Red-tailed hawk	Inactive	619101.3	3892546.5	Utility Structure	Unknown	0	0	Good
49	Common raven	Inactive	620696.5	3893721.4	Utility Structure	Unknown	0	0	Poor
50	Red-tailed hawk	Inactive	621208.2	3893837.1	Utility Structure	Unknown	0	0	Good
51	Common raven	Occupied	621350.7	3894072.5	Utility Structure	Incubation	n/a	n/a	Good
52	Red-tailed hawk	Inactive	622183.4	3894437.4	Utility Structure	Unknown	0	0	Good
53	Common raven	Inactive	622155.5	3894490.1	Utility Structure	Unknown	0	0	Good
54	Red-tailed hawk	Active	622883.4	3894832.8	Utility Structure	Nest Building	0	0	Good
55	Common raven	Inactive	623156.0	3895129.2	Utility Structure	Unknown	0	0	Poor
56	Common raven	Active	623522.7	3895347.7	Utility Structure	Nest Building	0	0	Good
57	Common raven	Active	623860.4	3895536.0	Utility Structure	Nest Building	0	0	Good
58	Red-tailed hawk	Active	624571.6	3895964.6	Utility Structure	Nest Building	0	0	Good
59	Common raven	Inactive	625424.6	3896477.5	Utility Structure	Unknown	0	0	Poor
60	Common raven	Inactive	597893.7	3879039.0	Utility Structure	Unknown	0	0	Poor
61	Red-tailed hawk	Occupied	594715.2	3877918.8	Utility Structure	Incubation	n/a	n/a	Good

Bird Nest ID[1]	Species	Nest Status	UTM[2] Zone 11S Meters E	UTM[2] Zone 11S Meters N	Nest Site Description	Nest Activity	No. of Eggs	No. of Chicks	Nest Condition
62	Common raven	Occupied	594068.4	3877949.3	Utility Structure	Incubation	n/a	n/a	Good
63	Red-tailed hawk	Occupied	592966.9	3877473.5	Utility Structure	Incubation	n/a	n/a	Good
64	Common raven	Active	588948.7	3876735.3	Utility Structure	Nest Building	0	0	Good
65	Red-tailed hawk	Occupied	588579.1	3876685.3	Utility Structure	Incubation	1	0	Good
66	Red-tailed hawk	Inactive	587755.5	3876329.8	Utility Structure	Unknown	0	0	Good
67	Common raven	Inactive	585673.5	3874708.4	Utility Structure	Unknown	0	0	Good
68	Red-tailed hawk	Active	584895.6	3874346.5	Utility Structure	Nest Building	0	0	Good
69	Common raven	Occupied	582205.6	3872355.6	Utility Structure	Incubation	n/a	n/a	Good
70	Red-tailed hawk	Occupied	581766.3	3872276.9	Utility Structure	Incubation	n/a	n/a	Good
71	Red-tailed hawk	Inactive	579929.1	3870285.7	Utility Structure	Unknown	0	0	Poor
72	Red-tailed hawk	Occupied	579223.8	3869649.5	Utility Structure	Incubation	n/a	n/a	Good
73	Red-tailed hawk	Occupied	575493.8	3866104.9	Utility Structure	Incubation	n/a	n/a	Good
74	Common raven	Inactive	575199.8	3865740.6	Utility Structure	Unknown	0	0	Poor
75	Common raven	Inactive	574663.9	3865006.4	Utility Structure	Unknown	0	0	Poor
76	Red-tailed hawk	Inactive	574094.8	3864301.7	Utility Structure	Unknown	0	0	Good
77	Common raven	Inactive	572680.1	3862381.9	Utility Structure	Unknown	0	0	Poor
78	Common raven	Inactive	570460.3	3860579.9	Utility Structure	Unknown	0	0	Good
79	Red-tailed hawk	Inactive	570032.2	3860286.3	Utility Structure	Unknown	0	0	Poor
80	Red-tailed hawk	Inactive	568100.6	3858717.4	Utility Structure	Unknown	0	0	Poor
81	Common raven	Inactive	564581.0	3856311.4	Utility Structure	Unknown	0	0	Poor
82	Red-tailed hawk	Occupied	564121.5	3856236.1	Utility Structure	Incubation	n/a	n/a	Good
83	Red-tailed hawk	Inactive	563826.4	3855852.6	Utility Structure	Unknown	0	0	Poor
84	Red-tailed hawk	Inactive	561651.8	3854222.1	Utility Structure	Unknown	0	0	Poor
85	Red-tailed hawk	Occupied	560827.9	3853604.1	Utility Structure	Incubating	0	0	Good
86	Common raven	Inactive	560317.7	3852921.9	Utility Structure	Unknown	0	0	Poor
87	Common raven	Inactive	558978.4	3851684.5	Utility Structure	Unknown	0	0	Poor
88	Common raven	Inactive	558034.9	3850635.6	Utility Structure	Unknown	0	0	Poor
89	Common raven	Occupied	556134.6	3848708.6	Cell Tower	Incubation	0	0	Good

Footnotes:

1. ID = identification
2. UTM = Universal Transverse

Table 5. Incidental species observations for the LVRAS project (March 22-23, 2021)

ID*	Species	Number of individuals	UTM Zone 11S Meters E	UTM Zone 11S Meters N	Notes
2	Red-tailed Hawk	1	669376.7	3933255.6	Perched on transmission tower
3	Red-tailed Hawk	1	668008.2	3931844.6	Perched on transmission tower
4	Red-tailed Hawk	1	666787.1	3930548.3	Perched on transmission tower
5	Red-tailed Hawk	1	664148.4	3928174.1	Perched on transmission tower
6	Red-tailed Hawk	2	653883.5	3918899.7	Pair perched on transmission tower
7	Red-tailed Hawk	1	651919.8	3917119.6	Perched on transmission tower
8	Prairie Falcon	1	651030.4	3916316.3	In flight
10	Red-tailed Hawk	2	643333.6	3909528.6	Perched on transmission tower
11	Red-tailed Hawk	1	642015.7	3908157.8	Perched on transmission tower
12	Red-tailed Hawk	1	640765.2	3907031.0	Perched on transmission tower
13	Red-tailed Hawk	1	638500.6	3904976.9	Perched on transmission tower
14	Red-tailed Hawk	1	633955.6	3901553.2	Perched on transmission tower
15	Red-tailed Hawk	1	633413.9	3901221.0	Perched on transmission tower
16	Red-tailed Hawk	1	631662.0	3900218.9	Perched on transmission tower
17	Red-tailed Hawk	1	631027.3	3899848.1	Perched on transmission tower
18	Red-tailed Hawk	1	627630.0	3897616.7	Perched on transmission tower
20	Red-tailed Hawk	1	624977.2	3896383.5	In flight
21	Red-tailed Hawk	1	620950.2	3893941.9	Perched on transmission tower
22	Red-tailed Hawk	1	620432.7	3893614.7	Perched on transmission tower
24	Red-tailed Hawk	1	614569.0	3889809.8	In flight
25	Red-tailed Hawk	1	607190.2	3884917.8	Perched on transmission tower
27	Bighorn Sheep	1	606716.1	3886744.2	1 ewe
28	Bighorn Sheep	2	604712.5	3884045.8	2 rams
29	Prairie Falcon	1	526222.3	3852592.4	In flight
30	Turkey Vulture	3	528195.8	3853416.7	
32	Red-tailed Hawk	1	540773.6	3848383.4	Perched on transmission tower
33	Red-tailed Hawk	2	556875.7	3849443.2	Perched on transmission tower

ID*	Species	Number of individuals	UTM Zone 11S Meters E	UTM Zone 11S Meters N	Notes
35	Red-tailed Hawk	1	563008.3	3852051.3	
36	Red-tailed Hawk	1	560445.4	3857495.6	
37	Prairie Falcon	1	559341.2	3855853.7	In flight
38	Bighorn Sheep	8	529727.1	3851109.2	5 ewes, 2 lambs, 1 ram
39	Prairie Falcon	1	530643.0	3850946.5	In flight
40	Short-eared Owl	1	606521.6	3880335.0	Perched on rocky hillside
41	Red-tailed Hawk	1	606686.5	3881338.0	Perched on transmission tower
42	Red-tailed Hawk	1	606370.0	3882192.4	Perched on transmission tower
43	Red-tailed Hawk	1	618259.5	3892079.7	Perched on transmission tower
44	American Kestrel	1	622350.8	3894641.4	In flight
46	Prairie Falcon	1	603905.4	3883560.4	In flight
48	Red-tailed Hawk	1	571792.3	3862145.7	Perched on transmission tower
49	Turkey Vulture	3	571373.5	3860999.5	In flight
50	Red-tailed Hawk	1	571936.0	3864810.3	In flight

* Identification numbers match the Object ID numbers in the GIS data schema for the survey. Some numbers are not included because test points, golden eagle observations (listed separately), and common raven observations have been removed from the table

FIGURES

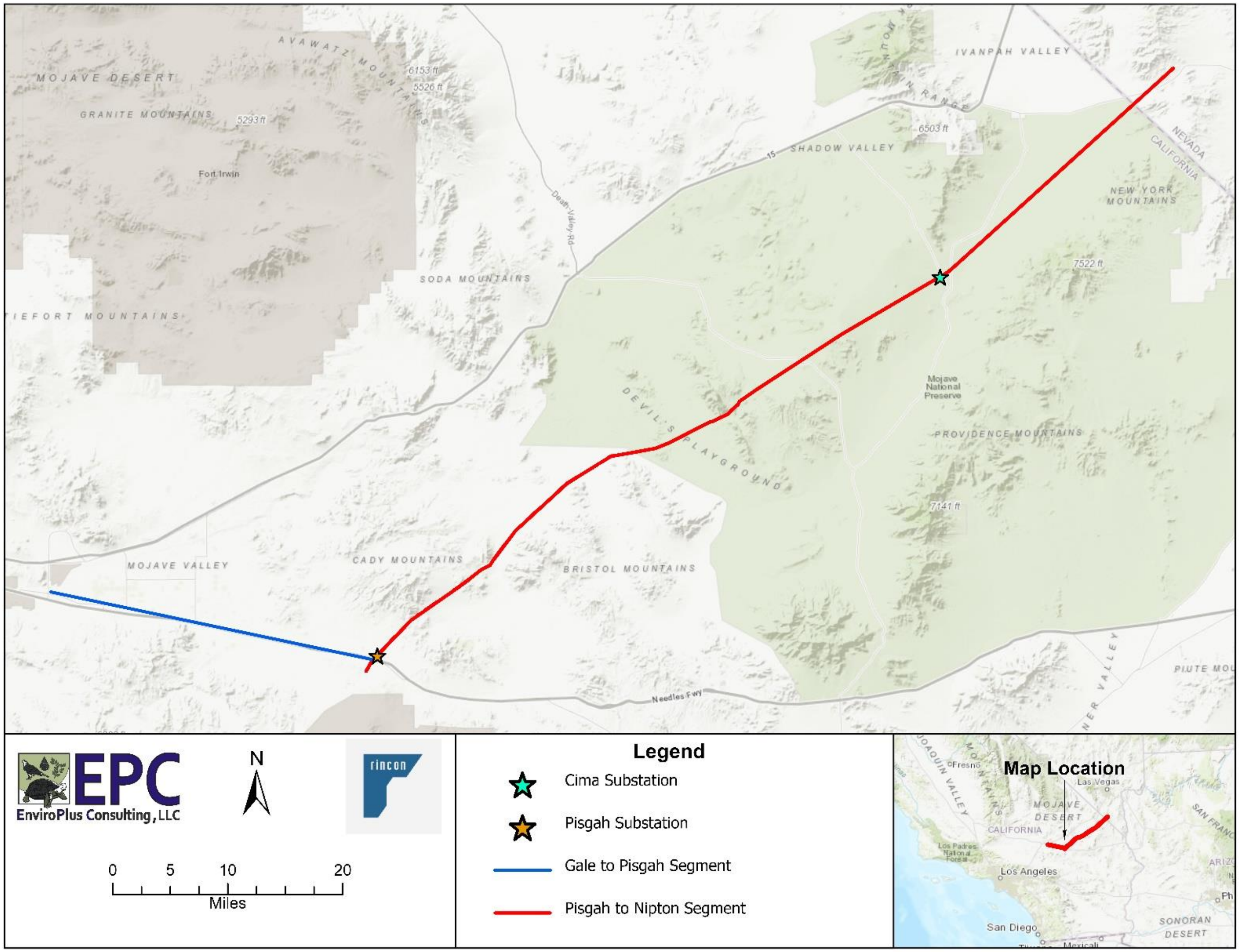


Figure 1. Project vicinity map.

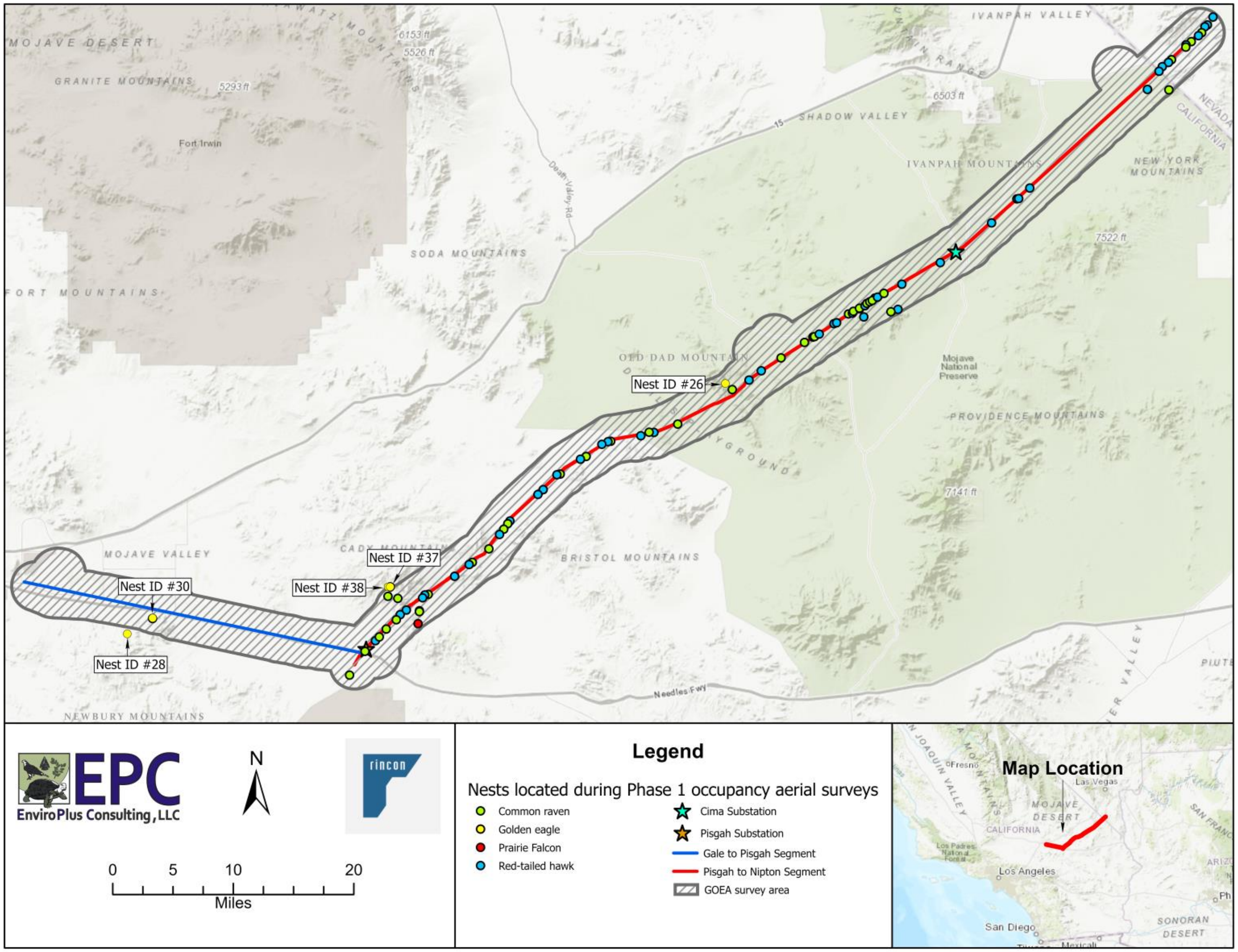


Figure 2. Nests located during Phase 1 occupancy aerial surveys (March 22-23, 2021).

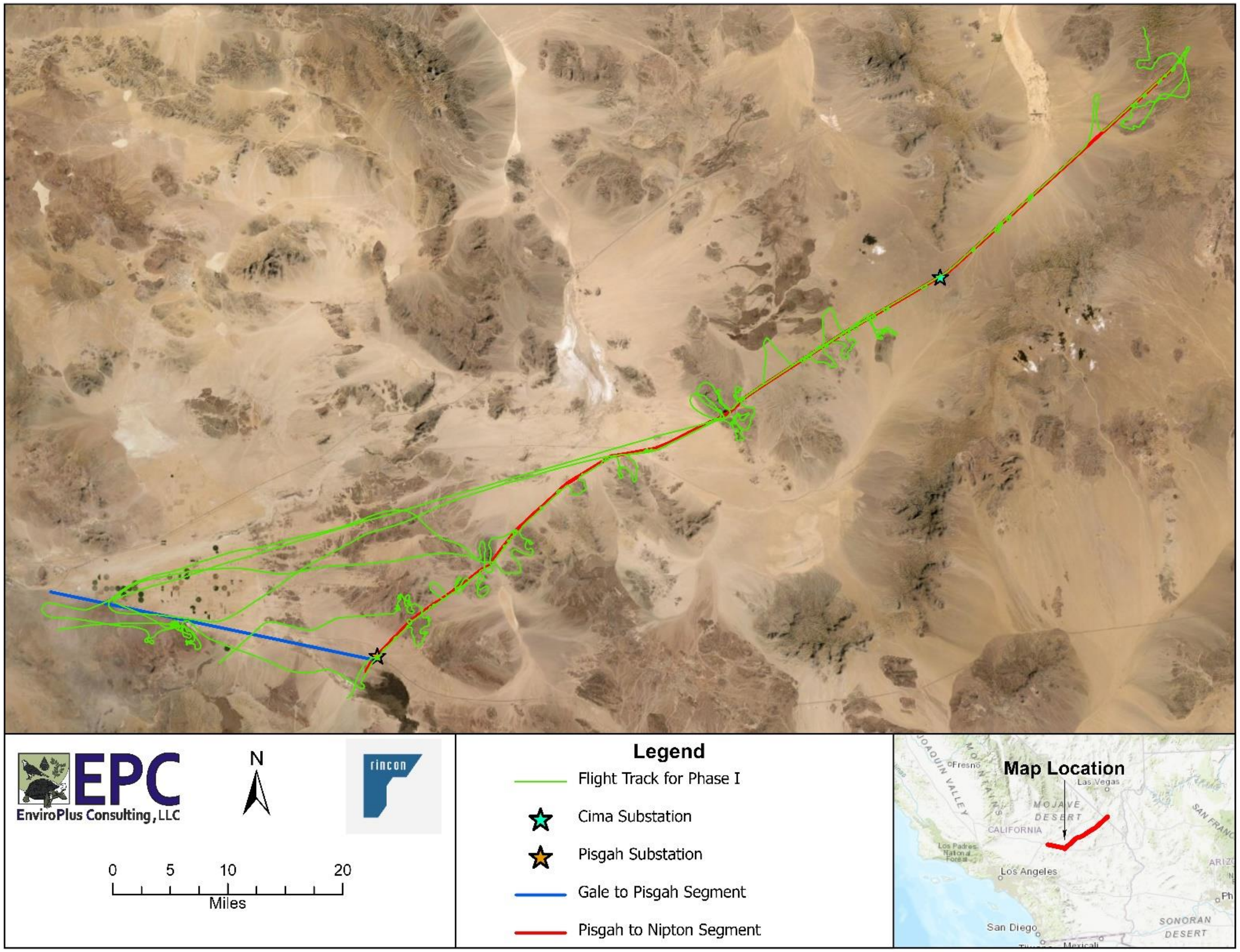


Figure 3. Flight track data (March 22-23, 2021).

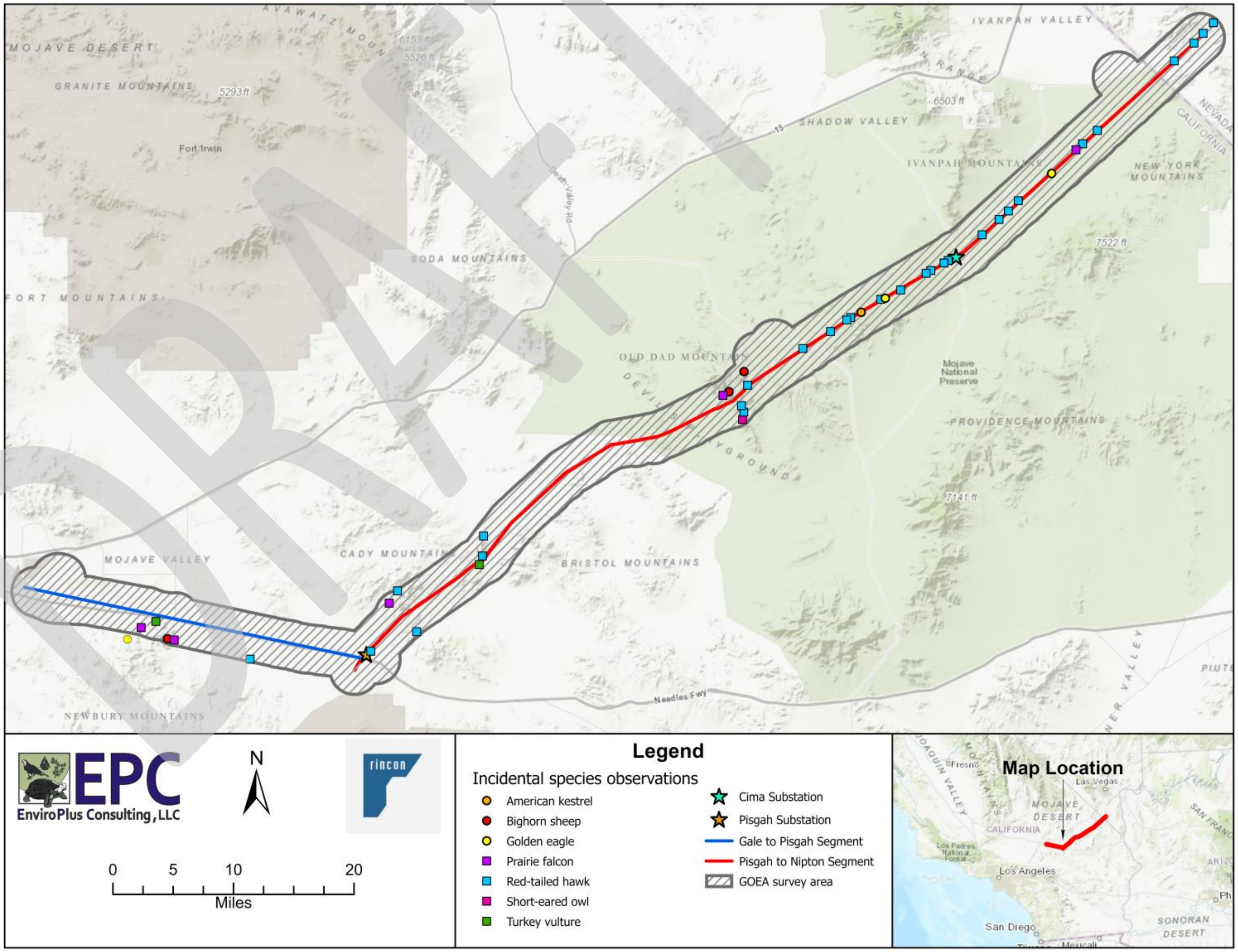


Figure 4. Incidental species observations during Phase 1 occupancy aerial surveys (March 22-23, 2021).

PHOTOGRAPHS

Photograph 1. Female golden eagle incubating eggs or brooding young in the Newberry Mountains nesting territory.

