United States Department of the Interior

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Date: January 21, 2014
File No. 2013-F-0301 &
1-5-05-FW-536, Tier 6

Memorandum

To: Superintendent, Southern Paiute Agency, Bureau of Indian Affairs, St. George, Utah

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

Subject: Biological Opinion for the Res Americas Moapa Solar Energy Center, Moapa River Indian Reservation, Clark County, Nevada

This transmits the Fish and Wildlife Service's (Service) biological opinion for the Res Americas Moapa Solar Energy Center. The Bureau of Indian Affairs (BIA) and Bureau of Land Management (BLM) determined that the proposed approval of a lease for the project by BIA on the Moapa River Indian reservation and issuance of a right-of-way grant by BLM for the subject project on BLM-administered lands may adversely affect the Mojave desert tortoise (*Gopherus agassizii*), a species listed as threatened under the Endangered Species Act of 1973, as amended (Act; 16 U.S.C. 1531 *et seq.*). The Moapa dace (*Moapa coriacea*), a species listed as endangered under the Act, may be adversely affected by groundwater withdrawal required for the project. No critical habitat will be adversely affected by the project.

The attached biological opinion is based on information provided in your memorandum dated August 1, 2013; November 2013 biological assessment for the project; January 30, 2006, programmatic biological opinion (File No. 1-5-05-FW-536); discussions and electronic transmissions among the Service, BIA, consultants, and BLM; desert tortoise survey reports from 2011 and 2013; *Draft Environmental Impact Statement, Moapa Solar Energy Center, August 2013*; and our files. A complete project file of this consultation is available in the Service's Nevada Fish and Wildlife Office in Las Vegas.

If you require additional assistance, please contact Susan Cooper in the Nevada Fish and Wildlife Office in Las Vegas at (702) 515-5230. Please reference File No. 84320-2013-F-0301 in future correspondence concerning this consultation.

Edward D. Koch

cc:
Chairman, Moapa Band of Paiutes, Moapa, Nevada
Supervisory Biologist - Habitat, Nevada Department of Wildlife, Las Vegas, Nevada
Assistant Field Office Manager, Renewable Resources, Bureau of Land Management, Field Office, Las Vegas, Nevada
Amy Heuslein, Bureau of Indian Affairs, Western Region, Phoenix, Arizona

ATTACHMENT

BIOLOGICAL OPINION
FILE NO. 84320-2013-F-0301

CONSULTATION HISTORY

On January 20, 2006, the Fish and Wildlife Service (Service) concluded intra-Service consultation and issued a programmatic biological opinion (PBO) (File No. 1-5-05-FW-536) for execution of the *Proposed Muddy River Memorandum of Agreement (MOA) Regarding the Groundwater Withdrawal of 16,100 acre-feet per year (afy) from the Regional Carbonate Aquifer in the Coyote Spring Valley and California Wash Basins and Establishment of Conservation Measures for the Moapa Dace, Clark County, Nevada.* As the sole Federal signatory to the MOA, the Service would carry out actions and commitments in the MOA that may adversely affect the federally listed as endangered Moapa dace (*Moapa coriacea*). The Service anticipated that all future Federal actions and formal consultations that involve withdrawal of groundwater under the MOA be tiered to the PBO; therefore, this consultation is tiered to the 2006 PBO.

On April 8, 2010, the Service met with the Moapa River Band of Paiutes (Tribe), Bureau of Indian Affairs (BIA), Bureau of Land Management (BLM), and Res Americas or Moapa Solar LLC (Applicant) to discuss the proposed solar project. During the meeting, various options for environmental compliance were discussed including section 7 consultation through the BIA and the Tribe's Section 17 Corporate Charter.

On May 7, 2012, the Service received a request from the BIA to be a cooperating agency for the development of issues and alternatives, and to assist in the document review process for the Environmental Impact Statement for the project. On July 26, 2012, the Service sent a letter to the BIA confirming cooperation consistent with respective authorities of the Endangered Species Act, Fish and Wildlife Coordination Act, Migratory Bird Treaty Act, and Bald and Golden Eagle Protection Act, along with other appropriate laws and administrative guidance pertinent to the Department of the Interior.

On April 4, 2013, the BIA provided a draft biological assessment to the Service for review. The Service reviewed the document and provided final comments to BIA on July 25, 2013.

On August 5, 2013, the Service received the BIA's request for consultation and a final biological assessment for the proposed solar project. The Service determined that the information was sufficient and initiated formal consultation on that date.

On September 11, 2013, the BIA and BLM informed the Service that an adjustment to the transmission line route would need to be made, for which new desert tortoise surveys would be conducted, and the biological assessment would be revised. The Service received the revised final biological assessment from the BIA on November 13, 2013, and formal consultation was resumed on that date.

DESCRIPTION OF THE PROPOSED ACTION

Moapa Solar LLC (Applicant) has entered into an agreement with the Tribe to lease land and obtain rights-of-way, for up to 30 years, on the Moapa River Indian Reservation (Reservation), Clark County, Nevada, for the purposes of constructing and operating the Moapa Solar Energy Center (MSEC), a solar generating facility and associated infrastructure (Figure 1). Because the BIA has a jurisdictional trust responsibility over Indian lands and the BLM has land management responsibilities under FLPMA, the proposed project is a major Federal action and compliance under the National Environmental Policy Act of 1969 is required. The Tribe, BLM, U.S. Environmental Protection Agency (EPA), and National Park Service are cooperating agencies on the proposed project.

The proposed project would utilize photovoltaic (PV) technology and also would include a site access road, two gen-tie transmission lines, and a water pipeline (Table 1). The MSEC would have impacts to resources on the Reservation and on BLM land. The solar generation facility, water pipeline, and parts of the other linear facilities would be within the Reservation (Figure 1). Two transmission lines (230 kV and 500 kV) and an access road, all requiring Rights-of-Way (ROW) grants would occur on lands managed by the BLM. The solar power generation facility (SPGF) site would include the PV-solar field, an office and maintenance building, parking area, lay-down area, switchyard, and a wastewater evaporation and detention pond. Controlled access gates would be located at the SPGF entrance. Permanent desert tortoise exclusionary fencing would also be installed around the perimeter of the SPGF.

Table 1 – Habitat disturbance associated with the proposed action.

Project Component		Tribal Lands	BLM	Total Impacts (acres)
		Habitat Disturbance (acres)		
Solar Site		**847.4**	**0.0**	**847.4**
230kV Gen-Tie	230kV Pole Structures	**0.1**	**7.2**	**7.3**
	230kV 12ft Road	**0.1**	**8.4**	**8.5**
	230kV Construction Area	**0.0**	**30.0**	**30.0**
	230kV Pull Site	**0.0**	**4.6**	**4.6**
500kV Gen-Tie	500kV Pole Structures	**1.1**	**0.2**	**1.3**
	500kV 12ft Road	**1.7**	**0.4**	**2.1**
	500kV Construction Area	**5.5**	**0.9**	**6.4**
	500kV Pull Site	**6.8**	**0.0**	**6.8**
Proposed Access Road		**0.7**	**14.4**	**15.0**
Water Pipeline		**22.1**	**0.0**	**22.1**
PROJECT TOTALS		**885.4**	**66.1**	**951.5**

PROJECT COMPONENTS

Solar Field

The proposed project would be up to 200 MW in size and would utilize crystalline silicon or thin-film PV panels that would be mounted on single-axis trackers. Using single-axis trackers, the panels will be oriented in north-south rows with the panels moving to track the sun as it moves across the sky during the day. The highest point on the single axis-trackers would be about 6 to 12 feet occurring during the morning and evening hours when the panels are tilted to face the rising or setting sun. This is based on a 2 or 3-panel mounting system. The degree of tilt will change over the course of each day for the single-axis trackers. The PV units will be mounted on driven pile foundations to support the panel mounting system. The electrical equipment (inverters and transformers) will be in enclosures or covered by shade structures approximately 8 to 10 feet high.

The MSEC will also include one or more small meteorological monitoring stations to track solar insolation, temperature, wind direction, and speed. These stations will have a height of approximately 10 feet.

Operations and Maintenance Area

An Operations and Maintenance (O&M) building would be constructed on the site that would contain administrative offices, parts storage, a maintenance shop, plant security systems, and plant monitoring equipment with adjacent worker parking. The O&M building would likely consist of one or more single story buildings with a maximum height of approximately 18 feet. The building will have exterior lighting on motion sensors and will have fire and security alarms.