Photograph 2. Active and unoccupied golden eagle nest in the Newberry Mountains nesting territory.

Photograph 3. Inactive and deteriorated golden eagle nest in the Old Dad Mountain nesting territory.

Photograph 4. Pair of golden eagles perched on a transmission structure.

Photograph 5. Adult male golden eagle perched on a transmission structure.

This page intentionally left blank.

ATTACHMENT 1 – Summary of Golden Eagle Survey Experience for Eric Dugan, PhD, and Dave Lohr

Eric Dugan, PhD

Dr. Dugan has worked extensively with eagles and other raptors in various capacities over the past 15 years. Specifically, he has conducted protocol-level ground and aerial helicopter surveys for cliff-dwelling raptors and golden eagles (*Aquila chrysaetos*) at various sites across southern California and Nevada. His field efforts have focused on identifying golden eagle nesting territories, assessing nest success and detailing nest ecology at sites associated with solar development and utility projects. Dr. Dugan has conducted the USFWS protocol golden eagle aerial and ground surveys for Southern California Edison's West of Devers Project in 2016, 2017, 2018 and 2019. Additionally, he spent several breeding seasons collecting reproductive data from historical coastal peregrine falcon (*Falco peregrinus*) breeding territories, manning raptor point count stations, and monitoring active raptor nests in California. Dr. Dugan's has first-hand experience with many raptor species, including golden eagle, Cooper's hawk (*Accipiter cooperii*), burrowing owl (*Athene cunicularia*), great-horned owl (*Bubo virginianus*), red-tailed hawk (*Buteo jamaicensis*), red-shouldered hawk (*B. lineatus*), American kestrel (*F. sparverius*), and barn owl (*Tyto alba*) during his involvement with mitigation management on natural gas pipeline, renewable energy and transmission line projects. Since 2005, he has served as an agency-approved raptor and avian biologist on projects throughout southern California. Dr. Dugan received his Bachelor of Arts in Environmental Studies from Pitzer College, Claremont Colleges in 2000, and his Ph.D. in Biology from Loma Linda University in 2011. He has an extensive publication record, including several book chapters and numerous scientific journal articles on topics ranging from rattlesnake niche partitioning to lizard ecology. He is actively involved in scientific research, with current projects in both southern California and the Baja Peninsula, Mexico.

Dave Lohr

Mr. Lohr is a life-long field biologist, with over 15 years devoted to the environmental industry. His experiences are highlighted by extensive work on the conservation of herpetofauna and avian species across the southwestern United States and northern Mexico. Mr. Lohr has conducted numerous seasons of protocol-level ground and aerial helicopter surveys for cliff-dwelling raptors and golden eagles (*Aquila chrysaetos*) at sites located in both California and Nevada. He has served as both an observer and photographer during previous protocol eagle surveys including Southern California Edison's West of Devers Project in 2018 and 2019. Mr. Lohr has been an instrumental figure on various research and energy projects ranging from rattlesnake radio-telemetry to avian biology and raptor conservation during the construction of transmission line projects. He has served as a field lead and has conducted thousands of hours of focused surveys for sensitive species, including golden eagle, burrowing owl, desert tortoise, barefoot gecko and nesting birds. His consulting portfolio includes 15 years of implementing compliance and mitigation monitoring programs. Mr. Lohr is an accomplished avian biologist proficient in species identification, handling, data collection, photography, and reporting. Most recently, he has served as an agency-approved avian biologist on Los Angeles Department of Water and Power, Southern California Edison, and Southern California Gas projects across the southwest U.S.

ATTACHMENT 2 - Curriculum vitae for Eric Dugan, Ph.D. and Dave Lohr

Eric A. Dugan, PhD

Doctor of Philosophy, Biology - June 2011
Dissertation Title: Comparative biology of sympatric Red Diamond and Southern Pacific rattlesnakes in Southern California
Loma Linda University, Loma Linda, CA

Bachelor of Arts, Environmental Studies - June 2000
Emphasis - Environmental Health and Policy
Pitzer College, Claremont, CA

SUMMARY

My background is founded on research, biological consulting, and conservation of sensitive flora and fauna, in particular herpetofauna and avian species. These efforts have provided a diverse and broad experience spanning 22 years in the biological consulting field, including work on numerous pipeline and transmission line projects, sensitive species surveys, and project management. I've conducted six seasons of aerial helicopter and ground surveys for golden eagle and am an agency-approved raptor and avian biologist. As part of these efforts, I have conducted over 4,000 hours of avian surveys and mitigation monitoring. As a state and federally permitted Master Falconer, I've trapped, handled, and examined hundreds of raptors. Most recently, I served as the lead avian biologist and subject matter expert for avian mitigation management on a large SCE transmission line project in southern California. Stemming from academic research, I have developed a significant publication record that includes peer-reviewed scientific journals and several book chapters. My 7-year radio-telemetry project on southern Pacific and red diamond rattlesnakes was covered by local media and aired on the Animal Planet series Venom ER. Selected recent projects are provided below.

SELECTED PROJECTS

West of Devers Upgrade Project - Southern California Edison - 2016-present
Lead Avian Biologist and Subject Matter Expert (SME)
Served as the lead avian biologist and SME for all avian mitigation management. Tasks included establishing and managing nest events, wildlife agency and CPUC communication, and review/editing of project-related reporting in the SCE FRED system.
Managed and scheduled a field team of agency approved avian biologists responsible for pre-construction surveys, nest documentation, nest updates, and buffer management.
Golden Eagle Aerial Surveys
Conducted USFWS protocol Phase 1 occupancy, Phase 2 productivity, and aerial tower nest surveys within a 2-mile buffer of the West of Devers Upgrade Project alignment. Surveys methodologies followed the U. S. Fish and Wildlife Service's *Interim Golden Eagle Inventory and Monitoring Protocols; and Other Recommendations.*

Stateline Solar Farm Project - BioResource Consultants - 2017
Golden Eagle Aerial Protocol Surveys
Conducted USFWS protocol Phase 1 occupancy surveys within a 5-mile buffer of the Stateline Solar Farm Project location. Survey methodologies followed the U. S. Fish and Wildlife Service's *Interim Golden Eagle Inventory and Monitoring Protocols; and OtherRecommendations.*
Surveys at nearby historical golden eagle nests in the vicinity of the wind farm were also conducted during these flights.

Lompoc Wind Energy Project - Sapphos Environmental - 2016
Golden Eagle Aerial Surveys
Conducted USFWS protocol Phase 1 occupancy surveys within a 10-mile buffer of the Lompoc Wind Energy Project's proposed location. Surveys methodologies followed the U.S. Fish and Wildlife Service's *Interim Golden Eagle Inventory and Monitoring Protocols; and Other Recommendations.*

San Mateo East Agricultural Field Tree Removal - NAVFAC SW - 2016
Lead Raptor/Avian Biologist
Conducted over 65 hours of ground surveys for nesting raptors and owls. Raptors observed included peregrine falcon, merlin, osprey, red-tailed hawk, cooper's hawk, red- shouldered hawk, and American kestrel. Data was collected on age, sex, and behavior of each individual raptor.

Barren Ridge Renewable Transmission Project – LADWP - 2015-2016
Desert Kit Fox, Desert Tortoise, and Woodrat Biologist
Established and monitored remote camera sites at active desert kit fox natal burrows.
Tasks included data collection, photo and behavior interpretation, and reporting.
USFWS Authorized desert tortoise biologist. Monitored power line development in tortoise habitat throughout all phases of construction.

ACU-5 Training Center - Marine Corps Base Camp Pendleton - 2013- 2014
California Gnatcatcher and Vernal Pool Biologist
Provided nest surveys and monitoring for the federally endangered California gnatcatcher during the delineation of vernal pools prior to construction of numerous waters wells.
Conducted over 100 hours of field surveys and monitoring during this project.

Devers Palo Verde 2 Project - Southern California Edison - 2012- 2013
Golden Eagle, Raptor, and Nesting Bird Biologist
Conducted numerous helicopter aerial tower nest surveys for golden eagle, red-tailed hawk, and common raven.
Assisted in ground monitoring of an active golden eagle nest. Monitored the behavior, activity patterns, and foraging of an adult pair of eagles raising chicks. Field work and mentoring was performed under eagle biologist Bob Chapman.
Desert Tortoise, Flat-tailed Horned Lizard, and Mohave Fringe-toed Lizard
United States Fish and Wildlife Service and BLM approved biologist for work occurring in critical habitat of endangered species along a 153-mile transmission line.

Sunrise Powerlink Project - San Diego Gas & Electric - 2010- current
Barefoot Banded Gecko Project Lead - CDFG Incidental Take Permit Holder
Field lead and agency contact for all Sunrise Powerlink Project work occurring in habitat of the state threatened barefoot banded gecko (*Coleonyx switaki*). San Diego and Imperial Counties, CA.
Conducted CDFG protocol habitat assessments, pre-construction surveys, construction monitoring, reporting, and monitoring of restoration efforts.
Assisted with surveys for bighorn sheep and cliff dwelling raptors during daily helicopter flights within the approved helicopter buffer. Over 75 helicopter flights were completed.
Raptor and Avian Biologist - NOREAS Inc. - 2012-2016
Golden Eagle Helicopter Nest Surveys - Mojave Desert, CA
-Conducted helicopter surveys for Golden Eagles in the Cady Mountains, Bristol Mountains, and along the northern border of the Marine Corps Air Ground Combat Center.

Served as the second eagle observer for all aerial survey efforts.
-Mentoring and training for these surveys was completed under golden eagle specialist and Senior Scientist, Brian Latta. Mr. Latta provided field training on survey protocols, eagle biology, nesting habitats, and data collection for the 2-day survey effort.
-Surveys included tower nest inventories along nearby transmission lines. Three active golden eagle nests were identified and mapped during the surveys. Chicks were aged and photos were taken of each nest.
-General operations included searching for nests and live eagles, recording data on chicks and nest locations, and mapping known nesting territories. Active nests of cliff-dwelling prairie and peregrine falcon and red-tailed hawk were also noted during the survey.
-Served as the Lead Eagle Biologist during ground reconnaissance and monitoring at the active golden eagle nests. Data was collected on nest status, eagle activity and diet, and chick development.

Peregrine Falcon Nest Surveys - Schuyler Heim Bridge Replacement

-Conduct over 100 hours of surveys at known peregrine falcon nesting territories in the Port of Long Beach. Surveys included locating falcons and nests to document nest status, courtship, hunting, and reproduction.
-Surveys were performed in 4 different nesting territories over a two-year period representing two breeding seasons.

Raptor Point Counts

Field lead during 200-plus hours of raptor point counts along the Colorado River. Raptor observations were noted at three observation points, along with data on behavior, daily activity, and direction of travel. Species observed included golden eagle, cooper's hawk, red-tail hawk, American kestrel, prairie falcon, and turkey vulture.

Migratory Bird Point Counts

-Conducted daily sunrise to sunset surveys and counted, identified, and recorded every bird aurally or visually detected during an 8-hour survey period
-Over 150 hours of field surveys were completed.

SELECTED RESEARCH

Rattlesnake Radio-telemetry Niche Partitioning Project - 2003-2015

-Principle investigator of radio-telemetry research examining niche partitioning among red diamond (*Crotalus ruber*) and southern Pacific (*C. helleri*). Daily tasks ranged from radio- tracking telemetered snakes, collecting all necessary data, processing new and recaptured snakes, and training of field assistants. Handled over 300 individual snakes of age classes.
-Published the results of this research in the books The Biology of Rattlesnakes, The Biology of Rattlesnakes II, and the scientific journal Herpetologica.

Barefoot Banded Gecko Project - 2000-present

-Principal investigator of range-wide field research examining seasonal activity, diet, and distribution of the state listed barefoot gecko (*Coleonyx switaki*).
-This is an International project performed under permits issued by both California and Mexican wildlife agencies. Study sites includes locations throughout the Baja Peninsula and southern California.

Large-billed Savannah Sparrow Ecology and Taxonomy Project

-Assisted in field collecting and mist-netting efforts along the margins of the Salton Sea.
-Monitored nets and assisted with morphological data collection and bird release.
-Field work was performed under permits issues to Loma Linda University and Stacy Peterson.

SELECTED PUBLICATIONS

Dugan, E. A. and W. K. Hayes. 2017. Differential niche use but negligible niche partitioning between the sympatric rattlesnakes *Crotalus ruber* and *C. oreganus helleri* in southern California. *In* Dreslik, M. J., W. K. Hayes, S. J. Beaupre, and S. P. Mackessy (Eds.), *The Biology of Rattlesnakes II*. Eco Publishing, Rodeo, New Mexico

Dugan, E. A. and W. K. Hayes. 2012. Diet and feeding ecology of the Red Diamond Rattlesnake. *Crotalus ruber* (Serpentes:Viperidae). Herpetologica 68(2):203-217.

Dugan, E. A., A, Figueroa, and W. K. Hayes. 2008. Home range size, movements, and mating phenologyof sympatric Red Diamond (*Crotalus ruber*) and Southern Pacific (*C. oreganus helleri*) rattlesnakes in Southern California. *The Biology of Rattlesnakes*. Loma Linda University Press, Loma Linda, California.

SPECIALIZED TRAINING AND CERTIFICATIONS

-*CDFW Scientific Collecting Permit and MOU holder (current)*
-*FWS and CDFW Licensed Falconer (2009 - 2013)*
Active falconer with experience trapping and flying red-tailed, cooper's, and harris hawks. Additional experience with golden eagle, northern goshawks, and various falcons.
-*Flat-tailed Horned Lizard Workshop (2008)*
Authorized by California Department of Fish and Game to take, possess and transport flat- tailed horned lizards.
-*Introduction to Desert Tortoise Surveying, Monitoring and Handling Workshop (2000)*
Participant in the Desert Tortoise Council Workshop, Ridgecrest, CA
-*Arroyo Toad Monitoring and Surveying Workshop (2000)*

Dave Lohr

PROFESSIONAL EXPERIENCE

Mr. Lohr is a life-long field biologist, with over 15 years devoted to the environmental industry. His experiences are highlighted by extensive work on the conservation of herpetofauna and avian species across the southwestern United States and northern Mexico. Mr. Lohr has served as an instrumental component on various research and energy projects ranging from rattlesnake radio-telemetry to avian biology and raptor conservation during the construction of transmission line projects. He has served as a field lead on numerous projects and has conducted thousands of hours of focused surveys for sensitive species, including golden eagle, burrowing owl, desert tortoise, barefoot gecko and nesting birds. His consulting portfolio includes 15 years of implementing compliance and mitigation monitoring programs. Mr. Lohr is an accomplished avian biologist proficient in species identification, handling, data collection, photography and reporting. He served as an avian biologist most recently on LADWP, SCE, and SCG projects across the southwest U.S.

LICENSES/CERTIFICATIONS

Mr. Lohr is recognized as an approved desert tortoise (CDFW ITP # 2081-2012-039-04) and bighorn sheep monitor, and holds qualifications for flat-tailed horned lizard, Wood turtle, and barefoot banded gecko (SCP#005172). Additionally, he was authorized by NJDEP (NJFW Permit No SC 2013131) to monitor and relocate the endangered timber rattlesnake and northern copperhead in conjunction with several pipeline projects in northern New Jersey. Mr. Lohr is also an accomplished agency approved avian and raptor biologist.

TRAINING

- 2013 – Trained and certified in the utilization of OHV for the purpose of conducting surveys and monitoring. Ringwood State Park, NJ.
- 2012 – Flat-tailed horned lizard workshop. Authorized by Department of Fish and Game to take, possess, and transport flat-tailed horned lizards. SDG&E
- 2011 – Quino checkerspot butterfly workshop. Topics covered included identification of both adult and larval stages, habitat and plant associations, seasonal activity, and species-specific distribution. Alpine, CA.
- 2011 - Desert Tortoise Council 20th Annual Workshop: Surveying, monitoring, and handling techniques workshop. Ridgecrest, CA.

PROFESSIONAL AFFILIATIONS

- Orianne Society, 2013 - present
- San Diego Herpetological Society, 2012 - present

PROJECTS

West of Devers Upgrade Project, SCE, Riverside and San Bernardino Counties, CA, 2018-2019: Served as an agency approved avian biologist for the project. Monitored numerous active migratory and raptor nests including golden eagle (*Aquila chrysaetos*) to determine activity levels and nest status. Provided a status update of each nest and documented the phenology of fledge dates and nest success/failure data. Conducted protocol aerial and ground surveys for golden eagle (*A. chrysaetos*) and other cliff dwelling raptors.

Gemini Solar Project, Dugan Biological Services, North Las Vegas, NV 2017: Provided protocol aerial and ground surveys for golden eagle (*A. chrysaetos*) and other cliff dwelling raptors. Aerial surveys documented active nests of golden eagle (*A. chrysaetos*), red-tailed hawk (*Buteo jamaicensis*), common raven (*Corvus corax*), and falcon species *(Falco sp*.). Ground surveys provided data on fledglings and nest productivity.

L3000 Post ILI Segment Replacement Project, SoCalGas, San Bernardino County, CA, 2017/2018: Provided clearance surveys and monitored segment replacement of natural gas transmission line, spanning over 30 miles through desert tortoise (*Gopherus agassizii*) habitat. Observed and reported on special status species, including desert tortoise, desert kit fox (*Vulpes macrotis*), prairie falcon (*Falco mexicanus*), and loggerhead shrike *(Lanius ludovicianus*).

Barren Ridge Renewable Transmission Project, LADWP, Kern and LA Counties, CA, 2016: Provided clearance surveys and monitored construction of transmission line, spanning over 20 miles through desert tortoise (*Gopherus agassizii*) habitat. Observed and reported on bird/raptor nests to determine activity level and provided status updates. Observed and provided updates on nesting birds, including golden eagle (*A. chrysaetos*), burrowing owls (*Athene cunicularia*), Swainson's hawk (*Buteo swainsoni*), red-tailed hawk (*B. jamaicensis*), ferruginous hawk (*B. regalis*), rough-legged hawk (*B. lagopus*), loggerhead shrike (*Lanius ludovicianus*), prairie falcon (*Falco mexicanus*), merlin (*F. columbarius*)

North-South Gas Pipeline Project, Southern California Gas Co, Riverside County, CA, 2015: Conducted protocol surveys for burrowing owl (*A. cunicularia*) as well as desert kit fox (*V. macrotis*). Conducted nesting bird surveys.

Beacon Solar Project, LADWP, Kern County, CA, 2015: Provided clearance surveys, monitored construction of solar field and relocated non-sensitive species from impact areas. Performed burrow excavation of potential desert tortoise (*G. agassizii*) burrows. Daily surveys focused on observations of migratory birds, including long-eared owl (*Asio otus*) and prairie falcon (*F. mexicanus*).

Aliso Canyon Turbine Replacement Project, Southern California Gas Co, Porter Ranch, CA, 2014: Served as an approved avian biologist for this project. Monitored numerous active nests (passerine/raptor) to determine activity level and nest status. Provided a status update of each nest and documented the phenology of fledge dates and nest success/failure data.

Valley South Subtransmission Project, So Cal Edison, Murrieta, CA, 2014: Conducted protocol surveys for burrowing owl (*A. cunicularia*). Provided species lists and field data for the final report.

Desert Bighorn Sheep Guzzler Project, MCAGCC, 29 Palms, CA, 2014: Assisted with detailed floristic surveys using the Releve method and field verification of GIS morning parameters for desert bighorn sheep (*Ovis canadensis nelsoni*).

Tehachapi Renewable Transmission Project (TRTP), SCE, Los Angeles and Orange Counties, CA, 2014: Served as an approved avian biologist for the project. Monitored numerous active nests (passerine/raptor) to determine activity levels and nest status. Provided a status update of each nest and documented the phenology of fledge dates and nest success/failure data.

Tennessee Gas Pipeline Project Northeast Upgrade Project (TGP NEUP), Tennessee Gas Co, Sussex, Passaic and Bergen Counties, NJ, 2013: Held Scientific Collecting Permit for handling and relocating timber rattlesnake (*Crotalus h. horridus*), northern copperhead (*Agkistrodon contortrix*) and wood turtle (*Glyptemys insculpa*). Provided clearance surveys, collection and relocation, and monitored construction of gas pipeline throughout three counties.

El Dorado Ivanpah Transmission Project (EITP), So Cal Edison, San Bernardino County, CA and Clark County, NV, 2013: Approved desert bighorn sheep (*O. c. nelsoni*) and desert tortoise (*G. agassizii*) monitor. Provided protocol surveys, clearance surveys, and construction and environmental monitoring throughout the project.

Golden Eagle Project, Noreas Environmental, San Bernardino County, CA, 2012: Conducted ground visits to active golden eagle (*Aquila chrysaetos*) nests to determine productivity. Observed nest-dependent fledglings in the vicinity of the nests. Provide a summary report verifying status of the nest and fledge or failure data.

SDG&E Sunrise Powerlink Project, SDG&E, San Diego and Imperial Counties, CA, 2012: Provided protocol surveys, clearance surveys, construction and environmental monitoring throughout the project. CDFG approved barefoot banded gecko (*Coleonyx switaki*) biologist.

Appendix D-12

Jurisdictional Delineation Report

Environmental Intelligence, LLC

JURISDICTIONAL DELINEATION REPORT

LUGO-VICTORVILLE 500 KV TRANSMISSION LINE REMEDIAL ACTION SCHEME PROJECT

SAN BERNARDINO COUNTY, CALIFORNIA AND CLARK COUNTY, NEVADA

Southern California Edison

Prepared For: **Southern California Edison**
2244 Walnut Grove
GO1 Quad 2C
Rosemead, CA 91770
Contact: Rey Gonzales

Prepared By: **Environmental Intelligence, LLC**
1590 South Coast Highway, Suite 17
Laguna Beach, CA 92651
Contact: Rebecca Gilbert

Date: Revised September 15, 2019

TABLE OF CONTENTS

TABLES

APPENDICES

COMMON ACRONYMS AND ABBREVIATIONS

AJD	Approved Jurisdictional Delineation
ADSS	All-dielectric self-supporting
AMSL	Above mean sea level
BMP	Best Management Practices
BNSF	Burlington Northern Santa Fe
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CFGC	California Fish and Game Code
CFR	Code of Federal Regulations
CWA	Clean Water Act
CWC	California Water Code
DOD	Department of Defense
EI	Environmental Intelligence, LLC
GIS	Geographic Information System
GPS	Global Positioning Systems
HUC	Hydrologic Unit Code
JD	Jurisdictional Determination
JDR	Jurisdictional Delineation Report
kV	kilovolt
LAD	Los Angeles District
LVRAS	Lugo-Victorville Remedial Action Scheme
MOA	Memorandum of Agreement
MNP	Mojave National Preserve
NDEP	Nevada Division of Environmental Protection
NOI	Notice of Intent
NPS	National Parks Service
NRCS	National Resources Conservation Service
NWP	Nationwide Permit
OFNR	Optical Fiber Non-Conducting Riser
OHWM	Ordinary High-Water Mark
OPGW	Optical Ground Wire
ORM	Operations Regulatory Module
PJD	Preliminary Jurisdictional Determination
ROW	Right-of-Way
RGL	Regulatory Guidance Letters
RWQCB	Regional Water Quality Control Board
SCE	Southern California Edison
SLC	State Lands Commission
SPN	Special Public Notice
SWRCB	State Water Resources Control Board
TNW	Traditional Navigable Waters
TOB	Top of bank
USACE	U.S. Army Corps of Engineers
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WDR	Waste Discharge Requirements
WOS	Waters of the State
WOUS	Waters of the United States

EXECUTIVE SUMMARY

On behalf of Southern California Edison (SCE), Environmental Intelligence, LLC (EI) conducted a jurisdictional delineation for the proposed Lugo-Victorville 500-kilovolt (kV) Transmission Line Remedial Action Scheme Project (LVRAS Project) located in San Bernardino County, California and Clark County, Nevada. The Project includes two segments, Segment 1: Gale-Pisgah and Segment 2: Pisgah to Nipton. Segment 1 includes the installation of telecommunication all-dielectric self-supporting (ADSS) cable line from SCE's Gale Substation near Barstow, California to SCE's Pisgah Substation near Ludlow, California for approximately 29 miles within existing SCE right-of-way (ROW) along U.S. Route 66 and Interstate Highway 40. The ADSS cable would be attached overhead to existing wood poles, and 1.3 miles would be placed in underground conduits. Segment 2 includes the removal of the existing overhead ground wire (OHGW) and replacement with Optical Ground Wire (OPGW) along approximately 84 miles within the existing SCE ROW starting at SCE's Pisgah Substation and ending at transmission tower M152-T2 within Clark County, Nevada (near Nipton Road/Joshua Tree Highway).

EI conducted a formal jurisdictional delineation within the Project Survey Area to map the amount, type, and location all potential jurisdictional waters under the regulatory purview of the United States Army Corps of Engineers (USACE), Lahontan Regional Water Quality Control Board (RWQCB [Region 6]), the California Department of Fish and Wildlife (CDFW), and the Nevada Division of Environmental Protection (NDEP). No federal or state defined wetland was identified or delineated within the Survey Area.

This report provides the primary information for SCE to achieve compliance with Clean Water Act (CWA) California Fish and Game Code (CFGC), Porter-Cologne Water Quality Control Act (Porter-Cologne), and all other relevant state resource codes and laws if it is determined that the construction of the LVRAS Project would result in regulated activities occurring within jurisdictional waters of the U.S. and/or state of California and/or Nevada.

<u>Potential Jurisdictional Waters Occurring within the Survey Area[1,2]</u>

Waters of the U.S. under the Purview of USACE

Approximately 55.92 acres of waters of the U.S. (WOUS) under the purview of USACE, composed of unvegetated ephemeral dry wash (40.23 acres) and unvegetated playa lake (15.69 acres), occur within the Survey Area. Please see Table ES-01, below.

TABLE ES-01: SUMMARY OF TOTAL USACE JURISDICTION

Unvegetated Ephemeral Dry Wash	Unvegetated Playa Lake	Total (acres)
40.23	15.69	55.92

Waters of the U.S. and State of California under the Purview of RWQCB

Approximately 53.46 acres of waters of the state of California (WOS) under the purview of RWQCB, composed of unvegetated ephemeral dry wash (37.77 acres) and unvegetated playa lake (15.69 acres), occur within the Survey Area. Please see Table ES-02, below.

TABLE ES-02: SUMMARY OF TOTAL RWQCB JURISDICTION

Unvegetated Ephemeral Dry Wash	Unvegetated Playa Lake	Total (acres)
37.77	15.69	53.46

[1] Within the Survey Area, waters of the U.S. include waters of the states of California and Nevada. Although federal and state jurisdictions do overlap, they would remain distinct for regulatory purview and permitting purposes.
[2] All acreages are rounded to the nearest hundredth (which may account for minor rounding error).

Waters of the U.S. and State of California under the Purview of CDFW

Approximately 90.13 acres of WOS under the purview of CDFW, in the form of unvegetated ephemeral dry wash (37.77 acres), unvegetated playa lake (15.69), streambanks/alluvial low terraces (36.41), and associated riparian extent (0.25 acre), occur within the Survey Area. Please see Table ES-03, below.

TABLE ES-03: SUMMARY OF TOTAL EXCLUSIVE CDFW JURISDICTION

Unvegetated Ephemeral Dry Wash	Unvegetated Playa Lake	Streambanks/Alluvial Low Terraces	Riparian Extent	Total (acres)
37.77	15.69	36.41	0.25	90.13

Waters of the U.S. and State of Nevada under the Purview of USACE and NDEP

Approximately 2.47 acres of jurisdictional waters of the state of Nevada under the purview of USACE and NDEP, in the form of unvegetated ephemeral dry wash, occur within the Survey Area. Please see Table ES-04, below

TABLE ES-04: SUMMARY OF TOTAL USACE AND NDEP JURISDICTION

Unvegetated Ephemeral Dry Wash	Total (acres)
2.47	2.47

Anticipated Temporary Impacts to Jurisdictional Waters

Based on the results of this delineation the Proposed Project, as described, will result in temporary impacts to USACE WOUS, RWQCB WOS, and CDFW WOS from access (vehicle crossings) and/or wire-setup or transmission pulling/stringing locations within regulated waters. There are no proposed activities within regulated waters under the purview of NDEP.

The Proposed Project, as described will result in temporary impacts to:

- Approximately 0.24 acre (1,599 linear feet) of WOUS/WOS under the purview of USACE and RWQCB (in the form of unvegetated ephemeral dry wash)
- Approximately 0.61 acre of WOS under the purview of CDFW (in the form of unvegetated ephemeral dry wash [0.24 acre] and streambank/alluvial low terrace [0.37 acre])

Purpose of Jurisdictional Delineation

The purpose of performing a jurisdictional delineation is to identify the presence or absence (including types, location, boundaries, and acreages) of potential waters of the U.S. and states of California and Nevada within the survey area. Once the presence or absence of potential jurisdictional waters is formally delineated and federal jurisdiction determined, based on this jurisdictional delineation report (JDR) and Proposed Project, as described, the following can occur:

a. The results of this JDR can be verified by the requisite federal and state agencies (e.g., USACE, CDFW and RWQCB) to concur about the amount of jurisdictional waters (including the type of jurisdictional waters) that are under their regulatory purview.

b. The results of this JDR can provide the primary information for SCE to achieve project compliance, authorizations, and permitting with all relevant and applicable federal and state regulations, codes and laws, concerning aquatic resources under the purview of CDFW, State Water Resources Control Board (SWRCB)/RWQCB, and USACE.

c. Proposed Compensatory Mitigation

No compensatory mitigation for temporary impacts to jurisdictional waters (as a result of vehicle crossings and/or wire-setup or transmission pulling/stringing locations) is proposed. SCE proposes to recontour all temporary impacts with hand tools (e.g., shovels and rakes) to as close to pre-project conditions as possible and anticipates all temporary impacts will self-recover.

1.0 INTRODUCTION

Environmental Intelligence, LLC (EI) was retained by Southern California Edison (SCE) to provide a jurisdictional delineation for the Lugo-Victorville 500-kilovolt (kV) Transmission Line Remedial Action Scheme Project (LVRAS Project) located within San Bernardino County, California and Clark County, Nevada.

EI conducted a jurisdictional delineation in July and September 2017 to identify and describe aquatic resources. This report facilitates efforts to:

- Provide background information;
- Avoid or minimize impacts to aquatic resources during the design process; and
- Document aquatic resource boundary determinations for review by regulatory authorities.

2.0 PROJECT LOCATION AND DESCRIPTION

The Proposed Project is located within San Bernardino County, California, and Clark County, Nevada, and extends from SCE's Gale Substation (one mile east of Daggett, California) to SCE's Pisgah Substation near Ludlow, California, and finally ends at transmission tower M152-T2 in Nevada near Nipton Road/Joshua Tree Highway. The Proposed Project is located within United States Geological Survey (USGS) Hector, Sleeping Beauty, Broadwell Lake, West of Broadwell Mesa, Broadwell Mesa, Soda Lake South, Cowhole Mountain, Old Dad Mountain, Indian Spring, Marl Mountains, Cima, Cima Dome, Joshua, Ivanpah, Nipton, Minneola, Newberry Springs, Troy Lake, Lavic Lake, Ludlow, and Crescent Peak 7.5-minute topographic quadrangles; material laydown yards are located within the Dunn and Baker USGS 7.5-minute topographic quadrangles (Appendix A, Exhibit 1).

SCE requires the Project to reliably interconnect and integrate multiple renewable generation projects in the Eastern California/Southern Nevada area onto the electrical grid. The primary function of the Project would be to prevent thermal overloading on the Lugo-Victorville 500 kV transmission line, by tripping generation in the event of loss of the Eldorado-Lugo 500 kV transmission line or both this line and the Lugo-Mohave 500 kV transmission line.

The Proposed Action would support the SCE communication system for the addition of renewable energy generation. This communication system is part of the larger SCE system that provides safe and reliable electrical service consistent with the North American Electric Reliability Corporation, Federal Energy Regulatory Commission, the California Independent System Operators, and SCE's planning design guidelines and criteria.

The Project includes two segments: Segment 1 (Gale to Pisgah), which extends for approximately 29 miles between SCE's Gale Substation and SCE's Pisgah Substation and Segment 2 (Pisgah to Nipton), which continues from SCE's Pisgah Substation for 84 miles to transmission tower M152-T2.

2.1 Segment 1: Gale to Pisgah

Segment 1 crosses approximately 29 miles of public and private lands within SCE's existing right-of-way (ROW). The Project will utilize existing structures on the Mineola 33kV, Baroid 33kV, Ludlow 12kV, and Hector 12kV distribution circuits. Approximately 5.7 miles of Segment 1 is located on Bureau of Land Management (BLM) lands, 1 mile on Department of Defense (DOD) lands, and 22 miles on private lands, of which 0.85 mile is adjacent to or near state lands. Of the 29 miles, approximately 1.3 miles of cable would be placed underground in five separate lengths, of which 0.45 mile is located on BLM and 0.85 miles on private lands.

Segment 1 of the Proposed Project would involve installation of telecommunication all-dielectric self-supporting (ADSS) cable line from SCE's Gale Substation to SCE's Pisgah Substation. The ADSS cable would be attached overhead to existing wood poles with 1.3 miles placed in underground conduits. Nine new manholes and one existing manhole would provide access to the underground conduit. The Proposed

Project includes 510 existing distribution pole sites, one existing material laydown yard (Daggett Laydown Yard), and two existing substations (Appendix A, Exhibit 2).

2.2 Segment 2: Pisgah to Nipton

Segment 2 crosses approximately 84 miles of public and private lands within SCE's existing ROW. The Project will utilize existing structures on the Hector 12kV distribution line and the Lugo-Victorville 500 kV transmission line, which is jointly owned and a major power transfer path between SCE and the Los Angeles Department of Water and Power (LADWP). Approximately 26 miles of Segment 2 is located on BLM lands, 51 miles on National Park Service (NPS) – Mojave National Preserve (MNP) lands, and 7 miles on California State Lands Commission (SLC) and private lands.

Segment 2 of the Proposed Project includes installation of a new telecommunication path consisting of Optical Ground Wire (OPGW), Optical Fiber Non-Conducting Riser (OFNR) cable, and ADSS fiber optic cable. Specifically, the Project entails the removal of the existing overhead ground wire (OHGW) and replacement with OPGW along approximately 84 miles within the existing SCE ROW between SCE's Pisgah Substation within San Bernardino County, California (near Ludlow, California) and transmission tower M152-T2 within Clark County, Nevada (near Nipton Road/Joshua Tree Highway). From Pisgah Substation, the ADSS/OFNR fiber optic cable will run underground to reach the existing Hector 12kV distribution line, where it will attach to existing poles and travel for approximately 0.4 miles north to a new interset pole. From the new interset pole, the fiber optic will again run underground in new conduit to tower M68-T3, where it will transition to OPGW, and continue overhead as OPGW along the Eldorado-Lugo 500 kV transmission line route until it ends at M152-T2 near Nipton Road (Joshua Tree Highway) in Clark County, Nevada. Additionally, from transmission tower M127-T6, the OPGW would run underground to connect to SCE's Cima Substation. The Proposed Project includes truck work at approximately 408 transmission tower locations, installation of guard poles at 14 locations, establishment of helicopter landing zones at 72 locations, pulling/tensioning activities at 27 locations, and mobilization activities at two material laydown yards (Appendix A, Exhibit 2).

3.0 REGULATORY FRAMEWORK

Aquatic environments and habitats occurring within California and Nevada are regulated under the following federal and state laws, which are discussed below.

3.1 Federal Regulations

3.1.1 Clean Water Act, Section 404

Pursuant to Section 404 of the Clean Water Act (CWA), the U.S. Army Corps of Engineers (USACE) is authorized to regulate any activity that would result in the discharge of dredged or fill material into waters of the U.S. (WOUS), which include those waters listed in 33 Code of Federal Regulations (CFR) Part 328 (Definitions).[3,4] The fundamental rationale of Section 404 of the CWA is that no discharge of dredged or fill material should be permitted if there is a practicable alternative that would be less damaging to aquatic resources or if significant degradation would occur to WOUS (including federally defined wetlands).

USACE, with oversight by United States Environmental Protection Agency (USEPA), has the principal authority to issue CWA Section 404 Permits (40 CFR Part 230). Under two 1989 Memorandums of Agreement (MOAs) between the USEPA and the DOD, USACE is given sole responsibility for making final permit decisions pursuant to Section 404, and 'conducts jurisdictional delineations associated with the day-to-day administration of the Section 404 program.' However, USEPA retains the authority to enforce compliance with Section 404 and maintains the power to overrule USACE decisions on the issuance or

[3] 51 FR 41250, November 13, 1986, as amended at 58 FR 45036, August 25, 1993; 80 FR 37104, June 29, 2015; 83 FR 5200, February 6, 2018.
[4] This Definition of 'Water of the U.S.' is based on the 2015 'Clean Water Rule' (80 FR 37053, June 29, 2015) and is applicable in California at the time of this writing (South Carolina Coastal Conservation League, et. al. v. Pruitt, 2:18-cv-00330-DCN, (D.S.C. August 16, 2018); USEPA (2018).

denial of permits. If there is a dispute about whether an area can be regulated, USEPA has the ultimate authority to determine the actual geographic scope of WOUS subject to jurisdiction under all sections of the CWA, including the Section 404 regulatory program (USEPA 1989).

3.1.2 Clean Water Act, Section 401

If it is determined that an activity proposed within jurisdictional waters requires a permit pursuant to Section 404 of the CWA, then, pursuant to Section 401 of the CWA, the Regional Water Quality Control Board (RWQCB; Region 6) must certify that the discharge will comply with state water quality standards or waive (as applicable) the certification requirement. The RWQCB, as delegated by USEPA, has the principal authority to issue a CWA Section 401 water quality certification or waiver.

Therefore, pursuant to the CWA, water quality standards are provisions of federal (and state) law that define the water quality goals of a water body, or portion thereof, by establishing (a) designated uses of water to be protected, and (b) water quality criteria to protect those uses. Water quality standards are to protect the public health or welfare, enhance the quality of water and serve the purposes of the CWA (40 CFR 130.2(c) and 131.3(I)). Antidegradation policies are also an integral component of federal water quality standards. Water quality standards are enforceable in the bodies of water for which they have been promulgated.

Additionally, under State Water Board Order 2003-0017-DWQ discharges of dredged or fill material that have received 401 Certification are eligible for Waste Discharge Requirements (WDR) coverage under Section 13260 of the California Water Code (CWC; 1969 Porter-Cologne Water Quality Control Act). These General WDRs fulfill the requirements of Article 4, of Chapter 4 of Division 7 of the CWC for proposed dredge or fill discharges to waters of the U.S. that are regulated under the State's CWA Section 401 authority.

3.2 State Regulations

3.2.1 California Fish and Game Code, Section 1600 *et seq*.

Pursuant to Section 1600 *et seq*. of the California Fish and Game Code (CFGC), the California Department of Fish and Wildlife (CDFW) regulates activities of an applicant's project that would substantially alter the flow, bed, channel, or bank of streams or lakes unless certain conditions outlined by CDFW are met by the applicant. The limits of CDFW jurisdiction are defined in CFGC Section 1600 *et seq*. as the 'bed, channel, or bank of any river, stream[5], or lake designated by [CDFW] in which there is at any time an existing fish or wildlife resource or from which these resources derive benefit.'[6] However, in practice, CDFW usually extends its jurisdictional limit and assertion to the top of a bank of a stream, the bank of a lake, or outer edge of the riparian vegetation, whichever is wider.

By long practice, CDFW defines a stream as 'a body of water that flows perennially or episodically and that is defined by the area in which water currently flows, or has flowed, over a given course during the historic hydrologic course regime, and where the width of its course can reasonably be identified by

---

[5] The California Code of Regulations (Title 14 CCR 1.72) defines a stream as "a body of water that flows at least periodically or intermittently through a bed or channel having banks and supports fish or other aquatic life. This includes watercourses having a surface or subsurface flow that supports or has supported riparian vegetation." Title 14, Section 1.72 ***does not*** pertain to CDFW's stream jurisdiction as embodied in CFGC and thus, ***is not*** the definition used in practice by CDFW. The 14 CCR 1.72 definition of a "stream" was developed to address a specific sports fishing issue that came before the California Fish and Game Commission, is not used by CDFW in general, and does not apply to CFGC Section 1600 *et seq*. (Brady et. al. 2013a).

[6] This also includes the habitat upon which fish or wildlife depend for continued viability (CFGC Division 5, Chapter 1, Section 45 ["Fish" means wild fish, mollusks, crustaceans, invertebrates, or amphibians, including any part, spawn, or ova thereof], and Division 2, Chapter 1, Section 711.2[a], ["Wildlife" means and includes all wild animals, birds, plants, fish, amphibians, reptiles, and related ecological communities, including the habitat upon which the wildlife depends for its continued viability]).

physical or biological indicators.' The '*historic hydrologic regime*' is defined in practice by CDFW as circa 1800 to the present (Brady and Vyverberg 2014).

Section 1601(a)[7] is based on Title 14 California Code of Regulations (CCR) 720, which designates waters under the administration of CDFW to be as follows:

> For the purpose of implementing Sections 1601 and 1603 of the Fish and Game Code, which requires submission to [CDFW] of general plans sufficient to indicate the nature of a project for construction by or on behalf of any person, governmental agency, state or local, and any public utility, of any project which will divert, obstruct, or change the natural flow or bed of any river, stream, or lake designated by [CDFW], or will use material from the streambeds designated by [CDFW], all rivers, streams, lakes, and streambeds in the State of California, including all rivers, streams, and streambeds which may have intermittent flows of water, are hereby designated for such purpose.

The CDFW links stream protection, conservation, and management with the presence (and/or indirect consideration) of fish, wildlife, and their habitats. In practice, the CDFW defines a stream as follows:

> A body of water that flows perennially, intermittently, or ephemerally and that is defined by the area in which water currently flows or has flowed over a given course during the historic hydrologic regime, and where the width of its course can reasonably be identified by physical or biological indicators (CDFG 2010).

In summary, CFGC Section 1600 *et seq.* was enacted to conserve fish and wildlife associated with stream ecosystems. The size of a watershed, the size of its streams, the duration of flows, and the absence of hydrologic connectivity to other waterbodies is immaterial. The CDFW does not consider a stream or watercourse defined by particular flow events, such as bank full flow or ordinary high water, but rather by the local topography or elevations of the land that confine a stream to a definite course when its waters rise to their highest level. Thus, the watercourse is a stream and its boundaries define the maximal extent or expression of a stream on the landscape. All streams are subject to CDFW jurisdiction (Brady and Vyverberg 2014).

Therefore, arid and semi-arid aquatic features with ephemeral flow can meet CDFW's definition of a jurisdictional stream and can be under CDFW's regulation because these arid and semi-arid aquatic features can support fish and wildlife (directly or indirectly). This is based on CDFW guidance concerning ephemeral streams and, to a lesser extent, developed swales that exhibit short-duration, low-volume flow (Vyverberg 2010). Therefore, under this interpretation, CDFW jurisdiction *is not* predicated on the following:

- The size of a stream or river
- The morphology of the stream or riverine feature, or how well-defined its banks are
- The cross-sectional area occupied by particular flow events
- The time period between flow events
- The constancy of water flow

3.2.2 CALIFORNIA WATER CODE, SECTION 13000 *ET SEQ.*

Pursuant to Section 13000 *et seq*. of the CWC (the 1969 Porter-Cologne Water Quality Control Act), the RWQCB is authorized to regulate any activity that would result in discharges of waste or fill material into waters of the state, including "isolated" waters and/or wetlands (e.g., vernal pools and seeps), saline waters, and groundwater within the boundaries of the state (CWC Section 13050[e]).

[7] Title 14 CCR 720 has long been recognized by CDFW and Case law to include streams with ephemeral flow.

Porter-Cologne authorizes the State Water Resources Control Board (SWRCB) to adopt, review, and revise policies for all waters of the state. It also directs the nine RWQCBs to develop and implement regional Basin Plans that recognize and are designed to maintain the unique characteristics of each region with regard to natural water quality, actual and potential beneficial uses, maintaining water quality, and addressing the water quality problems of that region[8].According to implementation language in the Basin Plans, the RWQCB's authority to protect water quality from waste discharges is limited to the regulation of 'controllable water quality factors,' those actions, conditions, or circumstances resulting from human activities that may influence the quality of waters of the state and that may be reasonably controlled.

CWC Section 13170 also authorizes the SWRCB to adopt water-quality control plans on its own initiative. As outlined in the *Water Quality Control Plan Lahontan Basin Region* (RWQCB 1993 [as amended]). Therefore, the entire streambed was considered under the purview of RWQCB if it was determined that any type of aquatic and/or aquatic-related features occurring within the survey area would present "beneficial use," the aquatic feature would be delineated (this would include all ephemeral washes). However, this would not include the active floodplain and the 100-year floodplain or swale features, as these features do not regularly convey surface water, present no distinguishable habitat (occurring in creosote bush scrub), and quickly infiltrate into the soil and/or abate into upland and, therefore, do not present a Beneficial Use, as defined in the *Water Quality Control Plan Lahontan Basin Region* (RWQCB 1993, as amended).

3.2.3 NEVADA DEPARTMENT OF ENVIRONMENTAL PROTECTION

The Nevada Division of Environmental Protection (NDEP) does not exert jurisdiction beyond the limits of USACE jurisdiction under Section 404 of the CWA. Water pollution and permitting are managed by the NDEP. The NDEP has the authority to grant or deny CWA Section 401 certification of a project requiring a federal permit for the discharge of dredge or fill materials under CWA Section 404. The Nevada definition of waters is consistent with those identified by the USACE. The NDEP has the right to waive its certification authority if no action is taken on an application within a reasonable time not to exceed one year if a waiver is granted and no conditions are attached. In some cases, a waiver may be equivalent to certification without conditions (NDEP 2008).

4.0 METHODS

4.1 Pre-Field Analysis

Prior to beginning the field delineation, EI analyzed numerous available data sets to assess the locations of potential areas of jurisdiction. These data included but were not limited to:

- U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) soil mapping data (NRCS 2017a);
- Natural Resource Conservation Service, Watershed Boundary Dataset (NRCS 2017b);
- National Wetlands Inventory (USFWS 2017);
- FEMA National Flood Hazard data (FEMA 2017);
- Historic and recent aerial photographs (Google 2017);
- Habitat Assessment Report for the Project (EI 2017); and
- USGS topographic maps.

A 100-foot buffer (Survey Area) around the Project components was assessed using these datasets to identify potential water resources.

[8] CWC Section 13050(j).

4.2 Field Delineation

Following the pre-field analysis, a team of aquatic resource specialists field verified the limits and extent of potentially jurisdictional waters within the Survey Area over several field delineation efforts on July 17-21, 26-28, and August 28-31, 2017. Fieldwork was led by EI wetland specialist Megan Minter with assistance from Doug Blackwood, Todd Hoggan, Scott Lillie, Rachel MacNutt, and Luis Aguilar.

The delineation fieldwork for involved walking the entire Survey Area, focusing on (but not limited to) potential areas of jurisdictional features identified during the pre-field research and identifying potentially jurisdictional waters. Once potentially jurisdictional waters were identified, a wetland specialist delineated any hydrologic, vegetative, and geomorphic characteristics in order to determine limits of waters and wetlands. This Survey Area was defined as all areas where the Proposed Project may have the potential to impact aquatic resources during construction. Survey Areas were generally centered at existing towers and pullouts where work may occur. While in the field, notes were taken documenting the characteristics of jurisdictional areas. Widths of potential jurisdictional hydrologic features were recorded onto a 200-scale color aerial photograph using visible landmarks and/or were mapped with a Trimble Global Positioning System (GPS) hand-held unit with sub-meter accuracy. Field data were then digitized using Geographic Information Systems (GIS) to determine acreages. A detailed delineation map was prepared illustrating the features that intersect the Proposed Project (Appendix A, Exhibit 4).