Water Use and Supply

During construction, up to 50 afy of water are estimated to be used for a total of 100 acre feet of water during construction. During operations, the MSEC would use up to 30 afy of water for a total of up to 750 acre feet of water over a 25-year period. The water supply required for the MSEC would be leased from the Tribe and provided from the Tribe's existing production wells on the Reservation located about 5.4 miles northeast of the SPGF. This well is located in the California Wash Basin of the Arrow Canyon Range Cell of the Carbonate-Rock Aquifer. Water would be delivered to the SPGF via a 5.4-mile underground water pipeline located on Reservation lands, but of which approximately 4.7 miles occurs within an existing utility corridor managed by the BLM. The water pipeline would be 8 to 12 inches in diameter and would be buried 3 to 6 feet below the ground surface.

Wastewater Management

The project would generate wastewater streams including neutralized wastewater from the ion exchange pretreatment system. Processed wastewater would be piped to lined, evaporation ponds that would be located within the fenced SPGF site. The ponds will be sized to retain all solids generated during the life of the Project. However, if required for maintenance, dewatered

residues from the ponds will be sent to an appropriate offsite landfill as non-hazardous waste. The evaporation pond would cover up to 5 acres and would be located entirely within the fenced area of the SPGF. The evaporation ponds would be designed to minimize the amount of discharge and to provide best management and control of the discharge. Ponds would be covered with bird-proof netting.

Access Roads

The MSEC would require vehicular access for construction, operation, and maintenance. A 2.5-mile gravel access road would be constructed on BLM-managed lands to connect the SPGF to the existing paved frontage road adjacent to I-15. From the existing paved frontage road west of I-15, the proposed site access road would follow an existing dirt road for approximately 2.0 miles until it reaches the proposed 230-kV gen-tie transmission line ROW, which it would then follow approximately 0.5 mile north to the SPGF site (Figure 1). The Applicant has requested a 100-foot-wide ROW so the existing road can be straightened if needed in some places. The access road would be designed to accommodate equipment deliveries, the construction workforce, and, ultimately, the operational needs of the Project. The roadway section would consist of two travel lanes, 24 feet wide with 5-foot shoulders and drainage swales on either side.

Transmission Lines

Construction of a new gen-tie transmission line is required to deliver the power generated by the SPGF to the electrical grid. Two gen-tie transmission lines, a 230 kV and a 500 kV, would be constructed within a 150-foot wide ROW (Figure 1). Transmission line design would be consistent with recommendations for reducing negative impacts of power lines on birds (APLIC 2006, 2012). The steel monopole type of transmission structures would be used for both the 230-kV line and the 500-kV line and would range in height from 60 feet to 100 feet. The gen-tie lines would consist of approximately 7.3 miles of single-circuit 230-kV overhead transmission line from the SPGF to the Harry Allen 230-kV Substation, of which 6.9 miles occurs on BLM-managed land; and approximately 1.6 miles of single-circuit 500-kV overhead transmission line from the SPGF to the 500-kV Crystal Valley Substation, of which 0.4 mile occurs on BLM-managed land.

SPGF CONSTRUCTION

All necessary permits for rights-of-entry would be obtained from the BLM or the Tribe, accordingly, before any survey work for siting construction areas and other project components would be initiated. Construction of the SPGF, from site preparation and grading to commercial operation, is expected to take up to 24 months. Prior to construction, the following would be surveyed and staked: SPGF site; right-of-way boundaries; locations of proposed facilities; centerlines of linear features, including access roads. Following site survey and marking, field surveys would be conducted to determine the presence of cultural resources and special-status species within potentially affected areas.

Once surveys have been completed, vegetation would be removed from the SPGF site where needed prior to grading. This removed vegetation would be handled in accordance with a plan

prepared in consultation with the Tribe and BIA and would either be hauled off-site for disposal or possibly used to create wildlife habitats on off-site lands.

The SPGF site would be graded, as needed, to facilitate the construction and operation of the PV tracking system. Any needed grading would take advantage of the existing slope of the site, while eliminating any abrupt grade changes. Where grading is not needed, vegetation would be trimmed or mowed, if needed, to allow installation and operation of PV tracking system. This would allow those areas to retain the local undisturbed soil surface and local drainage. The final grading and drainage plan would be in compliance with all applicable storm water standards and best management practices for erosion control.

Onsite roads would be surfaced with asphalt, aggregate base, or left surfaced with the native soil and treated with a dust palliative. Only BLM-approved palliatives would be used. The roads where heavy use is expected would be surfaced with asphalt; the primary roads within the solar fields would be surfaced with aggregate base; and the secondary roads within the solar fields would be graded native soils treated with dust palliative to minimize dust.

There is currently little traffic on any of the roads bordering or in the immediate vicinity of the project. The use on these roads is associated with the nearby energy infrastructure in the area. Daily trip generation during construction of the project would be generated by delivery of equipment and supplies and the commuting of the construction workforce. The number of workers expected on the site during construction of the Project would vary over the construction period and is expected to average up to approximately 300 each day, generating about 100 daily round trips. Deliveries of equipment and supplies to the site would also vary over the construction period but are expected to average about 10 to 20 daily trips. All project-related parking would be onsite during construction, moving within the solar field as it is developed.

Gen-Tie Construction

It is estimated that construction of the transmission lines would occur over a period of approximately 4 to 6 months. Mobile construction equipment access would be required at each transmission structure. The project would use a combination of new and existing access roads, and spur roads to place construction equipment at each structure.

To access the ROW, construction vehicles would use the existing access road off the existing paved unnamed frontage road adjacent to I-15 going to the Harry Allen and Crystal Substations. This primary access road is maintained by NV Energy and minimal to no improvements would be necessary to facilitate gen-tie construction.

Existing secondary access roads would be used to access the ROW where possible. Once within the ROW, spur roads may be used to access structure locations. The secondary access and spur roads are not routinely maintained and at some locations may require minimal improvements. Typical improvements would consist of minor grading and possibly limited addition of road base or rock in areas to allow safe vehicle travel. If used, spur roads would be staked and flagged. To the extent possible, drainages would be crossed at grade. Standard road design techniques such as installing water bars and dips to control erosion may be used in sloped areas as necessary.

Geotechnical Testing

Prior to final design of the lines, analysis of soil borings must be conducted along the proposed gen-tie line alignments to establish the design parameters for structural foundations. Up to ten test locations would occur at proposed structure locations mostly on BLM land. The testing process would involve survey staking each test location by a one- or two-person survey crew using a standard light-duty pickup truck. Test locations would be marked with wooden stakes and flagged. Once marked, a two- or three-person drilling crew would collect samples using a truck-mounted drill rig at various depths along the boring. Each boring would be approximately 6 inches in diameter and 50 feet deep and would be analyzed to determine soil classification, moisture content, density, depth to groundwater, and other characteristics.

Work areas surrounding each geotechnical boring location would be confined to a 30 by 40 foot area. After each test boring is completed, the spoil will be hand-backfilled into the boring hole and lightly compacted. After backfill, the test location will be smoothed and hand-graded as necessary to return the area to the pre-test grade.

Structure Site Clearing

Forty-seven structure locations requiring an approximately 160 by 200 foot work area for each structure would be needed for the 230 kV line. Eight structure locations requiring an approximately 200 by 200 foot work area would be required for the 500 kV line. Vegetation at each structure location and work area would be cleared only to the extent necessary as required to maintain safe working conditions at each location. Grading would not be conducted unless needed to provide a safe work area for equipment. Following construction, surface disturbance at work areas and structure locations on BLM-administered lands would be rehabilitated using seed mixtures and techniques developed in consultation with BLM. Surface disturbance on Tribal lands would be rehabilitated according to Tribal specifications. Permanent surface disturbance at structure locations would be minimized.

Temporary Work Areas

Transmission line construction would require several types of temporary work areas for material storage, construction staging, equipment laydown, transmission structure installation, and conductor pulling and tensioning. After completing construction, temporary work areas on BLM-administered lands would be rehabilitated using seed mixtures and techniques developed in consultation with BLM. Noxious weed control would continue onsite during the rehabilitation process according to the specifications stipulated by BLM. Temporary work areas located on Tribal lands would be rehabilitated according to Tribal specifications.

Access Road Construction

The proposed access road would include upgrades to existing roads and development of new sections of road. The existing roads would be widened, and sections of new road would be constructed using a bulldozer or grader. Front-end loaders would be used to move the soil locally. The road surface would be widened or developed to 24 feet, and a 5-foot shoulder

would be constructed on each side to facilitate drainage.

Following grading, the surface 12 inches of the subgrade of the road would be scarified and moisture-conditioned and compacted by a roller to compact and smooth the ground surface. Approximately 14 inches of Class 2 road base would be placed above the compacted subgrade and it also would be moisture-conditioned and compacted.

After project construction, this upgraded permanent access road would be used to provide access to the SPGF and also continue to be used by the existing road users who have ROWs from the BLM. The installation of culverts and other road improvement amenities would be reviewed and addressed on a site-by-site basis.

Disturbed areas where vegetation was removed during construction activities and that are no longer needed for future operation and maintenance would be restored in a manner consistent with BLM and Tribal requirements to encourage natural revegetation.

Transmission Structure Hauling, Assembly, and Erection

Conventional construction methods would be used to haul, assemble, and erect the transmission structures. Trucks would be used to transport materials to each structure location. Structure materials would include transmission poles, steel cross arms, insulators, hardware, and stringing sheaves. Steel structures would be assembled onsite and hoisted into place with a crane.

OPERATION AND MAINTENANCE

Operation and maintenance activities associated with the MSEC are minimal. The MSEC is expected to require up to 20 personnel during operations. No heavy equipment would be used during normal plant operation. Operation and maintenance vehicles would include trucks (pickups, flatbeds, and dump trucks), forklifts, and loaders for routine and unscheduled maintenance, and occasionally water trucks for solar panel washing. Large heavy-haul transport equipment may be brought to the site infrequently for equipment repair or replacement.

DECOMMISSIONING

The project would operate at a minimum for the life of its Power Purchase Agreement or other energy contracts. It is possible, because much of the needed electrical infrastructure would have been developed, the SPGF would continue to be upgraded and used to generate solar energy even beyond the term of the initial energy purchase agreements. Therefore, the SPGF site could remain in solar energy production for the foreseeable future. If the MSEC were to be decommissioned, the solar field, support structures, and electrical equipment would be removed from the SPGF site, and the site would be revegetated with native species to a condition similar to the original condition in accordance with a restoration and revegetation plan that would be developed in the future.

CONSERVATION MEASURES AND MONITORING

The following sections summarize BIA, BLM, and Applicant-proposed measures to avoid, minimize, or compensate for the potential impacts of the Proposed Action on federally listed species. The Applicant proposes to provide construction monitoring under the direction of biologists approved by the Service. The biologists would be given authority to supervise the functions listed below.

1. Oversee establishment and functionality of sediment control devices as outlined in the Storm Water Pollution Prevention Plan. Ensure that Best Management Practices (BMPs) are in place and working properly on a weekly basis.
2. Awareness training for desert tortoise would be provided to everyone onsite and performed by qualified personnel only.
3. Biologists would monitor the construction activities daily during the initial site disturbance (including installation of temporary and permanent desert tortoise exclusion fencing) and at weekly intervals after all tortoises have been removed from the site. Biologists shall be onsite daily to respond to tortoise issues. Exclusionary fencing would be checked monthly and after any substantial rain event to ensure that they are effective barriers for desert tortoise.
4. Implement controls at entry locations to facilitate weed management and invasive species control in order to minimize infestation within the project area from an outside source. Trucks and other large equipment would be randomly checked before entering the site for any invasive species debris or seed.
5. A permanent perimeter of tortoise-exclusionary fencing will be constructed around the solar facility boundary. Pre-construction clearance surveys to remove tortoises from the construction area will be conducted following Service protocol (2010). Construction of the exclusionary fence will be monitored by a qualified biologist in order to eliminate impacts to tortoise burrows or live tortoises. The fence shall be maintained in accordance with Service standards. Tortoise guards shall be placed at all road access points, where desert tortoise-proof fencing is interrupted, to exclude desert tortoises from the road and solar facility.
6. Biological monitors to monitor the various construction crews in the active construction areas will be assigned until 100-percent tortoise clearance is confirmed. Biological monitoring will also occur during access road improvements and gen-tie and water pipeline construction in occupied desert tortoise habitat.
7. The Applicant will pay a fee based on acreage of disturbance to the Tribe for disturbance of Tribal lands and to the BLM for disturbance of BLM lands. The fees will be assessed at a rate to be determined by the Tribe, BLM, and Service. The Tribe, BLM, and Service have agreed that the funds will be used to implement conservation measures established in the Reservation-wide desert tortoise management and conservation plan prepared for the K Road Moapa Solar Project and approved by the Tribe, BIA, and Service.
8. A biological monitor will be present during maintenance activities if occurring outside of the perimeter fence. Pre-maintenance clearance surveys followed by temporary

exclusionary fencing may also be required in desert tortoise habitat if the maintenance action requires ground or vegetation disturbance.

9. Speed limits within the project area will be restricted to less than 25 miles per hour (mph) during construction and operation. Speed limit signs will be posted along the access road. Lower speed limits may be imposed to protect tortoises if determined necessary by the Service.
10. Lighting will be focused in toward the solar facility and downward to avoid lighting habitats beyond the SPGF perimeter.
11. Any trenches or excavations will be covered if left open overnight or have escape ramps to allow wildlife to safely exit.
12. A Raven Control Plan will be prepared for the project. This plan will prescribe the following measures to limit the impacts of common ravens and other avian scavengers on desert tortoise:
    a. Monitoring for the presence of ravens and other potential human-subsidized predators of special status wildlife will be conducted.
    b. BMPs to discourage the presence of ravens onsite include trash management, elimination of available water sources, designing structures to discourage potential nest sites, use of hazing to discourage raven presence, and active monitoring of the site for presence of ravens.
    c. If ravens are seen building nests, this nesting material will be removed prior to an egg being laid.
    d. To minimize activities that attract prey and predators during construction and operations, garbage will be placed in approved containers with lids and removed promptly when full to avoid creating attractive nuisances for wildlife. Open containers that may collect rainwater will also be removed or stored in a secure or covered location to not attract birds.
13. A Weed Management Plan, which must be approved by the BIA, BLM, and the Tribe, will be implemented prior to the initiation of ground disturbing activities. Mitigation measures in the Weed Management Plan include: worker awareness training; limiting ground disturbance to designated areas only; maintenance of vehicle wash and inspection stations and close monitoring of materials brought onto the site to minimize the potential for weed introduction; re- establishment of native vegetation in disturbed areas to prevent weeds from colonizing newly disturbed areas; and, regularly scheduled monitoring to quickly detect new infestations of weeds, coupled with rapid implementation of control measures to prevent further infiltration.
14. A designated field contact representative (FCR) will be assigned to the construction phase of the solar project components; additional FCRs will be assigned for the linear project components including the transmission line and water pipeline.
15. Desert tortoises will be relocated to BLM-managed lands or Tribal lands following the Terms and Conditions in this Biological Opinion. Reporting of relocations and other information pertaining to desert tortoise will be completed per the Terms and Conditions in this Biological Opinion issued by the Service. Desert tortoise relocation is considered

a take and requires an incidental take authorization from the Service.

16. If a tortoise is injured as a direct or indirect result of project activities, it shall be immediately transported to a veterinarian or wildlife rehabilitation facility.
17. Tortoises within the solar facility footprint will be translocated to secure areas outside the fence as approved by the Service. The disposition of displaced desert tortoises will be evaluated and reported on following the Terms and Conditions of this Biological Opinion.
18. Any project-related activity that may endanger a desert tortoise shall cease if a desert tortoise is encountered on the project site. Project activities may resume after an authorized desert tortoise biologist removes the desert tortoise from danger or after the desert tortoise has moved to a safe area.
19. The Applicant and Tribe will coordinate to salvage and relocate cacti, yuccas, and shrubs on linear ROWs and plant them back on temporarily disturbed portions of the ROWs similar to the efforts undertaken on adjacent BLM lands. If the Tribe chooses to salvage plants from the solar facility, these plants may be held in a nursery or other temporary holding location until needed; no monitoring is required for these plants.
20. All work area boundaries will be conspicuously staked, flagged, or otherwise marked to minimize surface disturbance activities. All workers, equipment, vehicles, and construction materials shall remain within the ROW, existing roads, and designated areas. Staging areas will be located in previously-disturbed areas whenever possible.
21. The Applicant will develop a habitat restoration plan to be implemented for all temporary disturbances associated with construction of the project to be approved by the BIA, BLM (for disturbance of BLM land), Tribe, and the Service.
22. 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 to by the BIA, BLM, and 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 encountered in the trench will be reported and moved out of harm's way in accordance with handling protocols (Service 2009). In addition, wildlife escape ramps in open trench segments will be no greater than every 0.25 mile.