4.2.1 USACE AND NDEP

Jurisdictional WOUS include those waters listed in 33 CFR 328.3 (Definitions of Waters of the United States). Within the Survey Area, all WOUS were delineated to their jurisdictional limits as defined by 33 CFR 328.4 (Limits of Jurisdiction). It was determined through pre-field analysis, field reconnaissance, formal delineation efforts, and post-field assessment that the Project Survey Area does not support federally defined wetlands.[9] Therefore, the only potentially federally regulated water within the Project Survey Area warranting a formal delineation are non-tidal, non-wetland tributaries to WOUS as defined by 33 CFR 328(c)(3). Non-wetland tributaries rely on field indicators to define and identify the jurisdictional lateral extent of the tributary based on the ordinary high-water mark (OHWM) as defined by 33 CFR 328(c)(6), federal guidance, methodologies, and procedures, including the following:

- *A Field Guide to the Identification of the Ordinary High-Water Mark (OHWM) in the Arid West Region of the Western United States: A Delineation Manual* (Lichvar and McColley 2008);
- *Updated Datasheet for the Identification of the Ordinary High-Water Mark (OHWM) in the Arid West Region of the Western United States* (Curtis and Lichvar 2010);[10]
- All applicable USACE Regulatory Guidance Letters (RGLs) for OHWM based ephemeral tributary waters (e.g., "other waters").[11]

4.2.2 RWQCB

For jurisdictional water features occurring within the Survey Area, RWQCB jurisdiction was delineated based on the presence of aquatic features that simultaneously meet the definition for WOS (CWC Section 13050[e]) and present "beneficial use" as outlined in the Lahontan Basin Region (RWQCB 1993 [as amended]. Therefore, the OHWM was considered under the purview of RWQCB if it was determined that any type of aquatic and/or aquatic-related features occurring within the survey area would present "beneficial use," the aquatic feature would be delineated (this would include all ephemeral washes). However, this would not include the active floodplain and the 100-year floodplain or swale features, as these features do not regularly convey surface water, present no distinguishable habitat (occurring in

[9] As defined by 33 Code of Federal Regulations (CFR) 328.3(c)(4), the 1987 *Corps of Engineers Wetland Delineation Manual* (1987 Manual) (Environmental Laboratory 1987), and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0)* (2008 Supplement) (Environmental Laboratory 2008).
[10] This document was used as guidance only. No OHWM data sheets were prepared.
[11] RGL 88-06; RGL 05-05.

creosote bush scrub), and quickly infiltrate into the soil and/or abate into upland and, therefore, do not present a *Beneficial Use*.

4.2.3 CDFW

The formal field delineation is based on the CFGC Section 1600 *et seq*. definition, relevant State regulations (see *Section 3.0 Regulatory Framework*, above), CDFW regulatory practice, and past CDFW field guidance. CDFW does currently have a published discretionary delineation manual for assisting in the delineation of episodic streams within arid regions occurring within California. Therefore, in addition to the regulatory framework outlined above for the State's Lake and Streambed Alteration Program, potential waters of the state (e.g., jurisdictional aquatic habitat) under the purview of CDFW were also assessed within the Survey Area by referencing all applicable and relevant definitions and guidance provided in the following:

- *Methods to Describe and Delineate Episodic Stream Processes on Arid Landscapes for Permitting Utility Scale Solar Power Plants* (Brady and Vyverberg 2014: e.g., the MESA Guidelines);
- All applicable and relevant guidance outlined in *A Review of Stream Processes and Forms in Dryland Watersheds* (CDFG 2010);
- *Project Conservation Challenges in a Dryland Stream Environment* (Vyverberg 2010);
- *Classification of Wetland and Deepwater Habitats of the United States* (Cowardin et al. 1979).

CDFW episodic jurisdictional streams were identified on the basis of the following:

- Determining the maximum lateral flow extent of the washes (e.g., top of bank [TOB]);
- Determining the limit of the active floodplain and the multiple low-flow channels occurring within this zone;
- Recording the dominant particle size in the sediment that imparts a general texture to the low-flow channel(s);
- Determination of out of channel flow;
- Landscape and fluvial geomorphological context;
- Correlation of flow indicators with the channel type;
- Scour and shelving, local deposition, distinct and indistinct terraces, and changes in the character of soil;
- The presence of developed longitudinal bars within channel margins;
- Xeroriparian indicators (as secondary indicators only) and their distribution and density within and surrounding the active floodplain and low-flow channels;
- Type, abundance, and relative age of vegetation and/or destruction of terrestrial vegetation, and the presence and absence of litter and debris within the ephemeral, episodic streams;
- Ephemeral, episodic streams configuration, estimated streamflow behavior, and other subtle geomorphic evidence indicative of regular flow levels;
- Consideration of precipitation patterns and lack of consistent flow;
- Geomorphic fluvial indicators (e.g., surface relief, cobble bars, benches, crested ripples, particle size distribution, mud cracks, and gravel sheets); and/or
- Pattern and location of abandoned (or relictual) channels and discontinuous drainage features.

CDFW jurisdiction commonly extends beyond the lateral limits of USACE/RWQCB jurisdiction. The methodology for delineating and defining the dimensions of CDFW jurisdictional lateral extent is summarized as follows:

- Identifying the bed and bank of an established and stream feature.
- Identifying pattern and location of abandoned (paleo or relictual) channels and discontinuous drainage features.

- Identifying and designation of an area as ‘riparian habitat’ based on, and generally limited to, species or vegetation communities which are known to be wash dependent or wash associated (e.g., *Chilopsis linearis-Psorothamnus spinosus* [desert willow-smoke tree scrub], *Prosopis* sp. [mesquite scrub], *Ericameria nauseosa* [rubber rabbitbrush scrub], *Encelia farinosa* [brittlebush scrub], and *Pleuraphis rigida* [big galleta grass]).
- Identifying top of streambank and the associated alluvial low terrace. This would be the stream-based, non-riparian associated, maximum jurisdictional lateral extent of regular flow occurring within the stream channel (e.g., TOB) and the inclusion of the low terrace alluvial zones abutting or adjacent to the active channels where regular overbank flow presents hydrologic, biogeochemical, and habitat functions not specifically associated with riparian vegetation, such areas with localized ponding that can support terrestrial and aquatic organisms and/or where ecological functions such as hydrologic based exchange, with abutting or adjacent low flow and/or the active channels, can present nutrient cycling and carbon export can occur that can benefit fish and wildlife as jurisdictional aquatic habitat.
- Inclusion of the low terrace alluvial zones abutting or adjacent to the active channels where infrequent overbank flooding has resulted in distinct vegetation communities (vegetation shift) and/or sediment deposition and/or microtopographic features such as local deposition, distinct and indistinct terraces, and changes in the character of soil.
- Inclusion of the low terrace alluvial zones abutting or adjacent to the active channels where the hydrologic, biogeochemical, and habitat functions not specifically associated with riparian vegetation, such areas with localized ponding that can support terrestrial and aquatic organisms.
- Inclusion of the low terrace zones where ecological functions such as hydrologic based exchange, with abutting or adjacent low flow and/or the active channels, can present nutrient cycling and carbon export can occur.
- Inclusion of the areas where distinct riparian habitat extended beyond the bank-full low flow channel(s) (e.g., TOB) and into to the unvegetated alluvial low terrace zones.
- Exclusion of the upper terraces where overbank flooding occurs in extreme events (≥100-year storm).

5.0 RESULTS

5.1 Location and Topography

For most of its alignment, Segment 1 is within an existing distribution line right of way adjacent to Route 66. The area is characterized by open space public lands (BLM, DOD, and SLC), scattered residential development and commercial buildings, and utility corridors. Traffic on Interstate 40 (I-40) and trains on Burlington Northern Santa Fe (BNSF) Railway tracks, can be seen from the alignment, which is parallel to I-40 and the BNSF Railway along most of the alignment. Desert vegetation is sparse and trees are rare or completely absent. East of Newberry Springs, the alignment crosses Troy Lake, a dessert playa that is a sandy expanse with almost no vegetation. Further east, the alignment goes through a volcanic area where remains of dark dried lava can be observed from Route 66. The topography along the distribution line between the Gale and Pisgah Substations is mostly flat with gently, rolling hills ranging in elevation from approximately 1,800 to 2,100 feet above mean sea level (amsl).

Land use along Segment 2 is primarily undisturbed desert scrub habitat and sparsely-developed area characterized by scattered occupied and abandoned residences and commercial development, open space lands, and utility corridors. Topography consists of valleys, flats, alluvial fans, bajadas, rolling hills, and rocky slopes within the Proposed Project boundaries with elevations ranging from approximately 1,100 to 4,600 feet amsl. The Segment 2 alignment crosses lands owned by BLM, DOD, NPS (MNP), SLC, and private landowners.

5.2 Hydrology

The Project is located within two watersheds: Mojave River (HUC: 18090208) and Ivanpah-Pahrump Valleys (HUC 16060015; Appendix A, Exhibit 3 [Regional Watersheds]).

The Mojave River watershed contains the Mojave River, which is a federally jurisdictional receiving water and drains the watershed. The Mojave River's headwaters begin in the San Bernardino Mountains and flow north through Victorville and Helendale then flow east through Barstow to terminate south of Soda Lake near Baker. Soda Lake is an isolated, dry lake bed. The hydrology within the watershed is dominated by dry lake beds and ephemeral washes that flow only during storm events and remain dry for most of the year. These washes can experience significant lateral migration during large, infrequent, storm events. They contain multiple, braided small low-flow channels interspersed with upland interfluves that become inundated during large episodic flows. Large, episodic flows can carry destructive bed loads in these systems that drastically alter size and shape of low-flow channels, as well as the overall low terrace alluvial system associated with the stream feature. Within the Project Survey Area, the drainages identified flow into Soda Lake and other smaller dry lake beds.

Ivanpah Dry Lake is approximately 13 square miles and is located in the center of the Ivanpah-Pahrump Valleys watershed. This lake has been determined to be non-jurisdictional by the USACE for multiple projects within its watershed (i.e., State Farm Solar Project [PL-2011-01051-SLP, JD-1]). This watershed is a gently-sloping north-trending watershed. Like the Mojave River watershed, hydrology within this watershed is also dominated by dry lakes and ephemeral washes that flow only during infrequent storm events. Drainages identified within this watershed flow into Ivanpah Dry Lake.

5.3 Vegetation

Eighteen (18) vegetation communities/land cover types, including 4 sensitive vegetation communities and 14 non-sensitive vegetation communities/land cover types, were previously documented and mapped during habitat assessment studies for the Project (Appendix A, Exhibit 2). Descriptions of the communities can be found in the Manual of California Vegetation, 2nd Edition (Sawyer and Keeler-Wolf 2009). A list of the vegetation communities documented within the survey areas is provided below in Table 1.

In general, the predominant upland vegetation type within the Survey Area is Mojave Creosote Bush Scrub. This vegetation type consists of widely-spaced shrubs and cacti. Dominant shrubs in this community are upland species and include: Creosote bush (*Larrea tridentata*), Burrobush (*Ambrosia dumosa*), cheesebush (*Ambrosia salsola*), Nevada ephedra (*Ephedra nevadensis*), and Mojave yucca (*Yucca schidigera*). Other dominant vegetation types included Joshua Tree woodland on higher elevation plateaus and mountains. Several species of cacti are common throughout the Survey Area including: California barrel cactus (*Ferocactus cylindraceus*), clustered barrel cactus (*Echinocactus polycephalus*), Engelmann's hedgehog cactus (*Echinocereus engelmannii*), silver cholla (*Opuntia echinocarpa*), pencil cholla (*Opuntia ramosissima*), and beavertail cactus (*Opuntia basilaris* var. *basilaris*).

Several of the larger washes within the Survey Area contain sections of desert riparian vegetation including smoke tree (*Psorothamnus spinosus*), desert mesquite (*Prosopis pubescens*), desert willow (*Chilopsis linearis*), and indigo bush (*Psorothamnus arborescens*). Additionally, the banks and small islands within large washes within the Survey Area contained scale broom (*Lepidospartum squamatum*) and tamarisk (*Tamarix* sp.).

TABLE 1. VEGETATION COMMUNITY / LAND COVER TYPE

Vegetation Community / Land Cover Type[12]
Sensitive Vegetation Communities
Chilopsis linearis - Psorothamnus spinosus (Smoke tree) scrub Shrubland Alliance G4/3.2
Pleuraphis rigida (Big galleta shrub-steppe) Alliance G3/S2.2
Prosopis glandulosa - Prosopis velutina - Prosopis pubescens (Mesquite) thickets Shrubland Alliance G5 / S3
Yucca brevifolia (Joshua tree woodland) Woodland Alliance G4 / S3.2
Non-sensitive Vegetation Communities
Ambrosia dumosa (White bursage scrub) Shrubland Alliance G5/S4
Ambrosia salsola (Cheesebush scrub) Shrubland Alliance G5 /S4
Atriplex polycarpa (Allscale scrub) Shrubland Alliance G5 / S4
Atriplex canescens (Fourwing saltbush) Shrubland Alliance G5 / S4
Bromus (*diandrus, hordeaceus*) – *Brachypodium distachyon* (Annual brome grasslands) Semi-natural Stands Non-Native / Invasive
Bromus rubens – *Schismus* (*arabicus, barbatus*) (Red brome or Mediterranean grass grasslands) Semi-natural Stands Non-Native / Invasive
Senegalia greggii - *Hyptis emoryi* - *Justicia californica* (Catclaw acacia - desert lavender - chuparosa scrub) Shrubland Alliance G4/S4
*Encelia farinosa (*Brittle bush scrub) Shrubland Alliance G5 / S4
Ephedra nevadensis - *Lycium andersonii* - *Grayia spinosa* (Nevada joint fir - Anderson's boxthorn - spiny hop sage) scrub G5 / S5
Ericameria nauseosa (Rubber rabbitbrush) scrub G5 / S5
Larrea tridentata (Creosote bush scrub) Shrubland Alliance G5 / S5
Larrea tridentata – *Ambrosia dumosa* (Creosote bush – white burr sage scrub) Shrubland Alliance G5 / S5
Prunus fasciculata - *Salazaria mexicana* (Desert almond - Mexican bladdersage) scrub G4 / S4
Yucca schidigera (Mojave yucca scrub) Alliance G4 / S4
Land Cover Types
Barren – Not Developed
Developed

5.4 Areas of Potential Jurisdiction

A formal field survey was conducted within the Survey Area to identify the type, location, and extent of potential WOUS and WOS (including jurisdictional aquatic habitat) that may be regulated for activities occurring within them under CWA Section 404 and/or 401, and CFGC Section 1600 *et seq*. However, all delineated waters and/or aquatic habitat presented in this report are subject to confirmation by the respective resource agency (e.g., CDFW, RWQCB, USACE, and NDEP). For each feature, general descriptions and a description of the limits of jurisdiction are provided below.

The location and limits of the USACE, RWQCB, CDFW, and NDEP jurisdictional areas are depicted in Appendix A, Exhibit 4 (Jurisdictional Delineation Results). Representative site photographs are provided as Appendix B. For the purposes of identification between the Segment 1 and Segment 2, features are identified by an alphabetical identifier denoting the associated segment. Segment 1 features are followed by an 'A' and Segment 2 features are followed by a 'B'.

[12] Rankings follow CDFW's List of California Terrestrial Natural Communities (2018) and utilize NatureServe conservation status ranks. Under this system, status is assessed and documented at the global (G) and state/province (S) scales from critically imperiled (1) to demonstrable secure (5). A question mark denotes an inexact numeric rank. All vegetation types with a global or state rank of 3 or less is considered sensitive.

5.4.1 SEGMENT 1

Feature 1A

Feature 1A is a large, gently-sloping, ephemeral drainage flowing from south to north. The channel drains the area south of the Survey Area towards the Mojave River. The feature is bridged by Route 66 within the Survey Area. The drainage is incised 5-10 feet in some reaches. Vegetation along the edges of the drainage consists of large creosote bush. The bed of the feature is unvegetated. The tributary was defined by sediment sorting, wracking, and scour. The channel substrate is composed of loose, alluvial, sandy material interspersed with cobbles and gravel.

Average overlapping OHWM/TOB width of the tributary was 18 feet. A total of approximately 0.35 acre of unvegetated ephemeral stream under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area.

Feature 2A

Feature 2A is a large, gently-sloping, ephemeral drainage flowing from south to north, similar to Feature 1A. The channel drains the area south of the Survey Area towards the Mojave River. This aquatic feature is bridged by Route 66 within the Survey Area. The drainage is incised 5-10 feet in some reaches. Vegetation along the edges of the drainage consists of large creosote bush. The bed of the feature is unvegetated. The tributary was defined by sediment sorting, wracking, and scour. The channel substrate is composed of loose, alluvial, sandy material interspersed with cobbles and gravel.

Average overlapping OHWM/TOB width of the tributary was 10 feet. A total of approximately 0.19 acre of unvegetated ephemeral stream under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area.

Feature 3A

Feature 3A is a small, gently-sloping, ephemeral drainage flowing from south to north, originating from roadside ditch south of the Survey Area. The channel drains the area south of the Survey Area towards the Mojave River. The feature is bridged by Route 66 within the Survey Area. The drainage is incised 5 feet. Vegetation along the edges of the drainage consists of large creosote bush. The bed of the feature is unvegetated. The tributary bed was defined by sediment sorting, wracking, and scour. The channel substrate is composed of loose, alluvial, sandy material interspersed with cobbles and gravel.

Average overlapping OHWM/TOB width of the tributary was 42 feet. A total of approximately 0.33 acre of unvegetated ephemeral stream under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area.

Feature 4A

Feature 4A is Troy Dry Lake, a playa lake which receives direct input from rainfall and additional inflows from and ephemeral tributaries originating in the Cady Mountains to the north and Rodman Mountains to the south. The playa habitat along the edges of the lake consists of primarily of allscale saltbush (*Atriplex polycarpa*) with scattered tamarisk (*Tamarisk* sp.) intermixed in the saltbush scrub community. The jurisdictional limits of the lakebed were defined by the lakebed OHWM (micro-concave topography and distinct changes in vegetation based on the development and extent of the salt panne supporting minimal terrestrial vegetation [≤1% absolute cover]). The soil substrate of Troy Dry Lake is composed of fine salty material.

A total of approximately 15.69 acres of playa lakebed under the jurisdiction of the USACE/RWQCB/CDFW were delineated within the Survey Area.

5.4.2 SEGMENT 2

Feature 1B

Feature 1B is a shallow, gently-sloping, ephemeral wash adjacent to Pisgah Substation. The drainage flows from east to west, before flowing into Hector Wash, and eventually into Troy Lake, an isolated dry basin. Vegetation along the edges of the drainage consists of creosote bush (*Larrea tridentate*), rubber rabbitbrush (*Ericameria nauseosa*), and burrobush (*Ambrosia dumosa*). The bed is also sparsely vegetated with creosote. The tributary bed was defined by scour, shelving, destruction of terrestrial vegetation, and sediment sorting. The channel substrate is composed of loose sand and small gravel.

Average overlapping OHWM/TOB width of the tributary was 2 feet. A total of approximately 0.01 acre of unvegetated ephemeral stream under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area.

Feature 2B

Feature 2B is a wide, gently-sloping sandy ephemeral wash flowing from east to west and presumably to Troy Lake. The low-flow is relatively bare. Vegetation along the edges of the drainage consists of sandy hummocks composed of creosote bush, rubber rabbitbrush, and burrobush. The tributary bed was defined by scour, shelving, destruction of terrestrial vegetation, and sediment sorting. The channel substrate is composed of loose, alluvial, sandy material interspersed with gravel.

Average width of the tributary OHWM was 25 feet and width of the TOB was 100 feet. A total of approximately 0.17 acre of unvegetated ephemeral streambed under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area. Exclusive CDFW jurisdiction associated with this feature totals approximately 1.26 acres of ephemeral stream associated low terrace alluvial waters

Feature 3B

Feature 3B is a braided, gently-sloping ephemeral wash flowing from northeast to southwest along an access road and presumably to Troy Dry Lake. Vegetation along the edges of the drainage consists of creosote bush, non-native grasses (*Schismus arabicus, Schismus barbatus*, *Bromus madritensis*), burrobush, and rubber rabbitbrush. The bed is also sparsely vegetated with Mediterranean grass. The tributary bed was defined by scour, shelving, destruction of terrestrial vegetation, and sediment sorting. The channel substrate is composed of loose, alluvial, sandy material interspersed with cobbles and gravel.

Average width of the tributary OHWM was 10 feet and width of the TOB was 60 feet. A total of 0.05 acre of unvegetated ephemeral streambed under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area. Exclusive CDFW jurisdiction associated with this feature totals approximately 0.20 acre of ephemeral stream associated Mojave creosote bush scrub alluvial habitat.

Feature 5B

Feature 5B is a large, gently-sloping, braided alluvial system draining the Cady mountains to the north. The overall alluvial system flows from north to southwest and eventually into Troy Lake. Large portions of the system consist of a network of discrete-braided channels. Vegetation in small islands and along the edges of the drainage consists of creosote bush, cheesebush, Mediterranean grass, and burrobush. The bed is also sparsely vegetated with Mediterranean grass and small rubber rabbitbrush. The tributary was defined by sediment sorting and scour. The channel substrate is rocky with large cobbles and gravel.

Average overlapping OHWM/TOB width of the tributary was between 10 and 16 feet. A total of approximately 3.36 acres of unvegetated ephemeral stream under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area.

Feature 6B

Feature 6B is an anastomosed ephemeral channel. The drainages flow from north to south and confluence with Feature 7B, just south of the Survey Area. These features eventually flow into Troy Dry Lake to the southwest, an isolated dry basin. The bed is sparsely vegetated with Mediterranean grass and small burrobush. Vegetation along the edges of the drainage consists of creosote bush, Mediterranean grass, cheesebush, and burrobush. Upland interfluves (areas between the active channels) consisted of desert pavement and mature creosote bush. The tributaries were defined by sediment sorting, wracking, and scour. The channel substrate is sand with small cobbles and gravel occupying the floor of the channel.

Average width of the tributary OHWM was 5 feet and width of the TOB was 8 feet. A total of approximately 0.06 acre of unvegetated streambed under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area. Exclusive CDFW jurisdiction associated with this feature totals approximately 0.05 acre of unvegetated streambank.

Feature 7B

Feature 7B is a small, steep, rocky, ephemeral tributary to Feature 10B, draining from a tower access road. The drainage flows from north to south and the OHWM is incised. Vegetation is undifferentiated from surrounding uplands and consists of creosote bush and burrobush. The tributary was defined by sediment sorting and scour. The channel substrate is composed of large rocks, cobbles, and gravel.

Average width of the tributary OHWM was 5 feet and width of the TOB was 8 feet. A total of approximately 0.01 acre of unvegetated ephemeral streambed under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area. The exclusive CDFW jurisdiction associated with this feature totals approximately 0.01 acre of unvegetated ephemeral associated streambank.

Feature 8B

Feature 8B is a large, gently-sloping, braided drainage flowing from north to south through a narrow valley. The main channel of this feature begins at an access road just inside the project Survey Area and flows south eventually to Troy Dry Lake, an isolated playa basin. Vegetation along the edges of the drainage consists of creosote bush, burrobush, and rubber rabbitbrush. The bed is also sparsely vegetated with Mediterranean grass and small rubber rabbitbrush. The tributary bed was defined by sediment sorting, wracking, and scour. The channel substrate is composed of sand with small gravel and cobble.

Average width of the tributary OHWM was 5 feet and width of the TOB was 8 feet. A total of approximately 0.008 acre of unvegetated ephemeral streambed under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area. The exclusive CDFW jurisdiction associated with this feature totals approximately 0.01 acre of unvegetated streambank.

Feature 9B

Feature 9B is a large, gently-sloping, ephemeral drainage flowing from west to east. The channel drains the mountains located to the west of the Survey Area and confluences with Feature 12B, just east of the Survey Area. These features eventually drain into Broadwell Lake, an isolated dry basin. The drainage is incised 5-6 feet in some reaches. Vegetation along the edges of the drainage consists of creosote bush, catclaw acacia (*Senegalia greggii*), rubber rabbitbrush, non-native grasses, and burrobush. The bed is also sparsely vegetated with Mediterranean grass and small burrobush. The tributary bed was defined by sediment sorting, wracking, and scour. The channel substrate is composed of loose, alluvial, sandy material interspersed with cobbles and gravel.

Average width of the tributary OHWM was 3 feet and width of the TOB was 22 feet. A total of approximately 0.02 acre of unvegetated streambed under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area. The exclusive CDFW jurisdiction associated with this feature totals approximately 0.14 acre of alluvial low terrace waters.

Feature 10B

Feature 10B is a large, gently-sloping, ephemeral drainage flowing from west to east. The channel has a well-defined low-flow and bed and bank. It drains to the east of the Survey Area and confluences with Feature 9B just east of the Survey Area. These features eventually drain into Broadwell Lake, an isolated dry basin. The drainage is incised 6-7 feet in some reaches. Vegetation along the edges of the drainage consists of creosote bush and burrobush. The bed is also sparsely vegetated with non-native grasses, catclaw acacia, and small burrobush. The channel substrate is composed of gravel and sandy material interspersed with cobbles and gravel. The tributary was defined by sediment sorting, wracking, and scour.

Average width of the tributary OHWM was 4 feet and width of the TOB was 23 feet. A total of approximately 0.02 acre of unvegetated streambed under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area. The exclusive CDFW jurisdiction associated with this feature totals approximately 0.02 acre of alluvial low terrace waters.

Features 11B and 12B

Features 11B and 12B are small, gently-sloping, ephemeral tributaries to a large alluvial system flowing to the east of the Survey Area. These systems eventually flow into Broadwell Lake. The drainages are small, gently-sloping and drain the platform where a lattice tower is sitting. They are incised 3-4 feet in some reaches. Vegetation along the edges of the drainages consists of creosote bush and burrobush. The beds are unvegetated. The tributaries were defined by sediment sorting and scour. The channel substrate is composed of loose, rocky material interspersed with sand and gravel.

Average overlapping OHWM/TOB width of the tributaries were 1 foot. A total of approximately 0.002 acre and approximately 0.001 acre for Features 11B and 12B, respectively of unvegetated ephemeral stream under the jurisdiction of the USACE/RWQCB/CDFW were delineated within the Survey Area.

Feature 13B

Feature 13B is a large, gently-sloping, tributary to an alluvial system east of the Survey Area and presumably into Broadwell Lake. The drainage is large, gently-sloping, and flows around the platform where a lattice tower is sitting. The main channel exhibits bank sloughing and is incised 3-4 feet in some reaches. Vegetation along the edges of the drainage consists of creosote bush and burrobush. The tributary was defined by sediment sorting, wracking, and scour. The channel substrate is composed of loose, alluvial, sandy material interspersed with large cobbles and boulders.

Average overlapping OHWM/TOB width of the low flow channel was 100 feet and width of the TOB was approximately 100 feet. A total of approximately 0.49 acre of unvegetated ephemeral stream under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area.

Feature 14B

Feature 14B is a small, gently-sloping, ephemeral tributary to a large alluvial system flowing to the east of the Survey Area and eventually into Broadwell Lake. The drainage is small, gently-sloping, and drains the access road. Vegetation along the edges of the drainage consists of sparse creosote bush and burrobush. The bed is sparsely vegetated with Mediterranean grass. The tributary was defined by sediment sorting and scour within the lower portions of the drainage. The channel substrate is composed of sandy material interspersed with large cobbles and boulders.

Average overlapping OHWM/TOB width of the tributary was approximately 2 feet. A total of approximately 0.02 acre of unvegetated ephemeral stream under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area.

Feature 15B

Feature 15B is a large headwater of an alluvial system flowing to the north and east of the Survey Area and eventually into Broadwell Lake. The drainage is wide, gently-sloping, and drains the mountains to the east and west of the Survey Area. Vegetation along the edges of the drainage consists of creosote bush and burrobush. The bed is sparsely vegetated with Mediterranean grass. The tributary was defined by sediment sorting and scour. The channel banks of this drainage are very rocky and, in some reaches, consists of folded bedrock.

Average OHWM width of the low-flow channel was 25 feet and width of the TOB was approximately 35 feet. A total of approximately 0.27 acre of unvegetated streambed under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area. The exclusive CDFW jurisdiction associated with this feature totals 0.59 acre of low terrace alluvial waters.

Features 16B, 17B, and 18B

Features 16B, 17B, and 18B are small tributaries to Feature 15B. The tributaries are a narrow, moderately steep, and meandering headwater flowing to the north. Vegetation along the edges of the drainages consists of creosote bush and rubber rabbitbrush. The tributary beds are sparsely vegetated with non-native grasses, such as Mediterranean grass and *Bromus spp*. The tributary channels were defined by sediment sorting and portions of scour.

Average OHWM width of the low-flow channels was 1 foot and width of the TOB was approximately 1-3 feet. A total of approximately 0.07 acre of unvegetated streambed under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area. The exclusive CDFW jurisdiction associated with this feature totals approximately 0.01 acre of acre of alluvial low terrace waters

Feature 19B

Feature 19B is part of a large, alluvial system flowing from the north into an unnamed, isolated dry lake basin. The feature consists of many small, braided low-flow channels and islands. Vegetation along the edges of the drainage consists of creosote bush and burrobush. The islands within the banks are sparsely vegetated with small creosote bushes. The tributary was defined by sediment sorting, wracking, and scour. The channel substrate is composed of large rocks and boulders on top of packed sandy material.

Average overlapping OHWM/TOB width of the low-flow channels was 1 foot. A total of 2.06 acres of unvegetated ephemeral stream under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area.

Feature 20B

Feature 20B is part of a large alluvial fan flowing north into an unnamed, isolated dry lake basin. The feature consists of two main braided low-flow channels surrounded by alluvial habitat. Vegetation along the edges of the drainage consists of creosote bush and burrobush. The islands within the banks are sparsely vegetated with small creosote bushes. The tributary was defined by sediment sorting, wracking, and scour. The channel substrate is composed of large cobbles and boulders in a bed of coarse sand.

Average overlapping OHWM/TOB width of the low-flow channels was 3 feet. A total of 0.04 acre of unvegetated ephemeral stream under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey area. The exclusive CDFW jurisdiction associated with this feature totals 3.15 acres of low terrace alluvial waters.

Feature 21B

Feature 21B is part of a large alluvial system flowing north into an unnamed, isolated dry lake basin. The feature forms at the confluence of many small headwater drainages that drain mountain ranges to the east and west of the Survey Area. Vegetation along the edges of the drainage consists of creosote bush and rubber rabbitbrush. The islands within the banks are sparsely vegetated with small creosote bushes. The tributary was defined by sediment sorting, wracking, and scour. The channel substrate is composed of many cobbles and boulders and packed coarse sand.

Average OHWM width of the low terrace alluvial waters area is approximately 100 feet. A total of approximately 0.03 acre of unvegetated ephemeral stream under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area. The exclusive CDFW jurisdiction associated with this feature totals 0.03 acre of unvegetated streambed and 1.24 acres of low terrace alluvial waters.

Feature 22B

Feature 22B is large, well-defined channel part of a larger alluvial system flowing north into an unnamed, isolated dry lake basin. The feature drains the mountains to the east. Vegetation along the edges of the drainage consists of creosote bush and rubber rabbitbrush. The islands within the banks are sparsely vegetated with small creosote bushes. The tributary was defined by sediment sorting, wracking, and scour. The channel substrate is composed of many large cobbles and boulders with small sections of packed sand.

Average overlapping OHWM/TOB width of the channel was 47 feet. A total of approximately 0.22 acre of unvegetated ephemeral stream under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area.

Feature 23B

Feature 23B is a wide channel that is part of a large alluvial system flowing north into an unnamed, isolated dry lake basin. The feature is a large headwater draining the mountains to the east. Vegetation along the edges of the drainage consists of creosote bush, burrobush, and rubber rabbitbrush. The islands within the banks are sparsely vegetated with small creosote bushes and non-native grasses. The tributary was defined by scour, shelving, destruction of terrestrial vegetation, and sediment sorting. The channel substrate is composed of loose, alluvial, sandy material interspersed with large cobbles and boulders.

Average overlapping OHWM/TOB width of the channel was 170 feet. A total of approximately 0.19 acre of unvegetated ephemeral stream under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area.

Feature 24B

Feature 24B is part of a large braided drainage flowing north into an unnamed, isolated dry lake basin from the mountains to the east. Vegetation along the edges of the drainage consists of creosote bush, burrobush, and rubber rabbitbrush. The bed is unvegetated. The substrate is composed of packed sand along the bottom of the channel interspersed with many large cobbles and boulders. The tributary was defined by scour, shelving, destruction of terrestrial vegetation, and sediment sorting. Average overlapping OHWM/TOB width of the tributary channel was 35 feet. A total of approximately 0.40 acre of unvegetated ephemeral stream under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area. The exclusive CDFW jurisdiction associated with this feature totals 1.94 acres of low terrace alluvial waters.

Feature 25B

Feature 25B is a wide, well-defined channel flowing north into an unnamed, isolated dry lake basin. The feature is part of a large alluvial system draining the mountains to the east. Vegetation along the edges of the drainage consists of creosote bush, burrobush, and rubber rabbitbrush. The bed is unvegetated. The tributary was defined by sediment sorting and scour. The channel substrate is composed of loose, alluvial, sandy material with sparse cobbles and boulders along the edges of the channel.

Average overlapping OHWM/TOB width of the tributary channel was 25 feet. A total of approximately 0.34 acre of unvegetated ephemeral stream under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area.

Features 26B and 27B

Features 26B and 27B are small, braided channels that are part of a large alluvial system flowing north into an unnamed, isolated dry lake basin. The system drains a mountain range to the east. The low-flow of the channels is vegetated with smoketree (*Psorothamnus spinosus*). Vegetation along the edges of the drainages consists of creosote bush, burrobush, and rubber rabbitbrush. The tributary beds are unvegetated. The tributaries were defined by sediment sorting and scour. The channel substrate is composed of loose, alluvial, sandy material interspersed with small cobbles.

Average overlapping OHWM/TOB width of the distributary low flow channels was 3 feet. A total of approximately 0.07 acre unvegetated stream and approximately 0.49 acre of unvegetated ephemeral stream, approximately 1.0 acre of vegetated ephemeral stream (Desert willow-Smoketree wash woodland), and approximately 0.08 acre low terrace alluvial waters for Features 26B and 27B, respectively under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area.

Feature 28B

Feature 28B is a small tributary to a large alluvial system flowing north into an unnamed, isolated dry lake basin. The feature confluences with Feature 29B, just north of the Survey Area. Vegetation along the edges of the channels consists of creosote bush, burrobush, and rubber rabbitbrush. The tributary bed is unvegetated. The tributary was defined by sediment sorting and scour. The channel substrate is composed of loose sand and small cobbles along the edges of the channel.

Average overlapping OHWM/TOB width of the tributary was 4 feet. A total of approximately 0.01 acre of unvegetated ephemeral stream under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area.

Feature 29B

Feature 29B is a large drainage flowing north into an unnamed, isolated dry lake basin. The feature drains the mountains to the east of the Survey Area and confluences with Feature 28B, just north of the Survey Area. Vegetation along the edges of the channels consists of creosote bush, burrobush, and rubber rabbitbrush. The tributary bed is sparsely vegetated along the edges with non-native grasses. The tributary was defined by sediment sorting and scour. The channel substrate is composed mostly of loose sand with small cobbles.

Average overlapping OHWM/TOB width of the tributary and TOB was 15 feet. A total of approximately 0.04 acre of unvegetated ephemeral stream under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area.

Feature 30B

Feature 30B is a wide alluvial drainage flowing north into an unnamed, isolated dry lake basin. The feature drains the mountains to the east of the Survey Area and has been cut off from a major watershed to the north by railroad tracks. Vegetation along the edges of the channels consists of creosote bush, burrobush, and rubber rabbitbrush. The bed is sparsely vegetated with non-native grasses. The tributary bed was defined by sediment sorting and scour. The channel substrate is composed of sandy material interspersed with small cobbles.

Average overlapping OHWM/TOB width of the tributary was 28 feet. A total of approximately 0.09 acre of unvegetated ephemeral stream under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area. The exclusive CDFW jurisdiction associated with this feature totals approximately 0.86 acre of low terrace alluvial habitat.

Feature 31B

Feature 31B is a small, shallow meandering drainage flowing north into an unnamed, isolated dry lake basin. The feature drains the mountains to the east of the Survey Area and has been cut off from a major watershed to the north by railroad tracks. Vegetation along the edges of the channels consists of creosote bush and rubber rabbitbrush. The tributary bed is vegetated with non-native grasses. The tributary channel was defined by sediment sorting. The channel substrate is composed of loose, alluvial, sandy material.

Average overlapping OHWM/TOB width of the tributary was 5 feet. A total of approximately 0.05 acre of unvegetated ephemeral stream under the jurisdiction of the USACE/RWQCB was delineated within the Survey Area.

Feature 32B

Feature 32B is a large braided headwater tributary to a large alluvial system flowing north into an unnamed, isolated dry lake basin. Vegetation along the edges of the channels consists of creosote bush, burrobush, and rubber rabbitbrush. The tributary bed is sparsely vegetated with non-native grasses. The tributary was defined by sediment sorting and scour. The channel substrate is composed of loose sandy material and a few cobbles and gravel.

Average overlapping OHWM/TOB width of the tributary was 8-18 feet. A total of approximately 0.15 acre of unvegetated ephemeral stream under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area. The exclusive CDFW jurisdiction associated with this feature totals approximately 0.43 acre of low terrace alluvial waters.

Feature 34B

Feature 34B is a large, gently-sloping, blue-line drainage named Kelso Wash flowing west and into Soda Lake. The drainage is incised 4-5 feet in many reaches. Mud flats likely deposited in the past 2 or 3 years are present on the north and south sides of the banks within the floodplain of the drainage. Vegetation along the edges of the channels consists of creosote bush, burrobush, and rubber rabbitbrush. The bed is sparsely vegetated with non-native grasses. The tributary bed was defined by sediment sorting and scour. The channel substrate is composed of loose sandy material interspersed with small cobbles.

Average overlapping OHWM/TOB width of the tributary was 25 feet. A total of approximately 0.06 acre of unvegetated ephemeral stream under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area. The exclusive CDFW jurisdiction associated with this feature totals approximately 3.52 acres of low terrace alluvial waters.

Feature 35B

Feature 35B is a large drainage flowing west through Jackson Canyon towards Soda Lake. The feature is a very large system containing many small braided low-flow channels and small islands only inundated during high flows encompassing nearly all of the bottom of Jackson Canyon. Vegetation along the edges of the channel and on islands consists of creosote bush, rubber rabbitbrush, burrobush, Mojave yucca, and Nevada ephedra. The bed is sparsely vegetated with desert riparian species including catclaw acacia, broom sage, and desert willow. The channel substrate is composed of gravel, large cobbles, and boulders. The tributary was defined by defined banks, destruction of vegetation, and scour.

Nearly the entire Survey Area was located within the feature. The width of the feature was nearly 1,400 feet. A total of approximately 15.70 acres of unvegetated ephemeral stream and approximately 1.66 acres of vegetated ephemeral stream (Desert willow-Smoketree wash woodland) under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area. The exclusive CDFW jurisdiction associated with this feature totals approximately 4.90 acres of low terrace alluvial waters.

Feature 36B

Feature 36B is a braided tributary. Feature 36B is moderately steep and drains a large upland area to the north called Rocky Ridge. Vegetation along the edges of the channel consists of small creosote bush, Nevada ephedra, burrobush, and Mojave yucca. The tributary bed is sparsely vegetated with non-native grasses. The tributary bed was defined by sediment sorting and scour. The substrate is composed of gravel, large cobbles, and boulders. Upland areas contain packed cobbles and areas of desert pavement.

Average OHWM width of the tributary was 8 feet and the width of the TOB was 12 feet. A total of approximately 0.10 acre of unvegetated ephemeral streambed under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area. The exclusive CDFW jurisdiction associated with this feature totals approximately 0.03 acre of unvegetated streambank.

Feature 37B

Feature 37B is a small headwater tributary to Feature 35B, the drainage flowing west through Jackson Canyon, and towards Soda Lake. Feature 37B is moderately steep and drains a large upland area surrounded by the headwaters of Feature 35B. Vegetation along the edges of the channel consists of creosote bush, Nevada ephedra, and Mojave yucca. The channel bed is sparsely vegetated with non-native grasses. The tributary was defined by sediment sorting and scour. The channel substrate is composed of sand, small cobbles and small boulders.

Average OHWM width of the tributary was 2 feet and the width of the TOB was 4 feet. A total of approximately 0.05 acre of unvegetated streambed under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area. The exclusive CDFW jurisdiction associated with this feature totals approximately 0.05 acre of unvegetated streambank.

Feature 38B

Feature 38B is a small braided tributary to Feature 35B. The main channel of Feature 38B is incised approximately 1-2 feet in some reaches. Vegetation along the edges of the channel consists of creosote bush, rubber rabbitbrush, Nevada ephedra, and non-native grasses. The bed is sparsely vegetated with non-native grasses. The low-flow channel was defined by sediment sorting, and scour. The substrate on the bottom of the channel consists of loose sand and along the sides of the channel consists of small cobbles.

Average overlapping OHWM/TOB width of the low flow channel was 34 feet. A total of approximately 0.12 acre of unvegetated streambed under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area. The exclusive CDFW jurisdiction associated with this feature totals approximately 1.30 acres of low terrace alluvial waters.

Feature 39B

Feature 39B is a part of a large Willow Wash alluvial system draining the Kelso Mountains to the north. Feature 39B consists of a series of smaller, heavily braided low flow channels interspersed with small islands that become inundated during higher flows. Vegetation along the edges of the channel consists of creosote bush, Nevada ephedra, and non-native grasses. The channel bed is sparsely vegetated with non-native grasses. The low-flow channel was defined by sediment sorting, and scour. The substrate is composed of loose sand lined by small cobbles and gravel on the sides of the channel.

Average overlapping OHWM/TOB width of the low flow channel was 90 feet. A total of approximately 0.59 acre of unvegetated streambed under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area. The exclusive CDFW jurisdiction associated with this feature totals approximately 1.33 acres of low terrace alluvial waters.

Feature 40B

Feature 40B is a portion of a large, braided headwater tributary to Willow Wash, which flows west into Soda Lake. The portion of this feature within the Survey Area consists several shallow, low-flow channels. Vegetation along the edges of the channel consists of creosote bush, Nevada ephedra, and non-native grasses. The bed is sparsely vegetated with non-native grasses. The low-flow channel was defined by sediment sorting, wracking, and scour. The channel substrate is mostly loose sand on the bottom of the drainage with small cobbles on the edges.

Average overlapping OHWM/TOB width of the main low flow channel was 2 feet. A total of approximately 0.18 acre of unvegetated stream under the jurisdiction of the USACE/RWQCB was delineated within the Survey Area.

Feature 41B

Feature 41B upstream of Feature 40B and drains to the west into Willow Wash. The drainage contains several braided channels surrounded by areas of alluvial deposition that receive high flows. Vegetation along the edges of the channel consists of creosote bush, Mojave yucca, Nevada ephedra, and non-native grasses. The tributary channel was defined by sediment sorting and scour. The channel substrate is composed of sandy alluvial material and gravel.

Average overlapping OHWM/TOB width of the low flow channels was 10 feet. A total of approximately 0.02 acre of unvegetated streambed under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area.

Feature 42B

Feature 42B is adjacent to Feature 43B and consists of a large alluvial system draining to the east into Willow Wash and eventually into Soda Lake. This drainage is braided and surrounded by areas of alluvial deposition. Vegetation along the edges of the channel consists of creosote bush, Mojave yucca, Nevada ephedra, Joshua trees (*Yucca brevifolia*), and non-native grasses. The tributary was defined by sediment sorting and scour. The channel substrate consists of mostly sand interspersed with small gravel.

Average overlapping OHWM/TOB width of the low flow channels was 3 to 4 feet. A total of approximately 0.04 acre of unvegetated stream under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area. The exclusive CDFW jurisdiction associated with this feature totals approximately 2.13 acres of low terrace alluvial habitat.

Feature 43B

Feature 43B is a portion of a large, braided tributary to Willow Wash. Feature 43B within the Survey Area consists of many smaller low-flow channels interspersed with higher islands that only receive higher flows. Vegetation along the edges of the channel consists of creosote bush, rubber rabbitbrush, Mojave yucca, Joshua trees, and non-native grasses. The low flow channel was defined by sediment sorting and scour. The channel substrate is composed of mostly sand and small gravel.

Average overlapping OHWM/TOB width of the larger low-flow channels varied between 8 and 10 feet. A total of approximately 0.34 acre of unvegetated ephemeral stream under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area. The CDFW jurisdiction associated with this feature totals approximately 7.10 acres of low terrace alluvial habitat.

Features 44B, 45B, 46B, and 47B

Features 44B, 45B, 46B, and 47B are small drainages flowing west along Kelbaker Road. The drainages are narrow, meandering, and braids just north of the lattice tower within the Survey Area. Vegetation along the edges of the channels consists of creosote bush, rubber rabbitbrush, Joshua trees, Mojave yucca, and non-native grasses. The tributaries were defined by sediment sorting and scour. The channel substrate is composed of sand and small gravel.

Average overlapping OHWM/TOB width of the tributaries was 3 feet. A total of approximately 0.07 acre of unvegetated stream under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area.

Features 48B, 49B, and 50B

Features 48B, 49B, and 50B are part of a large, braided drainage flowing south into Kelso Wash. The drainages consist of a series of braided channels that are incised approximately 1 foot and surrounded by uplands that may receive flow during large flood events. Vegetation along the edges of the channels consists of creosote bush, Mojave yucca, Nevada ephedra, Joshua trees, and Mediterranean grass. The tributaries were defined by sediment sorting and scour. The channel substrate is composed of sandy material and large gravel.

Average overlapping OHWM/TOB width of the tributaries and TOB was 1 to 4 feet. A total of approximately 0.10 acre of unvegetated stream under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area.

Features 51B and 52B

Features 51B and 52B are part of a large, braided drainage flowing south through the Marl Mountains toward Kelso Wash. The drainages flow through a narrow canyon just southwest of the Survey Area. Vegetation along the edges of the channels consists of creosote bush, Mojave yucca, Nevada ephedra, Joshua trees, cholla (*Cholla* spp., and non-native grasses. The beds are unvegetated. The tributaries were defined by sediment sorting and scour. The channel substrate is composed of loose, sandy material and cobbles.

Average overlapping OHWM/TOB width of the tributaries was between 1 foot and 3 feet. A total of approximately 0.04 acre of unvegetated ephemeral stream under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area.

Feature 53B

Feature 53B is part of a large, braided drainage flowing south toward Kelso Wash. The drainage consists of two small channels of a series of braided channels that are incised approximately 1-2 feet and surrounded by uplands that may receive flow during large flood events. Vegetation along the edges of the channel consists of creosote bush, Mojave yucca, Nevada ephedra, Joshua trees, cholla, and non-native grasses. The bed is unvegetated. The tributary was defined by sediment sorting and scour. The channel substrate is composed of cobbles and small gravel.

Average overlapping OHWM/TOB width of the tributary was 2 feet. A total of approximately 0.02 acre of unvegetated ephemeral stream under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area.

Features 54B, 55B, 56B, 57B, and 58B

Features 54B, 55B, 56B, 57B, and 58B are part of a large alluvial system flowing south toward Kelso Wash. The drainages consist of gently-sloping channels that are incised approximately 1-2 feet and surrounded by uplands that may receive flow during large flood events. Vegetation along the edges of the channels consists of creosote bush, Mojave yucca, Nevada ephedra, Joshua trees, cholla, and sparse non-native grasses. The beds are unvegetated. The tributaries were defined by sediment sorting and scour. The channel substrate is composed mostly cobbles and gravel with portions of sand.