Focused Conservation Measure for Moapa Dace

1. Water use will be minimized to the extent possible during construction and operation of the Project.

ANALYTICAL FRAMEWORK FOR THE 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 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 determine the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the desert tortoise and designated critical habitat; and
4. The cumulative effects, which evaluates the effects of future, non-Federal activities in the action area on the desert tortoise.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of the rangewide status of the desert tortoise, taking into account any cumulative effects in the action area, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the desert tortoise in the wild. For the purposes of making the jeopardy determination, the analysis in this biological opinion places an emphasis on consideration of the rangewide survival and recovery needs of the desert tortoise and the role of the action area in the survival and recovery of the desert tortoise as the context for evaluating the significance of the effects of the proposed Federal action, together with cumulative effects.

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. No designated critical habitat will be affected by the proposed action; therefore, no further analysis of critical habitat will be performed in this biological opinion.

STATUS OF THE SPECIES RANGEWIDE

MOAPA DACE

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. 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 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 present. Maximum size is approximately 4.7 inches 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).

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 observed the species below 86° F, Deacon and Bradley (1972) indicated that the species reaches its greatest abundance at warmer temperatures between 82.4 and 86.0° 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).

In 1983, the Service prepared a recovery plan for the Moapa dace which was updated in 1996, and identified various tasks to guide recovery (Service 1996). The plan also 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 non-native fishes (e.g., tilapia and mollies) and parasites; habitat loss from water diversions and impoundments; increased threat of fire due to encroachment of non-native 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 2006 PBO provides an overview of the hydrogeological factors affecting the Moapa dace.

a. Warm Springs Natural Area

The Warm Springs Natural Area (WSNA) and the Moapa Valley National Wildlife Refuge (NWR) encompass about 20 springs that form the headwaters of the Muddy River. The springs and their outflows onto the WSNA are home to the majority of the Moapa dace population.

In September 2007, the Southern Nevada Water Authority (SNWA) purchased 1,179 acres of private property that encompasses several springs in the Muddy River headwaters area, including the former Warm Springs Ranch. The property includes 3.8 miles of the mainstream Muddy River. The WSNA is managed as a nature preserve for protection of Moapa dace; and restoration and management of the areas as an ecological reserve.

b. Current Distribution and Abundance

The Moapa dace is thermophilic and endemic to the headwaters of the WSNA (Figure 2). Moapa dace surveys have been conducted throughout the upper Muddy River system. The August 2013 survey data indicate that there were approximately 1,727 fish in the population occurring throughout the 5.6 miles of habitat in the upper Muddy River system. The entirety of the population occurred within one major tributary that includes 1.78 miles of spring complexes emanating from Pedersen, Plummer, and Apcar springs on the Moapa Valley NWR and their tributaries (upstream of the gabion barrier).

In 2008, the number of Moapa dace declined approximately 60 percent, from 1,172 fish in 2007 to 459 fish in 2008. Most of this decline was observed in the Pederson, Plummer, and Refuge stream areas which supported more than 92 percent of the population in 2007. The cause of the population decline is unknown, although beavers had recently changed stream characteristics in the Refuge and active vegetation management had recently occurred along the Pederson Unit. 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. Survey data since 2008 indicate an increasing population trend (Figure 3).

The overall trend in Moapa dace numbers suggests continued growth in the population since the lowest count in 2008. Restored areas continued to show increasing or stable numbers of Moapa dace (upper Apcar, lower Pederson, Goodchild [Little] Springs). Most recently, the largest concentrations have been documented on the lower Pederson spring tributaries, which supported about 18 percent of all Moapa dace observed in August 2013. The number of Moapa dace documented in August 2013 is the highest since consistent surveys were initiated in February 2005. An increase of about 41 percent was documented between the previous survey in February 2013 and the August 2013 survey (Figure 3).

DESERT TORTOISE

Status of the Species and Critical Habitat Rangewide

The rangewide status of the desert tortoise and its critical habitat consists of information on its listing history, species account, recovery plan, recovery and CHUs, distribution, reproduction,

and numbers. This information is dated February 9, 2012, and provided on the Service's website at: http://www.fws.gov/nevada/desert_tortoise/dt/dt_life.html. If unavailable on this website, contact the Nevada Fish and Wildlife Office in Las Vegas at (702) 515-5230, and provide File No. 84320-2013-F-0301 along with the date of February 9, 2012. Additional information is provided in our 5-year review (Service 2010a) and revised recovery plan for the Mojave desert tortoise (Service 2011).

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). Considering the proposed action will not result in adverse effects to critical habitat, any further discussion or evaluation of critical habitat will not be included in this biological opinion.

ENVIRONMENTAL BASELINE

ACTION AREA

The implementing regulations for section 7(a)(2) of the Act define the "action area" as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02).

The action area for the Moapa dace is defined as the entire range of the Moapa dace and the hydrogeomorphic basins which have hydrologic connectivity to the Muddy River ecosystem. These basins include the Muddy River Springs Area, Coyote Spring Valley, Garnet Valley, Hidden Valley, and California Wash where water pumping may result in impacts to the Muddy River Springs and Muddy River, and therefore, the Moapa dace.

The action area for the desert tortoise includes the 874-ac (1.3 square miles [mi^2]) solar facility site; 2.5-miles of access road; 1.6-miles 500-kV transmission line; 7.3-mile 230-kV transmission line; and 4.8-mile water pipeline; these project components are described in the Description of the Proposed Action section of this biological opinion. In addition, the action area includes a 0.5-mile wide buffer around the solar facility project boundary and along each side of linear project areas. We include a 0.5-mile buffer to address adverse effects to desert tortoises whose home ranges overlap the proposed solar facility and linear project areas; the buffer is based on reported home range sizes of male desert tortoises (26.4 hectares [0.10 mi^2], 210 hectares [0.81 mi^2]) which are variable depending on weather and other environmental factors (Duda et al. 1999, Harless et al. 2009). For situations where desert tortoises are moved less than 500 meters (1,640 feet), the buffer is based on the maximum straight-line distance that a male desert tortoise traveled in the first year following translocation [relocation] (Walde et al. 2008). For situations where desert tortoises are moved more than 1,640 feet, the buffer is based on the upper limits of the 95 percent confidence interval for the maximum straight-line distance that male and female desert tortoises were observed to disperse during the first year after release (Nussear 2004, Field et al. 2007, Gowan and Berry 2009).

STATUS OF THE MOAPA DACE IN THE ACTION AREA

The action area encompasses the entire range of the Moapa dace; therefore, the status of the Moapa dace in the action area is the same as the description of the rangewide status of the Moapa dace discussed above.

FACTORS AFFECTING THE MOAPA DACE IN THE ACTION AREA

a. Groundwater Use Memorandum of Agreement

On July 14, 2005, a MOA was signed by SNWA, Moapa Valley Water District (MVWD), Coyote Springs Investment, the 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 (Coyote Spring Valley and California Wash) within the regional carbonate aquifer system by SNWA (9,000 afy), MVWD, CSI (4,600 afy), and the Tribe (2,500 afy). The MOA and PBO 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 non-native fishes from migrating into Moapa dace habitat;
5. Eradicate non-native 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 cubic feet per second (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 that the cumulative actions of parties to the MOA could result in 31 percent reduction in the flows at the Warm Springs West in the Pedresen Unit of the NWR, reducing the flows to 2.7 cfs. This translates roughly into a 22 percent loss in riffle habitat and 16 percent loss in pool habitat in that area for the Dace. Should flows at the Warm Springs West gage decline to a flow below 2.7 cfs, water use from those anticipated in the PBO would be reduced.

Five projects have been proposed under the PBO, four of which have moved forward and have been tiered to the PBO: 1) issuance of a Section 404 permit under the Clean Water Act of 1972, as amended, for the CSI residential development project (Tier 1); 2) for a ROW to SNWA to construct a water conveyance pipeline (Tier 2), 3) 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 (Tier 4); and 4) construction of the K-Road PV solar project on Tribal lands within the Moapa River Indian Reservation requiring 72 afy of water during construction and up to 40 afy of water during operations and maintenance (see *Factors Affecting the Desert Tortoise in the Action Area* below for more information). Tier 3 was a proposed cement plant which was withdrawn without a biological opinion being issued. Tiers 1 and 2 are major projects and are discussed in detail below.