Average width of the tributaries ranged from 1 to 15 feet. A total of approximately 0.28 acre of unvegetated ephemeral streambed under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area. The exclusive CDFW jurisdiction associated with these features totals approximately 1.41 acres of low terrace alluvial habitat.

Feature 59B

Feature 59B is a pair of small, shallow channels incised approximately 1 foot flowing southeast toward Kelso Wash. Vegetation along the edges of the channel consists of creosote bush, Mojave yucca, Nevada ephedra, Joshua trees, cholla, and Mediterranean grass. The bed is unvegetated. The tributary was defined by sediment sorting and scour. The channel substrate is composed of sand and gravel.

Average overlapping OHWM/TOB width of the tributary was 2 feet. A total of approximately 0.01 acre of unvegetated ephemeral stream under the jurisdiction of the USACE/RWQCB was delineated within the Survey Area. The CDFW jurisdiction associated with this feature totals 0.01 acre of unvegetated streambed.

Features 60B, 61B, and 62B

Features 60B, 61B, and 62B are small, narrow channels flowing northeast toward Ivanpah Dry Lake. Vegetation along the edges of the channels consists of creosote bush, Mojave yucca, Nevada ephedra, Joshua trees, cholla, and non-native grasses. The channel beds are sparsely vegetated with non-native grasses. The tributaries were defined by sediment sorting and scour. The channel substrate is rocky alluvial materials such as large gravel and cobbles.

Average overlapping OHWM/TOB width of the tributaries was 1 foot. A total of approximately 0.07 acre of unvegetated stream under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area.

Feature 63B

Feature 63B is a small, poorly-defined portion of a large braided alluvial system flowing northeast into Ivanpah Lake. Vegetation along the edges of the channel consists of creosote bush, Mojave yucca, Nevada ephedra, Joshua trees, cholla, and non-native grasses. The channel bed is unvegetated. The low-flow channel was defined by sediment sorting. The channel substrate is composed of loose sand and small gravel.

Average overlapping OHWM/TOB width of the low-flow channel was 2 feet. A total of approximately 0.01 acre of unvegetated ephemeral stream under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area. The exclusive CDFW jurisdiction associated with this feature totals approximately 0.55 acre of low terrace alluvial habitat.

Features 64B and 65B

Features 64B and 65B are shallow channels within a network of braided channels flowing into Ivanpah Lake. Vegetation along the edges of the channels consists of creosote bush, Mojave yucca, Nevada ephedra, Joshua trees, cholla, and Mediterranean grass. The beds are unvegetated. The low-flow channels were defined by sediment sorting. The channel substrate is composed of loose sand interspersed with small gravel and cobbles.

Average overlapping OHWM/TOB width of the low-flow channels was 2-10 feet. A total of approximately 0.04 acre of unvegetated ephemeral stream under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area. The exclusive CDFW jurisdiction associated with Feature 64B totals approximately 0.25 acre of associated riparian vegetation (Catclaw acacia-desert lavender chuparosa scrub) extending past the banks of the feature.

Feature 66B

Feature 66B is a large, braided channel flowing northeast into Ivanpah Lake. The wide channel is incised approximately 1-2 feet in some reaches within the Survey Area. Vegetation along the edges of the channel consists of creosote bush, Mojave yucca, rubber rabbitbrush, cholla, Joshua trees, and non-native grasses. The bed is vegetated with desert riparian species including scale broom, catclaw, smoke tree, and desert willow. The low-flow channel was defined by sediment sorting, wracking, and scour. The channel substrate is composed of loose, sandy alluvial material interspersed with small gravel and cobbles.

Average overlapping OHWM/TOB width of the tributary was 120 feet. A total of approximately 0.99 acre of unvegetated ephemeral stream and approximately 4.69 acres of vegetated ephemeral stream (Catclaw acacia-desert lavender chuparosa scrub) under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area.

Features 67B, 68B, and 69B

Features 67B, 68B, and 69B consist of small tributaries to Feature 66B. Vegetation along the edges of the channels consists of creosote bush, Mojave yucca, rubber rabbitbrush, cholla, Joshua trees, and non-native grasses. The beds are unvegetated. The low-flow channels were defined by sediment sorting and scour. The channel substrate is composed of loose sand interspersed with small gravel and cobbles.

Average overlapping OHWM/TOB width of the low-flow channels and TOB was 1 to 3 feet. A total of approximately 0.05 acre of unvegetated ephemeral stream under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area. The exclusive CDFW jurisdiction associated with these features totals approximately 0.23 acre of low terrace alluvial waters.

Feature 70B

Feature 70B consists of three small channels within a large, gently-sloping alluvial system flowing northeast. The system eventually drains toward Ivanpah Lake. Feature 70B is incised approximately 1-2 feet from periodic high flows. Vegetation along the edges of the channel consists of creosote bush, Mojave yucca, Nevada ephedra, cholla, and non-native grasses. The bed is unvegetated. The low-flow channel was defined by sediment sorting and scour. The channel substrate is composed of sand and gravel.

Average overlapping OHWM/TOB width of the low flow channel was 2 to 4 feet. A total of approximately 0.07 acre of unvegetated ephemeral stream under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area.

Feature 71B

Feature 71B is a dense network of small braided channels flowing north. This large alluvial system drains to Ivanpah Lake. The narrow channels meander in and out of upland vegetation. Vegetation along the edges of the channel consists of creosote bush, Mojave yucca, Nevada ephedra, and sparse cholla. The low-flow channels are unvegetated. The low-flow channels were defined by sediment sorting and scour. The channel substrate is composed almost entirely of sand.

Average overlapping OHWM/TOB width of the low-flow channels was 1 to 5 feet. A total of approximately 0.42 acre of unvegetated ephemeral stream under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area. The exclusive CDFW jurisdiction associated with this feature totals approximately 0.04 acre of low terrace alluvial waters.

Feature 72B

Feature 72B consists of four small channels within a large, braided alluvial network draining northeast into Ivanpah Lake. Vegetation along the edges of the channel consists of creosote bush, Mojave yucca, Nevada ephedra, cholla, and non-native grasses. The channel bed is unvegetated. The low-flow channel was defined by sediment sorting and scour. The channel substrate is composed of sand and small gravel.

Average overlapping OHWM/TOB width of the low flow channel was 1 to 4 feet. A total of approximately 0.03 acre of unvegetated ephemeral stream under the jurisdiction of the USACE/RWQCB was delineated within the Survey Area. The exclusive CDFW jurisdiction associated with this feature totals approximately 0.04 acre of low terrace alluvial waters.

Features 73B, 74B, and 75B

Features 73B, 74B, and 75B are small, well-defined channels flowing to the northwest towards Ivanpah Lake. The larger drainages have been impacted by off road vehicle travel. Vegetation along the edges of the channels consists of creosote bush, Mojave yucca, Joshua trees, Nevada ephedra, cholla, and non-native grasses. The beds are unvegetated. The low-flow channels were defined by sediment sorting and scour. The channel substrate is composed of loose sand and small gravel.

Average overlapping OHWM/TOB width of the low flow channels was 14 feet. A total of approximately 0.29 acre of unvegetated ephemeral stream under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area. The exclusive CDFW jurisdiction associated with these features total 0.02 acre of low terrace alluvial waters.

Feature 76B

Feature 76B is part of a large, gently-sloping, braided alluvial system flowing north into Ivanpah Lake. The drainage flows past an abandoned house and has been impacted by off road vehicle travel within the channel. Vegetation along the edges of the channel consists of creosote bush, Nevada ephedra, cholla, and Mojave yucca. The bed is unvegetated. The low-flow channel was defined by sediment sorting and scour. The channel substrate is loose sand.

Average overlapping OHWM/TOB width of the low-flow channel was 7 feet. A total of approximately 0.03 acre of unvegetated ephemeral stream under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area.

Features 77B and 78B

Features 77B and 78B are narrow channels flowing north toward Ivanpah Lake. Vegetation along the edges of the channels consists of creosote bush, Nevada ephedra, cholla, and Mojave yucca. The beds are unvegetated. The low-flow channels were defined by sediment sorting and scour. The substrate is composed of sand and gravel.

Average overlapping OHWM/TOB width of the low-flow channels was 2 feet. A total of approximately 0.10 acre of unvegetated ephemeral stream under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area. The exclusive CDFW jurisdiction associated with these two features totals approximately 0.10-acre 0.14 acre of low terrace alluvial waters.

Features 79B and 80B

Features 79B and 80B are small narrow channels flowing north to Ivanpah Lake. Vegetation along the edges of the channels consists of creosote bush, Nevada ephedra, cholla, Mojave yucca, and non-native grasses. The beds are unvegetated. The low-flow channels were defined by sediment sorting and scour. The channel substrate is composed of sand.

Average overlapping OHWM/TOB width of the low-flow channels was 1 foot. A total of approximately 0.03 acre of unvegetated ephemeral stream under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area.

Feature 81B

Feature 81B is a dense network of small braided channels flowing north. This large alluvial system drains to Ivanpah Lake. The narrow channels meander in and out of upland vegetation. Vegetation along the edges of the channel consists of creosote bush, Nevada ephedra, cholla, Mojave yucca, and non-native grasses. The bed is unvegetated. The low-flow channel was defined by sediment sorting and scour. The channel substrate is composed of loose, sandy alluvial material interspersed with small gravel.

Average overlapping OHWM/TOB width of the low-flow channel was 2 to 3 feet. A total of approximately 0.27 acre of unvegetated ephemeral stream under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area.

Feature 82B

Feature 82B is large channel flowing to the west. This channel is incised 3-4 feet in some locations and is located on one of several points where the large alluvial system flows through a concrete box culvert under railroad tracks. Vegetation along the edges of the channel consists of creosote bush, burrobush, Nevada ephedra, cholla, Mojave yucca, and non-native grasses. The tributary bed is unvegetated. The tributary was defined by sediment sorting and scour. The channel substrate is composed of loose, sandy alluvial material interspersed with small gravel and cobbles.

Average overlapping OHWM/TOB width of the tributary was 16 feet. A total of approximately 0.13 acre of unvegetated ephemeral stream under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area. The exclusive CDFW jurisdiction associated with this feature totals approximately 0.0.03 acre of low terrace alluvial waters.

Feature 83B

Feature 83B consists of two small channels meandering through alluvial habitat and upland vegetation. Vegetation along the edges of the channel consists of creosote bush, burrobush, cholla, Mojave yucca, and non-native grasses. The bed is unvegetated. The low-flow channel was defined by sediment sorting and scour. The channel substrate is composed of loose, sandy alluvial material interspersed with small gravel.

Average overlapping OHWM/TOB width of the low-flow channel was 1 foot. A total of approximately 0.09 acre of unvegetated ephemeral stream under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area. The exclusive CDFW jurisdiction associated with this feature totals approximately 1.18 acres of low terrace alluvial waters.

Feature 84B

Feature 84B is dense network of braided channels draining into Ivanpah Lake to the northwest. The channels meander through upland vegetation such as creosote bush, burrobush, cholla, Mojave yucca, and non-native grasses. The bed is unvegetated. The low-flow channel was defined by sediment sorting and scour. The channel substrate is composed of loose sand and small gravel. Adjacent uplands contain areas of larger cobbles and gravel and portions become inundated during high-flow events.

Average overlapping OHWM/TOB width of the low-flow channels was 2 feet. A total of approximately 0.27 acre of unvegetated ephemeral stream under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area. The exclusive CDFW jurisdiction associated with this feature totals approximately 2.19 acres of low terrace alluvial waters.

Features 85B, 86B, and 87B

Features 85B, 86B, and 87B is network of narrow, meandering braided channels flowing northwest. The channels are small, shallow, and meander through upland vegetation such as creosote bush, burrobush, cholla, Mojave yucca, desert needlegrass, and non-native grasses. The channel beds are unvegetated. The low-flow channels were defined by sediment sorting and scour. The channel substrate is composed of gravel and cobble on a bed of coarse sand.

Average overlapping OHWM/TOB width of the tributaries was 1 to 10 feet. A total of approximately 0.20 acre of unvegetated ephemeral stream under the jurisdiction of the USACE/RWQCB/CDFW was delineated within the Survey Area. The exclusive CDFW jurisdiction associated with this feature totals approximately 0.05 acre of low terrace alluvial waters.

Features 88B and 89B

Features 88B and 89B are braids of a large named blue line drainage, the Big Tiger Wash, flowing west along Nipton Road. Big Tiger Wash receives high flows from steep mountains to the north, south, and east. The channels are incised approximately 4-5 feet in some reaches. Vegetation along the edges of the channels consists of creosote bush, rubber rabbitbrush, cholla, scale broom, tamarisk, catclaw acacia, and non-native grasses. The beds are sparsely vegetated with catclaw acacia. The tributaries were defined by sediment sorting, and scour. The substrate of the channels is composed of loose, sandy material interspersed with small gravel and large cobbles.

Average width of the tributaries was 55 feet. The portion of the Survey Area within these features is located within the State of Nevada. This drainage flows across the Nevada-California state line. The overlapping USACE and NDEP jurisdiction associated with these two features totals approximately 2.30 acres of unvegetated ephemeral streams.

Feature 90B

Feature 90B is part of a gently-sloping, braided drainage system flowing west into Big Tiger Wash. The tributaries drain steep mountains to the north, south, and east of Big Tiger Wash. Vegetation along the edges of the channel consists of creosote bush, burrobush, cholla, Mojave yucca, desert needlegrass, and non-native grasses. The tributary was defined by sediment sorting, wracking, and scour. The substrate is composed of loose, sandy material interspersed with small gravel and large cobbles.

Average width of the tributary was between 1 and 10 feet. The portion of the Survey Area within this feature is located within the State of Nevada. The overlapping USACE and NDEP jurisdiction associated with this feature totals approximately 0.17 acre of non-wetland WOUS.

5.5 Summary of Potential Jurisdiction

5.5.1 Waters of the U.S. and State of California

Approximately 55.92 acres (composed of ninety-two [92] individual aquatic features) were delineated within the Survey Area as potential waters of the U.S. and state of California under the regulatory purview of USACE, RWQCB, and CDFW. No federally defined wetland occurred within the Survey Area. A summary of the water's acreage and type, itemized by feature, is provided in Table 2, below.

TABLE 2: WATERS OF THE U.S. AND STATE OF CALIFORNIA UNDER THE REGULATORY PURVIEW OF USACE, RWQCB, AND CDFW

Feature Name	Waters of the U.S. and State of California under the Regulatory Purview of CDFW, RWQCB, and USACE		
	Type of Feature	Acres	Linear Feet
Feature 1A	Unvegetated Ephemeral Dry Wash	0.35	1524.64
Feature 2A	Unvegetated Ephemeral Dry Wash	0.19	1276.75
Feature 3A	Unvegetated Ephemeral Dry Wash	0.33	1235.70
Feature 4A	Playa Lake (Troy Dry Lake)	15.69	N/A
Feature 1B	Unvegetated Ephemeral Dry Wash	0.01	234.95
Feature 2B	Unvegetated Ephemeral Dry Wash	0.17	304.87
Feature 3B	Unvegetated Ephemeral Dry Wash	0.05	363.78
Feature 5B	Unvegetated Ephemeral Dry Wash	3.36	3449.82
Feature 6B	Unvegetated Ephemeral Dry Wash	0.06	587.05
Feature 7B	Unvegetated Ephemeral Dry Wash	0.01	136.48
Feature 8B	Unvegetated Ephemeral Dry Wash	0.01	34.51
Feature 9B	Unvegetated Ephemeral Dry Wash	0.02	333.88
Feature 10B	Unvegetated Ephemeral Dry Wash	0.02	240.06
Feature 11B	Unvegetated Ephemeral Dry Wash	0.002	84.91
Feature 12B	Unvegetated Ephemeral Dry Wash	0.001	34.46
Feature 13B	Unvegetated Ephemeral Dry Wash	0.49	281.13
Feature 14B	Unvegetated Ephemeral Dry Wash	0.02	384.02
Feature 15B	Unvegetated Ephemeral Dry Wash	0.27	503.89
Feature 16B	Unvegetated Ephemeral Dry Wash	0.02	449.36
Feature 17B	Unvegetated Ephemeral Dry Wash	0.04	1327.34
Feature 18B	Unvegetated Ephemeral Dry Wash	0.01	228.77
Feature 19B	Unvegetated Ephemeral Dry Wash	2.06	374.20
Feature 20B	Unvegetated Ephemeral Dry Wash	0.04	603.80
Feature 21B	Unvegetated Ephemeral Dry Wash	0.03	303.29
Feature 22B	Unvegetated Ephemeral Dry Wash	0.22	241.73
Feature 23B	Unvegetated Ephemeral Dry Wash	0.19	228.78
Feature 24B	Unvegetated Ephemeral Dry Wash	0.40	939.55
Feature 25B	Unvegetated Ephemeral Dry Wash	0.34	584.43
Feature 26B	Unvegetated Ephemeral Dry Wash	0.07	1100.67
Feature 27B	Unvegetated Ephemeral Dry Wash	0.49	4156.12
Feature 27B	Vegetated Ephemeral Dry Wash	1.0	N/A
Feature 28B	Unvegetated Ephemeral Dry Wash	0.01	77.38
Feature 29B	Unvegetated Ephemeral Dry Wash	0.04	189.12
Feature 30B	Unvegetated Ephemeral Dry Wash	0.09	161.37
Feature 31B	Unvegetated Ephemeral Dry Wash	0.05	456.39
Feature 32B	Unvegetated Ephemeral Dry Wash	0.15	600.67
Feature 34B	Unvegetated Ephemeral Dry Wash	0.06	85.67
Feature 35B	Unvegetated Ephemeral Dry Wash	15.70	596.30
Feature 35B	Vegetated Ephemeral Dry Wash	1.66	N/A
Feature 36B	Unvegetated Ephemeral Dry Wash	0.10	1095.48
Feature 37B	Unvegetated Ephemeral Dry Wash	0.05	213.59
Feature 38B	Unvegetated Ephemeral Dry Wash	0.12	422.95
Feature 39B	Unvegetated Ephemeral Dry Wash	0.59	161.37
Feature 40B	Unvegetated Ephemeral Dry Wash	0.18	1010.97
Feature 41B	Unvegetated Ephemeral Dry Wash	0.02	432.65
Feature 42B	Unvegetated Ephemeral Dry Wash	0.04	435.39
Feature 43B	Unvegetated Ephemeral Dry Wash	0.34	2748.59
Feature 44B	Unvegetated Ephemeral Dry Wash	0.06	902.15
Feature 45B	Unvegetated Ephemeral Dry Wash	0.01	278.52

Feature Name	Waters of the U.S. and State of California under the Regulatory Purview of CDFW, RWQCB, and USACE		
	Type of Feature	**Acres**	**Linear Feet**
Feature 46B	Unvegetated Ephemeral Dry Wash	0.003	120.32
Feature 47B	Unvegetated Ephemeral Dry Wash	0.002	105.31
Feature 48B	Unvegetated Ephemeral Dry Wash	0.07	1295.91
Feature 49B	Unvegetated Ephemeral Dry Wash	0.01	554.15
Feature 50B	Unvegetated Ephemeral Dry Wash	0.02	309.85
Feature 51B	Unvegetated Ephemeral Dry Wash	0.03	524.69
Feature 52B	Unvegetated Ephemeral Dry Wash	0.01	269.53
Feature 53B	Unvegetated Ephemeral Dry Wash	0.02	421.06
Feature 54B	Unvegetated Ephemeral Dry Wash	0.004	164.43
Feature 55B	Unvegetated Ephemeral Dry Wash	0.01	143.16
Feature 56B	Unvegetated Ephemeral Dry Wash	0.13	1634.84
Feature 57B	Unvegetated Ephemeral Dry Wash	0.02	466.23
Feature 58B	Unvegetated Ephemeral Dry Wash	0.12	532.74
Feature 59B	Unvegetated Ephemeral Dry Wash	0.01	264.16
Feature 60B	Unvegetated Ephemeral Dry Wash	0.01	269.77
Feature 61B	Unvegetated Ephemeral Dry Wash	0.02	854.55
Feature 62B	Unvegetated Ephemeral Dry Wash	0.04	1204.83
Feature 63B	Unvegetated Ephemeral Dry Wash	0.01	210.69
Feature 64B	Unvegetated Ephemeral Dry Wash	0.02	75.52
Feature 65B	Unvegetated Ephemeral Dry Wash	0.02	225.42
Feature 66B	Unvegetated Ephemeral Dry Wash	0.99	3937.77
Feature 66B	Vegetated Ephemeral Dry Wash	4.69	N/A
Feature 67B	Unvegetated Ephemeral Dry Wash	0.02	452.76
Feature 68B	Unvegetated Ephemeral Dry Wash	0.004	195.32
Feature 69B	Unvegetated Ephemeral Dry Wash	0.03	227.10
Feature 70B	Unvegetated Ephemeral Dry Wash	0.07	891.56
Feature 71B	Unvegetated Ephemeral Dry Wash	0.42	4551.74
Feature 72B	Unvegetated Ephemeral Dry Wash	0.03	968.59
Feature 73B	Unvegetated Ephemeral Dry Wash	0.06	198.62
Feature 74B	Unvegetated Ephemeral Dry Wash	0.06	1212.48
Feature 75B	Unvegetated Ephemeral Dry Wash	0.17	494.51
Feature 76B	Unvegetated Ephemeral Dry Wash	0.03	241.68
Feature 77B	Unvegetated Ephemeral Dry Wash	0.01	215.79
Feature 78B	Unvegetated Ephemeral Dry Wash	0.09	451.77
Feature 79B	Unvegetated Ephemeral Dry Wash	0.01	497.15
Feature 80B	Unvegetated Ephemeral Dry Wash	0.01	311.48
Feature 81B	Unvegetated Ephemeral Dry Wash	0.27	5150.85
Feature 82B	Unvegetated Ephemeral Dry Wash	0.13	403.16
Feature 83B	Unvegetated Ephemeral Dry Wash	0.09	483.53
Feature 84B	Unvegetated Ephemeral Dry Wash	0.27	4897.78
Feature 85B	Unvegetated Ephemeral Dry Wash	0.01	191.73
Feature 86B	Unvegetated Ephemeral Dry Wash	0.02	288.66
Feature 87B	Unvegetated Ephemeral Dry Wash	0.17	3891.90
Total		**53.45**	**76,768.76**

5.5.2 WATERS OF THE STATE OF CALIFORNIA, EXCLUSIVELY

Thirty-seven (37) features were identified within the Project that fall under the exclusive regulatory purview of CDFW. Exclusive CDFW jurisdiction totals 36.67 acres, consisting of approximately 36.26 acres of alluvial low terrace, approximately 0.15 acre of unvegetated streambank, and approximately 0.25 acre of riparian extent. A summary of CDFW exclusive waters by acreage and type, itemized by feature, is provided in Table 3

TABLE 3: WATERS OF THE STATE OF CALIFORNIA UNDER THE EXCLUSIVE REGULATORY PURVIEW OF CDFW

Feature Name	Type of Feature	Acres
2B	Alluvial Low Terraces	1.26
3B	Alluvial Low Terraces	0.20
6B	Streambanks	0.05
7B	Streambanks	0.01
8B	Streambanks	0.01
9B	Alluvial Low Terraces	0.14
10B	Alluvial Low Terraces	0.19
15B	Alluvial Low Terraces	0.59
16B	Alluvial Low Terraces	0.01
18B	Alluvial Low Terraces	0.01
20B	Alluvial Low Terraces	3.15
21B	Alluvial Low Terraces	1.24
24B	Alluvial Low Terraces	1.94
27B	Alluvial Low Terraces	0.08
30B	Alluvial Low Terraces	0.86
32B	Alluvial Low Terraces	0.43
34B	Alluvial Low Terraces	3.52
35B	Alluvial Low Terraces	4.90
36B	Streambanks	0.03
37B	Streambanks	0.05
38B	Alluvial Low Terraces	1.30
39B	Alluvial Low Terraces	1.33
42B	Alluvial Low Terraces	2.13
43B	Alluvial Low Terraces	7.10
56B	Alluvial Low Terraces	1.23
58B	Alluvial Low Terraces	0.18
63B	Alluvial Low Terraces	0.55
64B	Riparian Extent	0.25
69B	Alluvial Low Terraces	0.23
71B	Alluvial Low Terraces	0.04
72B	Alluvial Low Terraces	0.04
75B	Alluvial Low Terraces	0.02
78B	Alluvial Low Terraces	0.14
82B	Alluvial Low Terraces	0.03
83B	Alluvial Low Terraces	1.18
84B	Alluvial Low Terraces	2.19
87B	Alluvial Low Terraces	0.05
Total		**36.67**

5.5.2 WATERS OF U.S. AND STATE OF NEVADA WATERS

Three (3) features identified within the Survey Area in Nevada potentially fall under the regulation of USACE and NDEP. A total of approximately 2.47 acres of non-wetland WOUS were identified. A summary of the USACE/NDEP jurisdiction including water's acreage, itemized by feature, is provided in Table 4.

TABLE 4: WATERS OF THE U.S. AND STATE OF NEVADA UNDER THE REGULATORY PURVIEW OF USACE AND NDEP

Feature Name	Waters of the U.S. and State of Nevada under the Regulatory Purview of USACE and NDEP		
	Type of Feature	**Acres**	**Linear Feet**
Feature 88B	Unvegetated Ephemeral Dry Wash	0.92	512.43
Feature 89B	Unvegetated Ephemeral Dry Wash	1.38	701.51
Feature 90B	Unvegetated Ephemeral Dry Wash	0.17	1350.66
Total		**2.47**	**2564.62**

5.6 Preliminary Jurisdictional Determination for Waters of the U.S.

Based on USACE Regulatory Guidance Letter (RGL) 16-01 (Jurisdictional Determinations), the permit applicant may elect to use a Preliminary JD (PJD) to move ahead expeditiously to obtain CWA Section 404 permit authorization where applicants determine that is in their best interest to do so. A PJD may include the delineation limit of all aquatic resources on a parcel(s); however, a PJD does not determine the jurisdictional status of these delineated aquatic resources. When USACE issues a PJD or authorizes a regulated activity based on a PJD, USACE is making no legally binding determination of any type regarding whether jurisdiction exists over the delineated aquatic resource under review.

PJDs do not make an official determination of jurisdictional waters and are non-binding advisements that potential WOUS may be present within a site and therefore should be assumed to be jurisdictional by USACE. A PJD is not appealable under the USACE appeal process because it is not an official JD (e.g., Approved JD [AJD]). If a PJD is received by USACE, an AJD can always be requested by the applicant at a later time, if necessary. PJDs cannot be used for determining whether a site has no aquatic features, no potential jurisdictional WOUS (including wetlands), geographically isolated waters and/or wetlands, or some jurisdictional and some non-jurisdictional waters.

Per RGL 16-01, the USACE generally does not issue a JD of any type where no JD has been requested and there are certain circumstances in which a JD would not be necessary (such as authorizations by non-reporting Nationwide Permits [NWPs]). In some circumstances jurisdictional questions may not arise. Unless a JD is specifically requested by the prospective permittee, USACE will generally not conduct a JD. If the prospective permittee requests a JD, USACE will provide one. However, the prospective permittee should be aware that completion of a JD associated with a permit application may lengthen the processing time for rendering a final permit decision.

Pursuant to Item 1 of the USACE Los Angeles District (LAD) March 16, 2017 Special Public Notice (LAD March 2017 SPN) *Minimum Standards for Acceptance of Aquatic Resources Delineation Reports*, the applicant (SCE) is requesting a PJD (USACE 2017a). The prepared and signed LAD March 2017 SPN *Appendix 1-Request for Corps Jurisdictional Determination (JD) sheet* and LAD March 2017 SPN *Appendix 2-Preliminary Jurisdictional Determination (PJD) Form* are located in Appendix C.

This JDR and prepared PJD (Appendix C) are meant to provide assistance and support to USACE LAD (Los Angeles and San Bernardino Counties Section)[13] to determine that approximately 132.42 acres of delineated aquatic features (in the form of wetlands and other waters) "may be" WOUS and, thus, under its regulatory administration. For this jurisdictional delineation, the PJD Form was prepared to present the following:

- 40.23 acres of aquatic features (in the form of federally defined "other waters" [composed of non-wetland, non-navigable, ephemeral tributary]) that "may be" jurisdictional WOUS.

[13] The USACE district engineer retains the discretion to use an AJD in any other circumstance where it is determined appropriate given the facts of the particular case.

- 15.69 acres of aquatic feature (in the form of federally defined “other waters” [composed of non-wetland, non-navigable, playa lake]) that “may be” jurisdictional WOUS.

The completed Request for Corps Jurisdictional Determination and Preliminary JD Form for this jurisdictional delineation is located in Appendix C.

5.7 ORM Waters Bulk Upload Sheet for Delineated Aquatic Resources

Pursuant to Item 15 of the USACE LAD *Minimum Standards for Acceptance of Aquatic Resources Delineation Reports*, for sites with three 3 or more separate aquatic features a completed copy of the Operations Regulatory Module (ORM) Bulk Upload Aquatic Resources or Consolidated Excel spreadsheet must be submitted (USACE 2017a). A separate hardcopy and electronic version of the Waters Upload Sheet (collectively containing all formally delineated potentially jurisdictional waters) is provided in Appendix D of this JDR. The electronic file version is provided so that USACE can automatically populate the data fields in its ORM database, as needed and applicable.

6.0 ANTICIPATED IMPACTS

No temporary or permanent placement structures, excavation, or grading within waters of the U.S. or states of California and Nevada are proposed as part of the Project. Therefore, no permanent impacts to jurisdictional waters are anticipated as a result of this project.

Where unavoidable, Project-related access will utilize unvegetated portions of the drainages subject to seasonal surface flows. Impact avoidance and minimization measures to jurisdictional waters shall implemented during the construction process to the greatest extent feasible.

It is anticipated that planned and limited vehicular crossings of unvegetated and disturbed ephemeral tributaries and dry washes (as a result of recreational off-highway vehicle use) may not be considered a regulated activity within WOUS and WOS under the purview of USACE and RWQCB (e.g., planned and limited vehicular crossing will not result in a grade change or the discharge of dredge or fill or pollutants into ephemeral tributaries and dry washes), or CDFW (e.g., planned and limited vehicular crossing may not result in diverting, obstructing, depositing or disposing of material or changing the bed, channel or bank of any ephemeral tributaries and dry washes that would result in a substantially, adversely affect fish and wildlife resources).

In features with upland or riparian vegetation, vehicles may travel over vegetation, crushing the scattered shrubs while preserving the seed bank and roots. Minor/incidental vegetation trimming may be required to for a 12-foot wide access corridor and 50-foot wide work and turn around area. No grading or blading is proposed. All native vegetation along the access routes and at the pulling sites will be avoided to the greatest extent feasible. All helicopter landing areas will avoid riparian vegetation. Long term effects to native vegetation from access-related temporary impacts are not anticipated. Following the work, the vegetation would undergo self-recovery. For the purposes of this analysis, impacts to features with vegetation have been described as temporary.

The Proposed Project would require access to wire-setup or pulling locations that would temporarily cross or access into regulated USACE WOUS, RWQCB WOS, and CDFW Streambed. Multiple site visits between SCE construction and EI have resulted in the reduction and/or elimination of proposed crossings and access areas within the USACE, RWQCB, and CDFW regulated features. The proposed access routes as displayed on Appendix A, Exhibit 5 (Proposed Impacts) have been sited to avoid and minimize impacts to drainages and vegetation to the greatest extent possible.

No impacts to NDEP waters are anticipated. Temporary impacts related to Project access within USACE/RWQCB/CDFW regulated waters totals approximately 0.24. Temporary impacts related to Project access within exclusive CDFW regulated waters total approximately 0.35 acre. A summary of the temporary impacts by drainage feature and jurisdiction is provided in Table 5 and Table 6, below.

TABLE 5: ANTICIPATED TEMPORARY IMPACTS TO WATERS OF THE U.S. AND STATE OF CALIFORNIA UNDER THE PURVIEW OF USACE, RWQCB, AND CDFW

Feature Name	Feature Type	Acres	Linear Feet	Tower
Feature 5B	Unvegetated Ephemeral Dry Wash	0.01	47	M71-T3
Feature 16B	Unvegetated Ephemeral Dry Wash	0.01	234	M78-T1
Feature 17B	Unvegetated Ephemeral Dry Wash	0.001	43	M78-T1
Feature 18B	Unvegetated Ephemeral Dry Wash	≤0.003	58	M78-T2
Feature 25B	Unvegetated Ephemeral Dry Wash	0.02	26	M84-T6
Feature 27B	Unvegetated Ephemeral Dry Wash	0.02	131	M88-T2
Feature 35B	Unvegetated Ephemeral Dry Wash	0.03	45	M105-T1
Feature 43B	Unvegetated Ephemeral Dry Wash	≤0.002	43	M111-T5
Feature 49B	Unvegetated Ephemeral Dry Wash	≤0.001	20	M115-T1
Feature 51B	Unvegetated Ephemeral Dry Wash	0.02	291	M118-T1
Feature 66B	Unvegetated Ephemeral Dry Wash	0.11	346	M134-T2
Feature 71B	Unvegetated Ephemeral Dry Wash	0.01	85	M137-T3
Feature 81B	Unvegetated Ephemeral Dry Wash	≤0.001	30	M144-T3
Feature 84B	Unvegetated Ephemeral Dry Wash	0.01	199	M147-T4
Total		**0.24**	**1599**	

TABLE 6: ANTICIPATED TEMPORARY IMPACTS TO WATERS OF THE STATE OF CALIFORNIA UNDER THE EXCLUSIVE REGULATORY PURVIEW CDFW

Feature Name	Feature Type	Acres	Tower
Feature 16B	Alluvial Low Terraces	≤0.01	M78-T1
Feature 18B	Alluvial Low Terraces	≤0.003	M78-T2
Feature 20B	Alluvial Low Terraces	0.07	M81-T3
Feature 27B	Alluvial Low Terraces	≤0.004	M88-T2
Feature 43B	Alluvial Low Terraces	0.20	M111-T5
Feature 71B	Alluvial Low Terraces	≤0.002	M137-T3
Feature 84B	Alluvial Low Terraces	0.08	M147-T4
Total		**0.35**	

6.1 Avoidance and Minimization of Potential Impacts

The Proposed Project, as designed and described, will not result in permanent impacts to regulated waters (e.g., the Proposed Project proposes no placement of structures, excavation, filling, or grading within jurisdictional waters). Temporary impact avoidance and minimization measures to jurisdictional waters of the U.S. and state have been implemented through project design and shall be reasonably applied during the construction process to reduce potential impacts to jurisdictional aquatic features to the greatest practicable extent.

7.0 ANTICIPATED AUTHORIZATIONS AND PERMITTING

Based on the results of this delineation, the Proposed Project description, and an impact analysis of a minimum 75% complete project plans, it is anticipated that the Proposed Project will result in temporarily impacting approximately 0.24 acre of Jurisdictional Waters of the U.S. and state of California under the purview of USACE, RWQCB, and CDFW (Table 5; Exhibit 5) and approximately 0.35 acre of jurisdictional WOS, under the exclusive purview of CDFW (Table 6; Exhibit 5).

Prior to the commencement of any proposed regulated activity that would result in unavoidable impacts to jurisdictional waters of the U.S. or state (including federally defined wetland and other sensitive aquatic habitats) issuance of (and compliance with) the following authorizations and permits by the following federal and state resource agencies is required:

1. USACE CWA Section 404 authorization for discharge (placement) of dredged or fill material within waters of the U.S.;
2. RWQCB CWA Section 401 state water quality certification for an action that may result in the discharge of pollutants into waters of the U.S. and state; and
3. CFGC Section 1600 *et seq.* Lake and Streambed Alteration Agreement if planned activities would result in the substantial, adverse impacts the bed and/or bank (including the associated riparian extent) of a stream (waters of the state, exclusively).

7.1 CWA Section 404 Permitting

CWA Section 404 establishes a program which regulates the discharge of dredge or fill material into WOUS. The program is jointly administered by USACE and USEPA. USACE is responsible for regulatory administration (i.e., permitting) and USEPA provides program oversight. The fundamental rationale of the program is that no discharge of dredged or fill material into a federally jurisdictional water (including wetlands) should be permitted if there is a practicable alternative that would be less damaging to aquatic resources or if significant degradation would occur to WOUS.

For projects that require authorization from USACE, USACE LAD recognizes that, in addition to the discharge of dredged or fill into WOUS, any activity that may result in the reductions of aquatic resource functions, values, and/or services that would result in the project having more than minimal impacts would require all direct, indirect, and ancillary impacts (e.g., shading) to be avoided, minimized, and mitigated when appropriate.

If the Proposed Project does not result in the loss of 0.5-acre of jurisdictional WOUS and/or results in any type of impact of a federally jurisdictional vernal pool; based upon the USACE's March 22, 2017 *Reissuance of Nationwide Permits and Issuance of Final Regional Conditions for the Los Angeles District* (USACE 2017b), it is anticipated that the USACE may recommend authorizing the Proposed Project under the CWA Section 404 NWP Program (33 CFR 330).[14] Specifically, it is anticipated that the USACE will recommend authorizing this project under Section 404 by complying with NWP 12 (Utility Line Activities)[15]

7.2 CWA Section 401 Water Quality Certification

RWQCB regulates discharges related to federal and state water quality standards and beneficial use toward WOS; RWQCB may also consider ancillary impacts to WOUS (including wetlands) as part of its review under Section 401 of the CWA.

For Section 401 State Water Quality Certification/Waiver for an action that may result in degradation of WOS under Section 401 of the CWA, RWQCB implements the water quality certification process for any activity that requires a federal permit or license and that may result in the discharge of fill into WOUS (which include wetlands). RWQCB reviews the proposal to determine whether the activity would comply with state water quality objectives and, subsequently, will either issue a certification with conditions or deny the certification. According to the CWA, water quality standards include beneficial uses, water quality objectives, and complying with USEPA's anti-degradation policy.[16]

[14] Although CWA Section 404 authorization through the NWP program is for the loss of jurisdictional waters resulting from the discharge of dredge or fill material (33 CFR 323), the USACE reserves the right (i.e., discretion) to modify, suspend, or revoke NWP authorizations (33 CFR 330[e]).

[15] Provided the proposed activity meets all terms and conditions of the selected NWP (33 CFR 330.1[c]).

[16] 40 CFR Part 131.12.

In many cases, the conditions of the RWQCB CWA Section 401 certification are more stringent than the CWA Section 404 permit. All parties proposing to discharge waste that could affect WOS, but do not affect federal waters (which requires a CWA Section 404 permit *and* CWA Section 401 certification), must file a Report of Waste Discharge with the appropriate RWQCB.[17]

The application for CWA Section 401 Water Quality Certification would be submitted to Lahontan Regional Water Quality Control Board (RWQCB [Region 6]), for the Proposed Project concurrently with the submittal of the General CWA Section 404 permit.

It is anticipated that this project may qualify for SWRCB General Order for authorization of NWP 12 (e.g., Pre-Certified 401). If the applicant (SCE) shall pursue a Pre-Certified 401 for NWP 12 a Notice of Intent (NOI) will be prepared and submitted to RWQCB Region 6 or the SWRCB.

7.3 CFGC Section 1600 *et seq*. Permitting

A submission of a Notification of Lake or Streambed Alteration to the CDFW Inland Deserts Region Field office for the Proposed Project may be required. Submitting the Lake or Streambed Alteration Notification to the CDFW Inland Deserts Region for the Project allows CDFW to determine whether aquatic features, under their regulatory purview will become 'substantially, adversely affected' under by the proposed Project activities, and to provide guidance on requisite and appropriate compensatory mitigation for any unavoidable impacts to these aquatic resources as a result of the Proposed Project.

7.4 Compensatory Mitigation

No compensatory mitigation for temporary impacts to jurisdictional waters (as a result of vehicle crossings and/or wire-setup or transmission pulling/stringing locations) is proposed. SCE proposes to recontour all temporary impacts with hand tools (e.g., shovels and rakes) to as close to pre-project conditions as possible and anticipates all temporary impacts will self-recover. All temporarily disturbed topsoil (for seedbank) will be preserved and recontoured on site and at the conclusion of each activity.

[17] CWC Section 13260.

8.0 REFERENCES

Brady, R. H. III, and K. Vyverberg. 2014. Methods to Describe and Delineate Episodic Stream Processes on Arid Landscapes for Permitting Utility-Scale Solar Power Plants. California Energy Commission. Publication Number: CEC-500-2014-013.

California Department of Fish and Game (CDFG). 2010. A Review of Stream Processes and Forms in Dryland Watersheds. Ecosystem Conservation Division. Sacramento, California. December. Prepared by Kris Vyverberg, CDFG Senior Engineering Geologist.

California Resources Agency. 1969. Porter-Cologne Water Quality Control Act. California Water Code, Section 13000 et seq.: "Water Quality." Environmental Law Institute. 2007. The Clean Water Act Jurisdictional Handbook. 2007 Edition. Washington, D.C.

Cowardin, L., V. Carter, F. Golet, and E. LaRoe. 1979. *Classification of Wetlands and Deepwater Habitats of the United States.* U.S. Department of Interior. U.S. Fish and Wildlife Service. FWS/OBS-79/31. December.

Environmental Intelligence (EI). 2017. Habitat and Resource Assessment: Lugo-Victorville 500-Kv Transmission Line Remedial Action Scheme Project.

Federal Emergency Management Agency (FEMA). 2017. National Flood Hazard Layer. Accessed online at:https://hazards-fema.maps.arcgis.com/apps/webappviewer/index.html?id=8b0adb51996444d4879338b5529aa9cd on January 24, 2018.

Google. 2017. Aerial as taken: November, 2003 through January, 2016. Online.

Nevada Division of Environmental Protection (NDEP). 2008. Fact Sheet Pursuant to NAC 445A 236 for Reliant Energy Wholesale Generation LLC. Pennittee Bighorn Generating Station. Las Vegas Nevada. Permit NEV2002500.

Natural Resources Conservation Services (NRCS). 2017a. Web Soil Survey. Online. http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx.

Natural Resources Conservation Services (NRCS). 2017b. Watershed Boundary Dataset. Online. https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/water/watersheds/dataset/.

Regional Water Quality Control Board (RWQCB) 1993. Water Quality Control Plan Lahontan Basin Region 6 (as amended). March. Available at: https://www.waterboards.ca.gov/lahontan/water_issues/programs/basin_plan/. Accessed August 2017.

Sawyer, J.O., and T. Keeler-Wolf. 2009. A Manual of California Vegetation, Second Edition. California Native Plant Society, Sacramento, California. Federal species occurrence database maintained by the Carlsbad Fish and Wildlife Office (CFWO 2016).

U.S. Army Corps of Engineers (USACE). 1987. USACE of Engineers Wetlands Delineation Manual. U.S. Army Corps of Engineers Waterways Experiment Station. Vicksburg, MS.

U.S. Army Corps of Engineers (USACE). 2008a. Regional Supplement to the USACE of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0), ed. J. S. Wakeley, R. W. Lichvar, and C. V. Noble. ERDC/EL TR-08-28. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

U.S. Army Corps of Engineers (USACE). 2010. Updated Datasheet for the Identification of the Ordinary High-Water Mark (OHWM) in the Arid West Region of the Western United States. Publication ERDC/CRREL TN-10-1 by K.E. Curtis and R.W. Lichvar. Dated July 2010.

U.S. Army Corps of Engineers (USACE). 2008. A Field Guide to the Identification of the Ordinary High-Water Mark (OHWM) in the Arid West Region of the Western United States. Publication ERDC/CRREL TR-08-12 by R.W. Lichvar and S.M. McColley. Dated August 2008.

U.S. Army Corps of Engineers (USACE). 2008b. A Field Guide to the Identification of the Ordinary High-Water Mark (OHWM) in the Arid West Region of the Western United States, R. W. Lichvar, and S. M. McColley. ERDC/ CRREL TR-08-12. Hanover, NH: U.S. Army Engineer Research and Development Center.

U.S. Army Corps of Engineers (USACE). 2009. Approved Jurisdictional Determination Form. Sacramento District, Ivanpah Airport Site, Ivanpah Lake Playa, SPK-2004-50472.

U.S. Army Corps of Engineers (USACE). 2010. Determination regarding requirement for Department of the Army Permit. Prado Dam Field Office. Corona, California. File No. SPL-2010-00382.

U.S. Army Corps of Engineers (USACE). 2012. Approved Jurisdictional Determination Form. Los Angeles District, Stateline Solar Farm Project, SPL-201-01051-SLP, JD-1.

U.S. Army Corps of Engineers (USACE). 2013. Approved Jurisdictional Determination Form. Los Angeles District, Soda Mountain Solar Project, SPL-2010-01042-SLP.

U.S. Department of Agriculture (USDA). 2016. Field Indicators of Hydric Soils in the United States, Version 8.0. L.M. Vasilas, G.W. Hurt, and J.F. Berkowitz (eds.). USDA, NRCS, in cooperation with the National Technical Committee for Hydric Soils.

U.S. Army Corps of Engineers (USACE). 2017a. Special Public Notice: *Minimum Standards for Acceptance of Aquatic Resources Delineation Reports*. Los Angeles District. March 16. Available at:https://www.spl.usace.army.mil/Portals/17/Users/251/43/2043/Final%20Delin%20report%20standards%203-16-2017.pdf?ver=2017-03-16-170513-523. Accessed August 2019.

U.S. Army Corps of Engineers (USACE). 2017b. Special Public Notice: *Reissuance of The Nationwide Permits and Issuance of Final Regional Conditions for the Los Angeles District*. Available at: https://www.spl.usace.army.mil/Portals/17/Users/251/43/2043/22%20mar%202017%20PN%20announcing%202017%20NWPs%20and%20final%20RCs.pdf?ver=2017-03-22-172458-817. March 22. Accessed August 2019.

U.S. Environmental Protection Agency (USEPA). 2008. Clean Water Act Jurisdiction Following the U.S. Supreme Court's Decision in Rapanos v. United States & Carabell v. United States.

U.S. Environmental Protection Agency (USEPA). 1989. Memorandum Between the Department of the Army and The Environmental Protection Agency.

U.S. Fish and Wildlife Service (USFWS). 2017. National Wetlands Inventory Mapper Application. Online. Accessed July 2017.

U.S. Geological Survey (USGS). 1967. Broadwell Lake Quadrangle Topographic Map (7.5-minute series), 1 sheet.

U.S. Geological Survey (USGS). 1982. Hector Quadrangle Topographic Map (7.5-minute series), 1 sheet.

U.S. Geological Survey (USGS). 1983a. Cima Quadrangle Topographic Map (7.5-minute series), 1 sheet.

U.S. Geological Survey (USGS). 1983b. Cima Dome Quadrangle Topographic Map (7.5-minute series), 1 sheet.

U.S. Geological Survey (USGS). 1983c. Cowhole Mountain Quadrangle Topographic Map (7.5-minute series), 1 sheet.

U.S. Geological Survey (USGS). 1983d. Indian Spring Quadrangle Topographic Map (7.5-minute series), 1 sheet.

U.S. Geological Survey (USGS). 1983e. Ivanpah Quadrangle Topographic Map (7.5-minute series), 1 sheet.

U.S. Geological Survey (USGS). 1983f. Joshua Quadrangle Topographic Map (7.5-minute series), 1 sheet.

U.S. Geological Survey (USGS). 1983g. Marl Mountains Topographic Map (7.5-minute series), 1 sheet.

U.S. Geological Survey (USGS). 1983h. Nipton Topographic Map (7.5-minute series), 1 sheet.

U.S. Geological Survey (USGS). 1983i. Old Dad Mountain Topographic Map (7.5-minute series), 1 sheet.

U.S. Geological Survey (USGS). 1983j. Soda Lake South Quadrangle Topographic Map (7.5-minute series), 1 sheet.