- **Tier 1:** CSI is permitted to pump State-appropriated water from as many as 4 wells in Coyote Spring Valley for a combined duty of 4,600 afy in order to meet water demands for its proposed residential community, including an existing golf course. The Nevada State Engineer requires CSI to monitor groundwater levels in Coyote Spring Valley at its four production wells in a manner that complies with monitoring requirements under State Engineer Order 1169 (NSE 2002) and to report monthly production from each of its wells as a condition of their water right permits. State Engineer Order 1169, issued in 2002, ordered a study of a portion of the regional carbonate-rock aquifer that includes Coyote Spring Valley, the Muddy River Springs Area, and California Wash, among other basins, in the form of a 2-year pumping test (the 'Order 1169 pumping test') which was

conducted from November 2010 to December 2012 to evaluate how groundwater withdrawals in this portion of the carbonate-rock aquifer impact the aquifer system, including discharge from the Muddy River Springs and to the Muddy River. Impacts to the springs and river, in turn, have the potential to impact the Muddy River ecosystem. Monitoring by CSI at their four production wells as a condition of their water right permits continues to inform assessments of pumping impacts on the carbonate-rock aquifer, springs, and river under the MOA following completion of the Order 1169 pumping test.

- **Tier 2:** This project involves SNWA constructing a pipeline to convey groundwater withdrawals from southern Coyote Spring Valley to Reed Bowman Reservoir and eventually to Lake Mead for return flow credits by way of the lower Muddy River. SNWA is currently permitted to pump State-appropriated water from two carbonate production wells in southern Coyote Spring Valley, MX-5 and CSI-2 located approximately 1.3 miles northwest of MX-5, at a combined rate of 9,000 afy for municipal water supply in Las Vegas and vicinity. At present, only carbonate production well MX-5 is connected to the pipeline; production from MX-5 is limited by the size of the pump installed in the well to roughly 3,800 gallons per minute or a maximum annual rate of about 6,100 afy. Pumping of MX-5 was temporarily stopped by SNWA in late April 2013 following completion of the Order 1169 pumping test. During the 2-year pumping test, SNWA's MX-5 production well was pumped at an average rate of 4,072 afy; the average rate of pumping from the carbonate-rock aquifer in Coyote Spring Valley was 5,383 afy during the test (the combination of MX-5 and CSI pumping). CSI pumping from the carbonate-rock aquifer continues in Coyote Spring Valley to meet demand for their planned community (i.e., the golf course).

  The State Engineer requires SNWA to monitor groundwater levels at as many as 9 carbonate and 6 basin-fill monitoring wells in Coyote Spring Valley in a manner that complies with monitoring requirements under State Engineer Order 1169 and to report monthly production from each of its production well(s) as a condition of their water right permits. Groundwater level and production monitoring by SNWA in Coyote Spring Valley continues to inform assessments of pumping impacts on the carbonate-rock aquifer, Muddy River Springs, and Muddy River under the MOA following the completion of the Order 1169 pumping test.

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 gage on Pederson Stream in the National Wildlife Refuge determine thresholds that would trigger certain conservation actions including reductions in groundwater pumping in the Muddy River Springs Area and Coyote Spring Valley. Currently, the first instream flow at the Warm Springs West gage that would trigger a reduction in groundwater pumping is 3.0 cfs. This instream flow would trigger the cessation of MVWD pumping at the Arrow Canyon carbonate production wells located in the Muddy River Springs Area approximately 3 miles northwest of the Pederson springs and a redistribution of pumping by SNWA and CSI in Coyote Spring Valley. Additionally, the MOA provides that at this instream flow total pumping by SNWA and CSI in Coyote Spring Valley would be limited to 8,050 afy. At present, this would not be likely

to result in a significant, if any, reduction in pumping in Coyote Spring Valley since the pumping capacity of SNWA's MX-5 well is approximately 6,100 afy and CSI's demand for water is roughly 2,000 afy or less. The next instream flow at the Warm Springs West gage that would trigger a reduction in groundwater pumping under the MOA is 2.9 cfs. This would restrict SNWA and CSI's combined pumping in Coyote Spring Valley to 6,000 afy, a modest reduction if SNWA was pumping the MX-5 production well at full capacity at the time, but no reduction compared to the average level of pumping imposed during the Order 1169 pumping test. Additionally, pumping by the Moapa Band of Pauites in California Wash would be limited to 2,000 afy (which is well above the current level of pumping). Finally, instream flows of 2.8 and 2.7 cfs at the Warm Spring West gage trigger the restriction of pumping by SNWA and CSI in Coyote Spring Valley to a combined 4,000 and 724 afy, respectively, under the MOA, the latter representing a significant reduction in the rate of pumping from the carbonate-rock aquifer in Coyote Spring Valley compared to levels imposed during the Order 1169 pumping test. Instream flow at the Warm Springs West Flume as of December 2013 is 3.4 cfs (USGS 2013). Therefore, based on the monitoring information provided, we have not reached any instream flow trigger points analyzed in the biological opinion as of yet.

During the 2-year pumping test, the greatest impacts occurred at the highest elevation springs in the Muddy River Springs Area (Pederson and Pederson East springs) where large reductions in the flow of these springs were documented (NDWR 2012). More importantly, we concluded through interpretation of the pumping test that the majority of impacts to spring discharge were still developing as of the end of the 2-year pumping test (Service et al. 2013), and the final impacts to the springs would not fully culminate for at least months following the cessation of the test pumping (as has so far been confirmed by observation) (Service et al. 2013).

Environmental baseline information for the Moapa dace prior to 2006 can be obtained in the PBO; updated information since 2006 is provided below.

b. 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 acres 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.

c. 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 square feet of sheet flow.

d. Kane Springs Valley Groundwater Development Project

On October 29, 2008, the Service issued a non-jeopardy biological opinion (File No. 84320-2008-F-0007) to the Ely District Office of the Bureau of Land Management for the purpose of permitting the construction of groundwater production and monitoring wells, water pipelines, storage, tanks, power transmission lines and substations, access roads, and fiber optic lines by the Lincoln County Water District (LCWD), Lincoln County Power District Number 1, and the Lincoln County Telephone Company. The proposed action also included the pumping of 1,000 afy of water from the Kane Springs Valley aquifer, which is within the low-gradient, high-transmissivity zone that connects Kane Springs Valley, Coyote Springs Valley, and the Warm Springs Area Basins. The analysis stated it would be difficult to determine effects resulting specifically from this project from those resulting from the 2006 PBO (described above). However, concurrent monitoring of the Kane Springs well was required in addition to the monitoring required in the 2006 PBO. The project proponents also agreed 1) to reduce groundwater pumping by half in the Kane Springs Valley should stream flows reach 3.15 cfs or less but greater than 3.0 cfs at the Warm Springs West gage; and 2) to stop pumping in Kane Springs Valley should stream flows reach 3.0 cfs or less at the Warm Springs West gage. Results from the 2-year pumping test described above includes impacts from groundwater pumping from this project.

e. 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.

f. Reproductive ecology study

On December 28, 2012, the Service issued a biological opinion (84320-2013-F-0029) for issuance of a recovery permit to the University of Arizona for the capture of up to 40 adult Moapa dace in order to study their reproductive ecology to determine whether and how the species can be bred successfully in captivity. The consultation was reinitiated, and the Service issued a second biological opinion (84320-2013-F-0029-R001) on December 3, 2013, to include the capture and study of an additional 30 dace. The Service determined that neither action were likely to jeopardize the continued existence of the Moapa dace because enough dace would remain in the wild population to compensate for the loss.

STATUS OF THE DESERT TORTOISE IN THE ACTION AREA

Habitat

The project is located in Dry Lake Valley of the Northeastern Mojave Recovery Unit for the desert tortoise. Most of the habitat in the Action Area is potentially suitable for the desert tortoise and is largely dominated by Mojave creosote-bush scrub vegetation and includes Mojave mixed scrub and creosote-bursage vegetation. Dominant species associated with this vegetation community include shadscale (*Atriplex confertifolia*), brittlebrush (*Encelia farinosa*), creosote (*Larrea tridentata*), bursage (*Ambrosia dumosa*), and desert saltbush (*Atriplex polycarpa*) that occur on lower slopes and in washes. Associate species also included Mojave yucca (*Yucca schidigera*), Mormon tea (*Ephedra nevadensis*), range ratany (*Krameria parvifolia*), desert trumpet (*Eriogonum inflatum*), big galleta (*Hilaria rigida*), and Indian ricegrass (*Oryzopsis hymenoides*).

The portion of the 230-kV gen-tie transmission route to the Harry Allen Substation (approximately 1.7 miles in length) that traverses Dry Lake is almost completely unvegetated with hard-packed soils, often with an alkali crust. Based on the lack of vegetation, there is no forage or cover present for desert tortoises. This portion of Dry Lake occasionally becomes completely inundated.

Near the south end of the transmission interconnection, the habitat becomes steeper with rockier soils and greater components of cholla (*Cylindropuntia* sp.), Mojave yucca and prickly pear (*Opuntia* sp.). This area is crossed by several small ephemeral drainages originating from a large sloping bajada extending from the southwest.

Desert Tortoises in the Action Area

All survey results are based on information in the BIA's 2013 biological assessment. Three separate desert tortoise surveys were conducted within the project action area. In May 2012, surveys covered the SPGF, access road, and gen-tie transmission lines. The water pipeline was surveyed in October 2012. Where the 230-KV gen-tie transmission line traverses Dry Lake, protocol surveys were not conducted because it is not suitable desert tortoise habitat. Small portions of this area were spot sampled; suitable burrows were not observed, and soil conditions were not conducive for burrow excavation. The vegetated margins of the lake bed were surveyed since these areas represented potentially suitable foraging areas; though soils in these areas were still extremely hard packed. In October 2013, a modification of the 230-kV route near the Harry Allen substation was surveyed (BIA 2013). All observed desert tortoise sign were mapped and recorded. Sign included scat, burrows, live tortoises, carcasses, shell fragments, eggshells, tracks, courtship rings, and drinking depressions. Desert tortoise and desert tortoise sign were observed in the Action Area (Table 2). Although considered expired, results from surveys of these project areas from 2010 are consistent with the 2012 and 2013 survey results (BIA 2010, 2013).

Table 2. Desert tortoise sign observed during surveys of the proposed solar facility and associated project components (BIA 2013).

Sign	Solar Field	Water Pipeline ROW	230-kV Transmission Line	500-kV Transmission Line	Access Road	Totals
Burrows	19	14	23	2	1	59
Carcasses[1]	0	1	3	0	0	4
Live tortoises ≥160 mm MCL	1	2	1	1	0	5
Live tortoises <160 mm MCL	0	1	0	0	0	1

[1]Carcass totals include individual locations of whole carcasses and shells or their parts.

One adult desert tortoise and 14 suitable desert tortoise burrows were observed on the SPGF area; one adult tortoise, 23 suitable desert tortoise burrows, and three desert tortoise shells or shell fragments were observed along the 230-kV transmission line; one adult desert tortoise and two potentially suitable burrows were observed along the buffer transects associated with the 500-kV gen-tie transmission line; one potentially suitable burrow occurred along the access road; and two adult and one subadult desert tortoise and fourteen suitable burrows were observed along the pipeline ROW.

Based on Table 3 in the 2010 Service protocol (Service 2010b), the following number of desert tortoise are estimated to occur within the area of each specific project components: 2 (95%CI: 0.36-10.64) in the SPGF site; 7 (95%CI: 1.98-23.11) in the pipeline ROW; and 2 (95% CI: 0.37-10.77) in the 230-kV transmission line ROW.

Accurate estimates of numbers of juvenile tortoises or tortoise eggs are difficult to make and involve uncertainty. Turner et al. (1987) estimated that juvenile and hatchling tortoises accounted from 19- to 81-percent of the overall population. If this assumption is used, the expected number of juvenile and hatchling tortoises expected on the SPGF would be between 0 and 56 (0.44-56.00); the expected number of juvenile or hatchling tortoises within the water pipeline ROW would be between 2 and 122 (2.44-121.63); and the expected number of juvenile and hatchling tortoises along the rerouted portion of the 230-kV transmission line ROW would be between 0 and 57 (0.46-56.68).

During May and June, the project area would be expected to contain desert tortoise eggs (Turner et al. 1984, Wallis et al. 1999). Assuming a 1:1 sex ratio, there are between 0.18 and 5.32 female tortoises in the SPGF; between 0.99 and 11.56 female tortoises in the pipeline ROW; and between 0.19 and 5.39 female tortoises in the rerouted portion of the 230-kV transmission line ROW. Female tortoises lay an average of 1.6 clutches per year (Turner et al. 1984) and each clutch contains an average of 5.38 eggs (Turner et al. 1986). Thus, between 1.55 and 45.79 eggs would be expected within the SPGF; between 8.52 and 99.50 eggs would be expected within the

pipeline ROW; and between 1.64 and 46.40 eggs would be expected within the rerouted portion of the 230-kV transmission line ROW.

Desert tortoises are expected to be present along the proposed access road and the 500-kV transmission route based on the presence of sign and/or suitable burrows, though population estimates along these routes are not possible because adult desert tortoises were not detected. An adult desert tortoise was observed in the buffer area associated with the 500-kV transmission line; however, tortoises located in buffer areas are not used to generate relative abundance estimates.

FACTORS AFFECTING THE DESERT TORTOISE IN THE ACTION AREA

a. Kern River Gas Transmission (KRGT) Project

Two parallel natural gas pipelines operated by Kern River traverse the southeastern portion of the proposed primary recipient area and proposed BLM ROW for the project power transmission line. Features of the pipeline ROWs that co-occur in the action area for the solar project include the utility (main) access road where the road crosses over the ROWs in two locations. The pipeline projects required a license from the Federal Energy Regulatory Commission (FERC), ROWs from BLM, and permit from the Army Corps of Engineers. The biological opinion for the first KRGT pipeline was issued to FERC on December 21, 1990 (File No. 1-1-87-F-36R). The Service concluded that 45 desert tortoises may be killed or injured; 424 desert tortoises harassed; and 93 desert tortoise nests destroyed. As of June 24, 1991, approximately 23 deaths and 253 captures/movements of desert tortoise were recorded by Kern River along the pipeline ROW. Problems associated with vehicular traffic on the ROW and access roads may have contributed to the mortalities in combination with high desert tortoise activity levels that were not anticipated. Consequently, on June 24, 1991, FERC requested reinitiation of formal consultation for the project based on a high incidence of desert tortoise mortality and captures/movements on the pipeline project, which exceeded those limits established in the incidental take statement. The Service responded by letter dated June 28, 1991, and under reinitiation of consultation, imposed additional minimization measures, increased the capture/movement limits for desert tortoise from 294 to an unlimited number, and injury/mortality limits from 25 to 35.

On July 9, 2002, the Service issued a biological opinion (File No. 1-5-02-F-476) to FERC for construction, operation, and maintenance of the second KRGT pipeline, adjacent to the first pipeline. The second pipeline project approximates the previous pipelines constructed under the 1990/1991 biological opinions. The pipeline ROW crosses approximately 318.8 miles of potential desert tortoise habitat, of which about 102.9 miles traverse desert tortoise critical habitat. Pipeline construction resulted in disturbance of 4,182 acres of desert tortoise habitat including 1,333 acres of desert tortoise critical habitat. Approximately 50 feet of the construction ROW overlapped the previously disturbed land that was affected by construction of the first KRGT pipeline. During construction of the second KRGT pipeline project, over 840 desert tortoises were encountered and one was killed as a direct result of project activities which includes only one desert tortoise in Utah; and approximately 380 tortoises in Nevada. One tortoise was killed on June 8, 2011, as a result of maintenance operations. Consequently, BLM

and the Service agreed that the requirement for reinitiation of consultation had been triggered for O&M activities due to a desert tortoise mortality and additional effects to the desert tortoise due to a large-scale translocation project in the pipeline action area. On September 28, 2011, the Service issued a biological opinion to BLM for O&M of the KRGT pipelines (File No. 84320-2011-F-0337). The Service is still waiting for a final report from FERC for this project.

b. Calpine Corporation Natural Gas-Fired Power Plant

On December 20, 2001, the Service issued a biological opinion to the BIA for their proposed approval of a lease of Tribal land to Calpine Corporation for construction, operation, and maintenance of a natural gas-fired power plant. The lease would involve approximately 65 acres for the proposed 760 MW baseload natural gas-fired combined cycle power plant. An additional 33 acres of Tribal land may be used as borrow sites for construction activities which would require BIA approval. Peaking capacity of the plant may reach 1,100 MW. The project would be constructed, operated, and maintained under a long-term lease (25 years with a 20-year option) with Calpine Corporation for Tribal land and water use.