U.S. Geological Survey (USGS). 1983k. West of Broadwell Mesa Topographic Map (7.5-minute series), 1 sheet.

U.S. Geological Survey (USGS). 1984. Crescent Peak Quadrangle Topographic Map (7.5-minute series), 1 sheet.

U.S. Geological Survey (USGS). 1985. Broadwell Mesa Quadrangle Topographic Map (7.5-minute series), 1 sheet.

U.S. Geological Survey (USGS). 2012. Newberry Springs Topographic Map (7.5-minute series), 1 sheet.

U.S. Geological Survey (USGS). 2012. Troy Lake Topographic Map (7.5-minute series), 1 sheet.

U.S. Geological Survey (USGS). 2018. Lavic Lake Topographic Map (7.5-minute series), 1 sheet.

U.S. Geological Survey (USGS). 2018. Ludlow Topographic Map (7.5-minute series), 1 sheet.

U.S. Geological Survey (USGS). 2018. Minneola Topographic Map (7.5-minute series), 1 sheet.

U.S. Geological Survey (USGS). 2018. Sleeping Beauty Topographic Map (7.5-minute series), 1 sheet.

Vyverberg, K. 2010. Project Conservation Challenges in a Dryland Stream Environment. Presentation at Episodic Streams: Imperatives for Assessment and Environmental Planning in California. Southern

California Coastal Water Research Project (SCCWRP). Costa Mesa, California. Available at: http://www.waterboards.ca.gov/water_issues/
programs/academy/courses/episdc_streams/krisvyverbery.pdf. Accessed May 2017.

APPENDIX A:

EXHIBITS

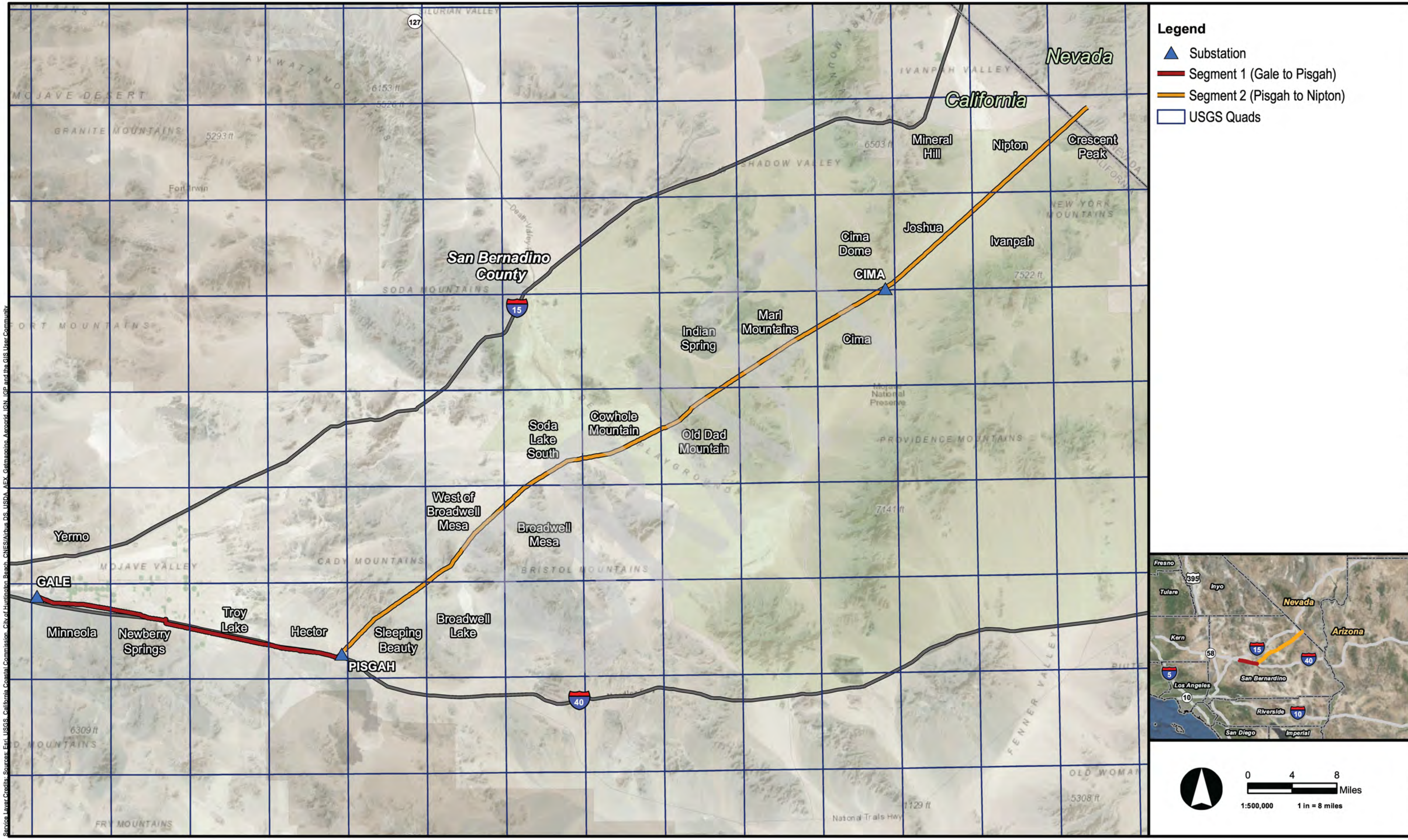


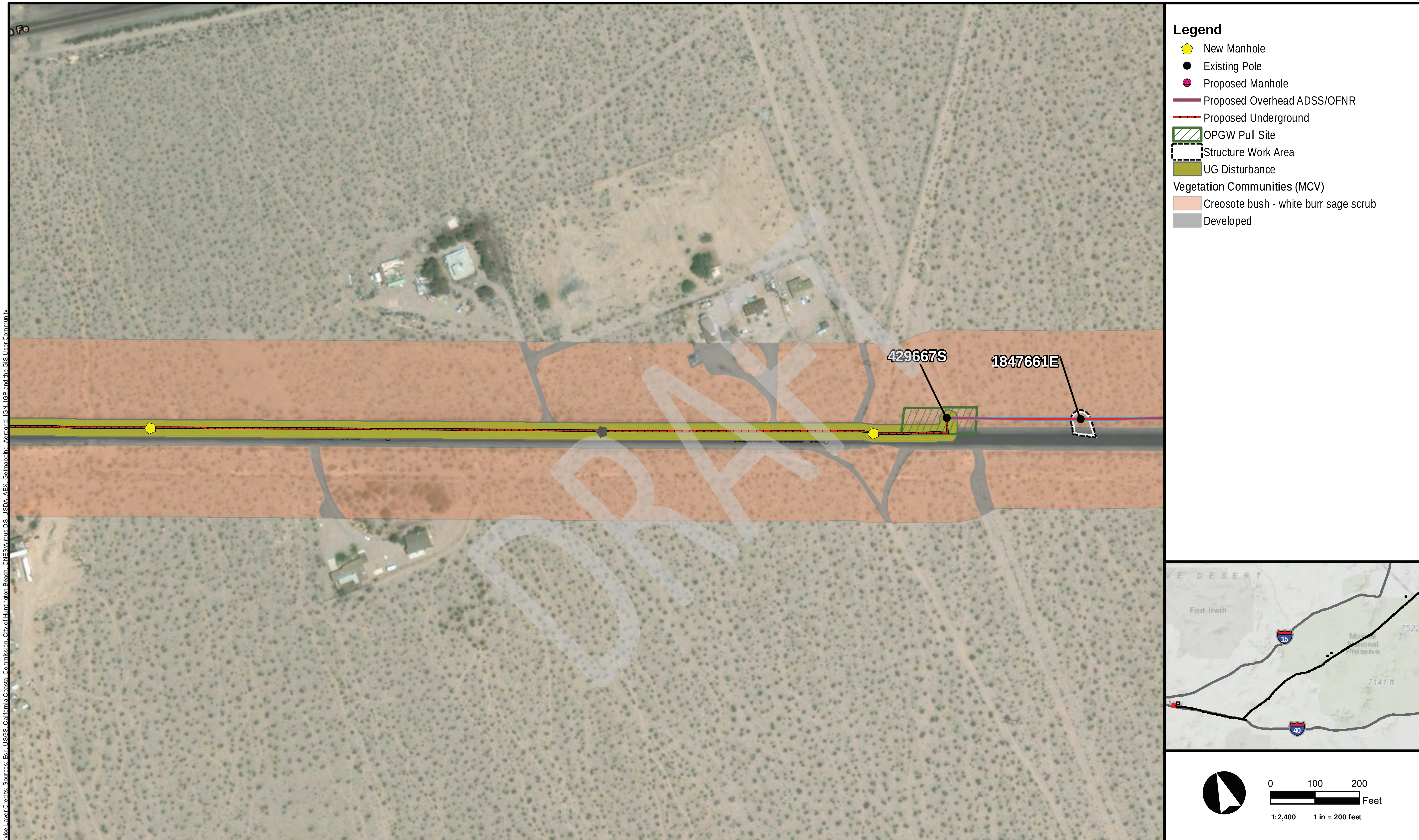
Exhibit 1. Regional Location

Lugo-Victorville 500-kV Transmission Line Remedial Action Scheme Project | San Bernardino County, CA and Clark County, NV

Environmental Intelligence. Date: 2/25/2019. Q:\SCE\On-Call Environmental Services\CWA_060_LVRAS_NestingBirds\02_GIS_Data\maps\2019\Combined_JD\EX_2_Description_EI01_20190218.mxd

EXHIBIT 2. PROJECT DESCRIPTION (PAGE 1 OF 260)

LUGO-VICTORVILLE 500-KV TRANSMISSION LINE REMEDIAL ACTION SCHEME PROJECT | SAN BERNARDINO COUNTY, CA AND CLARK COUNTY, NV



Service Layer Credits: Sources: Esri, USGS, California Coastal Commission, City of Huntington Beach, CNES/Airbus DS, USDA, AEX, Getmapping, Aerogrid, IGN, IGP, and the GIS User Community

Environmental Intelligence. Date: 2/25/2019. Q:\SCE\On-Call Environmental Services\CWA_060_LVRAS_NestingBirds\02_GIS_Data\maps\2019\Combined_JD\EX_2_Description_EI01_20190218.mxd

EXHIBIT 2. PROJECT DESCRIPTION (PAGE 2 OF 260)

LUGO-VICTORVILLE 500-KV TRANSMISSION LINE REMEDIAL ACTION SCHEME PROJECT | SAN BERNARDINO COUNTY, CA AND CLARK COUNTY, NV

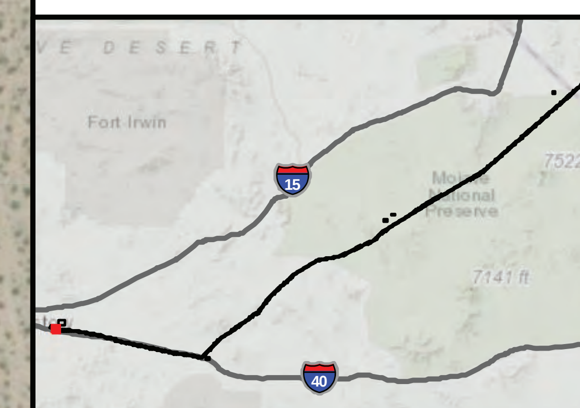
Service Layer Credits: Sources: Esri, USGS, California Coastal Commission, City of Huntington Beach, CNES/Airbus DS, USDA, AEX, Getmapping, Aerogrid, IGN, IGP and the GIS User Community

Legend

- Existing Pole
- Proposed Overhead ADSS/OFNR
- Structure Work Area

Vegetation Communities (MCV)

- Creosote bush - white burr sage scrub
- Developed



Environmental Intelligence. Date: 2/25/2019. Q:\SCE\On-Call Environmental Services\CWA_060_LVRAS_NestingBirds\02_GIS_Data\maps\2019\Combined_JD\EX_2_Description_EI01_20190218.mxd

Exhibit 2. Project Description (Page 3 of 260)

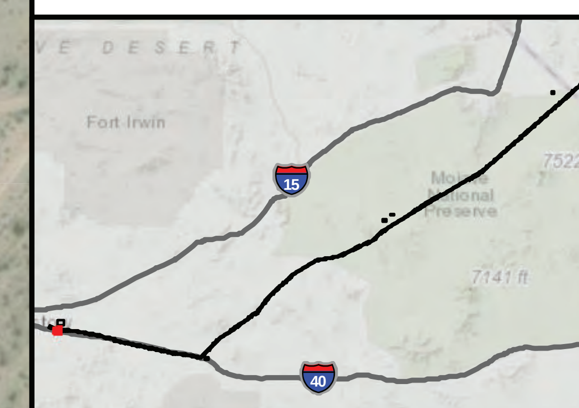
Lugo-Victorville 500-kV Transmission Line Remedial Action Scheme Project | San Bernardino County, CA and Clark County, NV

Legend

- New Manhole
- Existing Pole
- New Anchor
- Proposed Manhole
- Proposed Overhead ADSS/OFNR
- Proposed Underground
- Install Overhead Span Guy
- Anchor
- OPGW Pull Site
- Structure Work Area
- UG Disturbance

Vegetation Communities (MCV)

- Creosote bush - white burr sage scrub
- Developed



0 100 200 Feet

1:2,400 1 in = 200 feet

Exhibit 2. Project Description (Page 4 of 260)

Lugo-Victorville 500-kV Transmission Line Remedial Action Scheme Project | San Bernardino County, CA and Clark County, NV

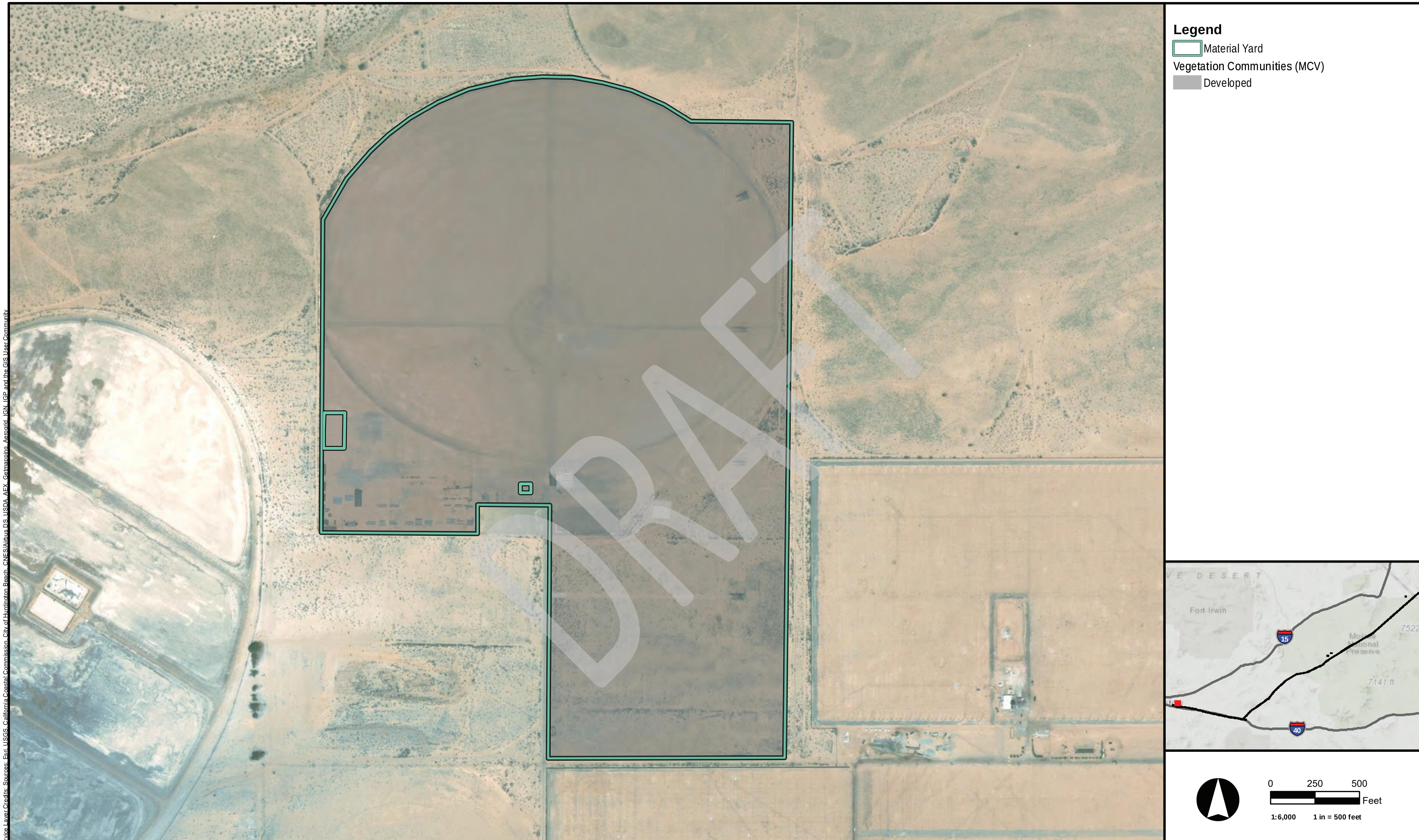
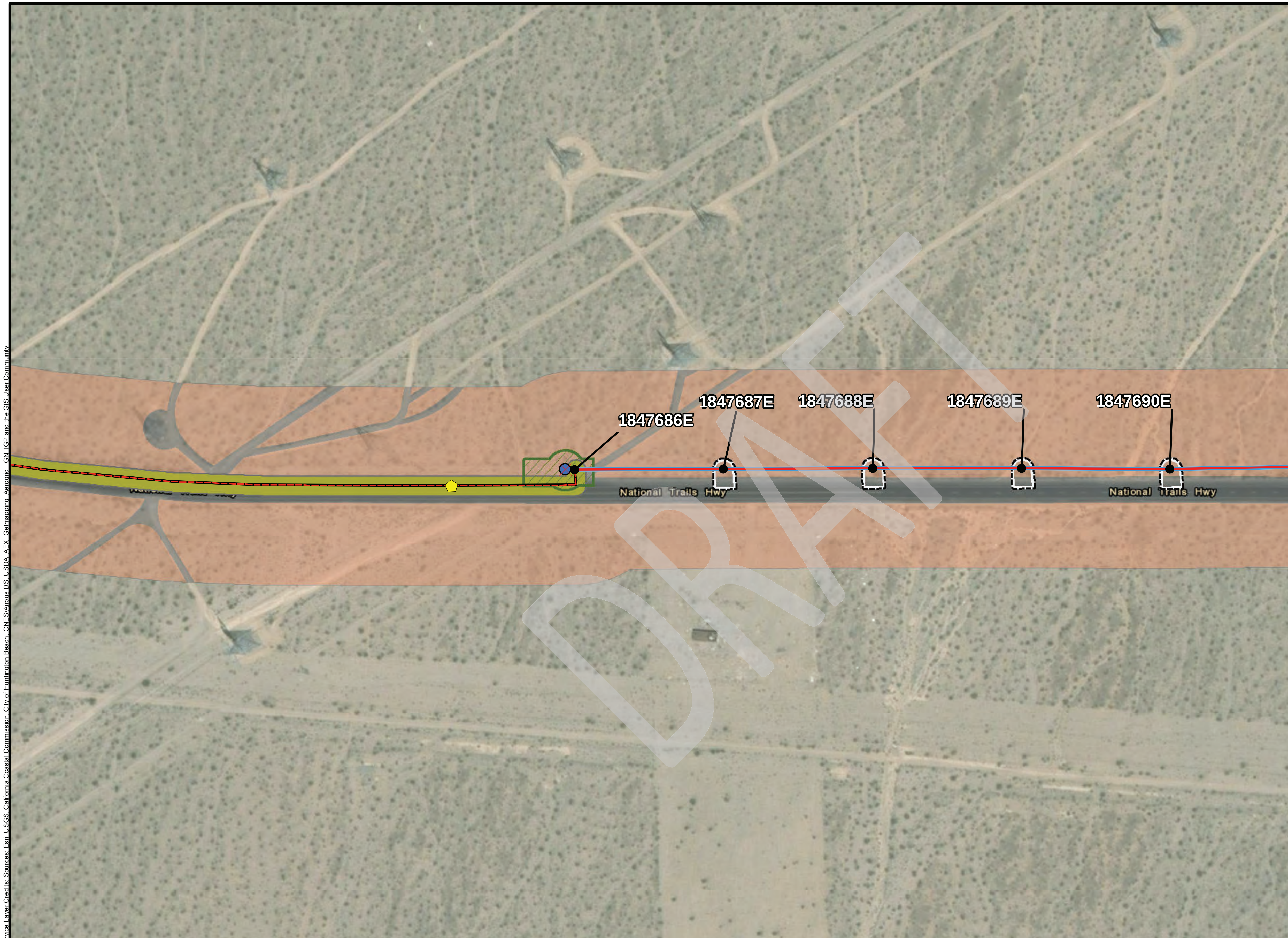


Exhibit 2. Project Description (Page 5 of 260)

Lugo-Victorville 500-kV Transmission Line Remedial Action Scheme Project | San Bernardino County, CA and Clark County, NV

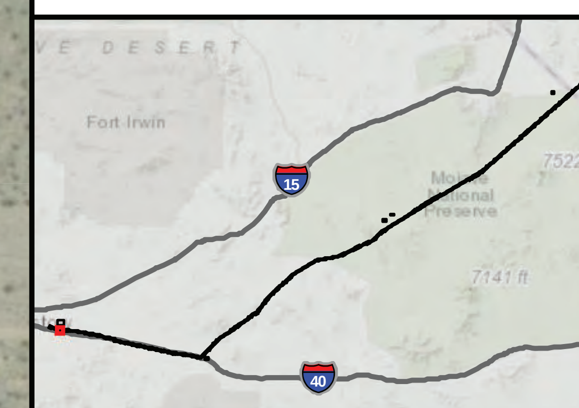


Legend

- New Manhole
- Existing Pole
- New Anchor
- Proposed Manhole
- Proposed Overhead ADSS/OFNR
- Proposed Underground
- Install Overhead Span Guy
- Anchor
- OPGW Pull Site
- Structure Work Area
- UG Disturbance

Vegetation Communities (MCV)

- Creosote bush - white burr sage scrub
- Developed



0 100 200 Feet

1:2,400 1 in = 200 feet

Service Layer Credits: Sources: Esri, USGS, California Coastal Commission, City of Huntington Beach, CNES/Airbus DS, USDA, AEX, Getmapping, Aerogrid, IGN, IGP, and the GIS User Community

Environmental Intelligence. Date: 2/25/2019. Q:\SCE\On-Call Environmental Services\CWA_060_LVRAS_NestingBirds\02_GIS_Data\maps\2019\Combined_JD\EX_2_Description_EI01_20190218.mxd

Exhibit 2. Project Description (Page 6 of 260)

Lugo-Victorville 500-kV Transmission Line Remedial Action Scheme Project | San Bernardino County, CA and Clark County, NV

Service Layer Credits: Sources: Esri, USGS, California Coastal Commission, City of Huntington Beach, CNES/Airbus DS, USDA, AEX, Getmapping, Aerogrid, IGN, IGP and the GIS User Community

Environmental Intelligence. Date: 2/25/2019. Q:\SCE\On-Call Environmental Services\CWA_060_LVRAS_NestingBirds\02_GIS_Data\maps\2019\Combined_JDEX_2_Description_EI01_20190218.mxd

Exhibit 2. Project Description (Page 7 of 260)

Lugo-Victorville 500-kV Transmission Line Remedial Action Scheme Project | San Bernardino County, CA and Clark County, NV

Exhibit 2. Project Description (Page 8 of 260)

Lugo-Victorville 500-kV Transmission Line Remedial Action Scheme Project | San Bernardino County, CA and Clark County, NV

Exhibit 2. Project Description (Page 9 of 260)

Lugo-Victorville 500-kV Transmission Line Remedial Action Scheme Project | San Bernardino County, CA and Clark County, NV