The project would include 500 kV electrical transmission lines and access roads on Tribal and BLM lands. The EPA proposed to issue an authority to construct permit to Calpine Corporation under the Prevention of Significant Deterioration program at 40 CFR§52.21. The U.S. Army Corps of Engineers proposed to permit Calpine Corporation under section 404 of the Clean Water Act. BIA was the lead Federal agency for the consultation. No construction occurred and this project has not moved forward.

c. Sampling and Geotechnical Investigation for Proposed Cement Plant

In 2005, Ash Grove Cement Company, in cooperation with the Tribe, proposed to conduct preliminary studies in support of a proposed cement plant and limestone quarry on the Reservation. On August 24, 2005, the Service issued a biological opinion (File No. 1-5-05-F-497) to the BIA for their approval of the cement project. The project would locate suitable materials to develop the cement plant. The proposed project involved 23.7 acres of disturbance within a 298-acre area.

Area 1 of the proposed cement plant overlaps a portion of the western portion of the solar facility site. Surveys of Siting Area 1 occurred March 24 through 31, 2005. Desert tortoise sign observed during the survey include: 63 burrows, 11 carcasses, 26 scats, and 12 live tortoises. In addition to the 63 typical Mojave desert tortoise burrows that were excavated in soil, there were numerous areas where outcroppings of cap rock with caliche caves and other naturally occurring cavities are present. The abundance of these naturally occurring caves would increase the number of useable tortoise dens from 63, to 100 to 120.

Desert tortoise surveys and tortoise removal from haul and construction road areas began in March 2006. These areas occur outside the action area for the proposed solar project. The cement plant project did not go forward; no biological opinion was issued.

d. Tribal Travel Plaza Water Pipeline

On August 6, 2007, the Service issued a biological opinion (File No. 1-5-05-FW-536, Tier 3) to the U.S. Department of Housing and Urban Development for their proposed funding to construct a water pipeline from an existing well to the existing Tribal Travel Plaza approximately 3 miles away. Construction of the water pipeline resulted in 17.57 acres of desert tortoise habitat disturbance. No desert tortoises were reported taken as a result of the project.

e. UNEV Pipeline

On November 13, 2009, the Service issued a biological opinion to the BLM for ROW grants to construct, operate, and maintain the UNEV petroleum pipeline (File No. 6-UT-09-F-023. The UNEV gas pipeline project aligns with the previous KRGT pipeline ROWs and crosses the main access road as described above for the KRGT Project. On April 8, 2011, a desert tortoise was killed after being buried under a spoil pile. A second tortoise was crushed by a project vehicle and killed on May 9, 2011. A third tortoise died on June 29, 2011, when it fell into an open project trench, exceeding the incidental take exempted in the biological opinion. Consultation was reinitiated, and the Service issued a second biological opinion on July 1, 2011, exempting three additional desert tortoise mortalities or injuries (five in total). On July 18, 2011, BLM reported a fourth desert tortoise mortality when a project vehicle ran over and crushed a very small tortoise in the road. On August 20, 2011, UNEV reported the fifth tortoise mortality, a crushed desert tortoise on their ROW. The mortality report concluded that the mortality was caused by an unauthorized, private vehicle that illegally accessed the ROW.

On August 31, 2011, BLM requested a second reinitiation of consultation in response to the additional desert tortoise mortalities. On September 29, 2011, the Service issued a biological opinion for the UNEV pipeline project. The Service exempted incidental take of 12 desert tortoises through injury or mortality, including the 5 previously killed and 237 desert tortoises captured and moved from harm's way.

On March 21, 2012, the BLM submitted a memorandum to the Service describing a newly discovered Sahara mustard (*Brassica tournefortii*) infestation in the ROW of the UNEV pipeline; a plan to treat the infestation; minimization measures to protect the desert tortoise during the treatment; and a post-application monitoring plan. The infestation occurred approximately from Meadow Valley Wash in Clark County (milepost 371) to the Beaver Dam Slope (milepost 325) at the Nevada and Utah state line. This situation constituted emergency consultation; thus, consultation was reinitiated for the third time and resulted in the Service issuing a biological opinion for this emergency consultation on July 19, 2012.

f. K Road Moapa Solar Energy Project

In 2012, the Service issued a biological opinion (File Nos. 84320-2011-F-0430) to the BIA for the K Road Moapa solar energy project under the intra-Service PBO for the Proposed Muddy River MOA (File No. 1-5-05-FW-536, Tier 5). The project involved the Tribe leasing land to a private applicant for the construction of a PV solar generating station 30 miles northeast of Las Vegas in Clark County. The BIA approvals included the lease of Tribal land and grant of

easement for ROW for the access road, 12-kV transmission line, and water pipeline. The BLM issued ROW grants for an up to 500-kV transmission line and improvement of an existing access road. The BLM ROW occurs within an existing utility corridor, of which 5.0 miles is located on the Reservation and 0.5 mile on BLM land just south of the Reservation boundary. The project area is located on approximately 2,241 acres of land within the Reservation and 12 acres on BLM land within the utility corridor (total of 2,153 acres). All components, with the exception of power transmission lines, access roads, firebreak, and water pipeline, will be developed within the fenced 2,000-ac solar facility. Power and water transmission lines include an approximate 5.5-mile electric transmission line corridor (200 feet wide), an approximate 1-mile water pipeline corridor (25 feet wide), and an approximate 3-mile 12-kV transmission line (25 feet wide) to the Moapa Travel Plaza. The project also includes a 6,000-ac site to receive displaced tortoises and two additional evaluation areas for short-term use (i.e., 5 years or less) associated with translocation of the tortoises. The Tribe will conserve the established home ranges of most translocated tortoises, up to 6,000 acres, at least until the lease on the 2,000-ac solar site ends, and the Service determines that the site is available and suitable.

Desert tortoise pre-project surveys estimated that 25 to 103 adult and sub-adult desert and 20 to 83 hatchling and juvenile tortoises would occur in the 2,000-acre K Road solar facility boundary; thus, the biological opinion identified a threshold of 103 adult and subadult and 83 hatchling and juvenile desert tortoises could be taken by capture within this area of the project. On April 13, 2013, the BIA reinitiated consultation for the project because 98 of the 103 subadult and adult desert tortoises had been captured in the solar facility boundary, and the final capture number was anticipated to exceed the identified 103 threshold. Based on the information in the reinitiation request, the Service revised the incidental take threshold and identified that no more than 120 adult and subadult tortoises would be captured and translocated from the solar facility boundary (File No. 84320-2011-F-0430.R001). As was reported on July 29, 2013, final clearance surveys of the solar facility area resulted in the capture of 105 adults and subadults and 49 hatchlings and juveniles; these tortoises have been or will be translocated according to the translocation plan for the project (BIA 2011).

g. Other Existing Linear Disturbances and Anthropogenic Features

The Union Pacific Railroad crosses through the Reservation east of the solar site. I-15 occurs outside the Reservation, south and east of the solar site. I-15 has been fenced to exclude tortoises and thus restricts east-west movement of tortoises in the area. The railroad also presents a barrier to tortoise movement but tortoises are likely capable of crossing the railroad at certain locations. Several large culverts exist that allow tortoise passage underneath the levee for the railroad. Unpaved roads and the access road that extends beyond the paved portion of Las Vegas Boulevard provides public, Tribal, and project access to the action area. A northeast to southwest BLM utility corridor occurs within the Reservation, west and north of the solar site and recipient areas.

h. BLM PBOs in the Action Area

On November 25, 1997, the Service issued a PBO (File No. 1-5-97-F-251) to BLM for implementation of various land management programs within the Las Vegas District planning

area excluding desert tortoise critical habitat and areas of critical environmental concern (ACECs), and outside the Las Vegas Valley. Activities proposed that may affect the desert tortoise in the action area include issuance of a ROW, Recreation and Public Purposes Act leases, mineral material sales and leases, and mining plans of operation. The programmatic consultation is limited to activities which may affect up to 240 acres per project, and a cumulative total of 10,000 acres excluding land exchanges and sales. Only land disposals by sale or exchange in Clark County but outside the Las Vegas Valley are covered under the consultation up to a cumulative total of 14,637 acres. Thus, a maximum total of 24,637 acres of desert tortoise habitat may be affected by the proposed programmatic activities.

On June 18, 1998, the Service issued a PBO (File No. 1-5-98-F-053) to BLM for implementation of various land management programs within desert tortoise habitat and the Las Vegas planning area, including desert tortoise critical habitat and ACECs. Activities that were proposed that may affect the desert tortoise in the action area include recreation; designation of utility corridors and mineral material extraction areas and designation of the desert tortoise ACECs.

On June 17, 2010, the BLM submitted a programmatic biological assessment to the Service to request consultation for program-level and project level actions that may affect, and are likely to adversely affect 19 threatened and endangered species, including the desert tortoise and Moapa dace, and of which 13 have designated critical habitat within the BLM's action area. On January 2, 2013, the Service issued a non-jeopardy PBO to the BLM based on review of these activities. While the BLM's 1998 resource management plan remains in effect, the 2013 PBO replaces the Service's 1998 document, which covered a 10-year period.

EFFECTS OF THE PROPOSED ACTION

Effects of the action refer to the direct and indirect effects of the proposed action on the species or critical habitat that would be added to the environmental baseline, along with the effects of other activities that are interrelated or interdependent with that action. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification.

Interdependent actions are those that have no independent utility apart from the action under consideration. Indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur. Indirect effects can be both spatial and temporal in nature. In contrast to direct effects, indirect effects can often be more subtle, and may affect species and habitat quality over an extended period, long after project activities have been completed. Indirect effects are of particular concern for long-lived species such as the desert tortoise, because project-related effects may not become evident in individuals or populations until years later.

MOAPA DACE

The Moapa dace will not be directly affected by the physical construction and maintenance of the proposed action; however, groundwater pumping activities associated with the action are interrelated actions. The effects of the proposed groundwater pumping associated with the project on the Moapa dace were previously analyzed in the 2006 PBO, which evaluated the

effects on the endangered Moapa dace from cumulative groundwater withdrawal of 16,100 afy from the carbonate aquifer in Coyote Spring Valley and California Wash. The Tribe is only one of multiple parties that will be withdrawing groundwater from the Coyote Spring Valley and California Wash basins under the programmatic action. To date, biological opinions for site-specific actions that have been tiered to the 2006 PBO and are still active included analyses for 1) CSI's appropriated water rights of 4,600 afy from the Coyote Spring Valley basin (Tier 01); 2) SNWA's appropriated water right of 9,000 afy from the Coyote Spring Valley basin (Tier 02); 7 afy of the Tribe's appropriated 2,500 afy of water (Tier 03); and 72 afy of water during 5 years of construction and 40 afy during O&M of the Tribe's appropriated 2,500 afy of water for the K Road Solar Energy Project (Tier 04). During construction of the K Road Solar Energy project, 2421 afy of water appropriated for use by the Tribe would still be available. The highest use of water for the MSEC project would be during construction when 50 afy of water would be needed for two years; therefore, 2371 afy of water appropriated for use by the Tribe would then be available. The anticipated effects from the Moapa Solar Energy Project are consistent with those anticipated in the PBO. The use of up to 50 afy of water during 2 years of construction and up 30 afy during the 25 years of O&M of the proposed solar project will contribute to adverse effects on the Muddy River Springs area discharge and subsequently the Moapa dace as analyzed in the 2006 PBO. Use of groundwater for the project will become part of the environmental baseline for future groundwater withdrawals for the affected aquifer.

DESERT TORTOISE

Direct Effects

Construction and O&M Effects

We estimate that all life stages of desert tortoise that occur within the SPGF area and in harm's way on other project areas, as described above, may be adversely affected by the proposed action. Our estimates of the numbers of desert tortoises and eggs that are likely to occur in the action area are based mostly on pre-project survey data.

Death and injury of desert tortoises could result from excavation 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. Desert tortoises that enter or attempt to cross project access roads may be struck resulting in death or injury. Mortality also may result from individual desert tortoises or their eggs being crushed or buried in burrows during construction and O&M-related activities. Because of increased human presence in the area, desert tortoises may be killed or injured due to collection or vandalism associated with increased encounters with workers, visitors, and unauthorized pets. Desert tortoises also may be attracted to the construction area by application of water to control dust, placing them at higher risk of death or injury.

Prior to ground disturbance, the Applicant will install desert tortoise exclusion fencing and security fencing around the SPGF and remove all desert tortoises that are encountered during clearance surveys. Based on pre-project surveys, two (but up to 10 tortoises may be moved

without triggering reinitiation, see Table 3) tortoises are expected to need to be relocated from the SPGF area (BIA 2013). While fencing the SPGF will overall reduce direct mortality of tortoises during construction within the fence, in some cases, desert tortoises that have been fenced out of their home territories may make repeated efforts to return and may follow fence lines for long periods of time. If these desert tortoises are exposed to harsh conditions (i.e., cold or hot temperatures) while pacing fences, they may die. We expect that desert tortoises whose home territories have been reduced by the SPGF would be the animals most likely to pace fences. An unknown number of tortoises occur adjacent to the SPGF, and the installation of fencing may reduce the home range size of some of these individuals. 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.

Prior to ground disturbance for the SPGF perimeter fencing and prior to other ground-disturbing activities within and outside the SPGF (transmission lines, water pipeline, access roads), the Applicant will perform desert tortoise clearance surveys and move all desert tortoises encountered out of harm's way. Therefore, we anticipate that construction activities are likely to kill a small number, if any, adult or subadult individuals larger than 160 millimeters (mm) midline carapace length (MCL) (Table 3). We acknowledge, however, that not all individuals killed or injured during construction, operations, and maintenance activities will be detected by biological monitors or project staff and subsequently reported to us. The inability to detect all tortoises is largely due to their cryptic nature, fossorial habits, and limited abundance; and in the case of juveniles and eggs, detection probabilities are reduced due to their small size and location underground. An additional confounding factor reducing the detection of all project-related tortoise mortalities is that scavengers may locate, consume, or remove carcasses before monitors can locate them.

Overall, we expect death and injury of most subadult and adult tortoises to be avoided during construction and O&M activities through implementation and compliance of Conservation Measures 2, 3, 5, 6, 8, 9, 11, 15, 17, and 22.

Project Access Effects

Primary access to the proposed solar site would be via I-15. A 2.5-mile gravel access road connecting the SPGF to the existing paved frontage road adjacent to I-15 would be constructed, resulting in 14.4 acres and 0.7 acres of habitat disturbance on BLM and BIA-administered lands, respectively. Project-related vehicles and equipment will operate only within the fenced boundary and access road within the utility corridor. Roads that are not designated as open by the Applicant and Tribe will not be used by project personnel unless accompanied by an authorized biologist.

The primary effect of project access on desert tortoises is the risk of vehicle strikes. Access to project work areas outside of the fenced SPGF may kill or injure desert tortoises due to increased vehicular use of existing routes. Implementation of Conservation Measures 2, 3, 6, 8, and 9 is expected to minimize impacts to desert tortoises from access effects. Because all workers will participate in the WEAP (Conservation Measure 2), and speed limits will be limited to 25 mph

(Conservation Measure 9), workers may be less likely to strike desert tortoises than a casual user. In addition, clearance surveys (Conservation Measure 6) and the use of authorized desert tortoise biologists and monitors during construction of the access roads (Conservation Measures 3, 6, 8, and 9).

While no desert tortoises were observed along the access road during pre-project surveys (BIA 2013), we cannot predict how many individuals will be killed or injured due to project-related access because of variables such as weather conditions, the nature and condition of roads, public use which may be confused with project use, and activity patterns of desert tortoises at the time the roads are in use; however, we expect this number to be small, if any.

Effects of Loss of Habitat

The proposed project includes the installation of permanent desert tortoise exclusion fencing along the entire solar facility boundary (approximately 4.6 miles), making the 847 acres within the SPGF entirely unavailable to tortoise. Approximately 952 acres of occupied desert tortoise habitat would be permanently disturbed or unavailable to desert tortoises as a result of the proposed project (Table 1).

Because recovery of vegetation in the desert can take decades or longer, we consider all ground-disturbing impacts associated with the proposed project to be long-term. Lovich and Bainbridge (1999) identified various types of anthropogenic impacts to desert ecosystems which may take 50 to 300 years to recover to pre-disturbance plant cover levels. Vasek et al. (1975) demonstrated that in the Mojave Desert, transmission line construction and O&M activities 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. Based on a quantitative review of studies evaluating post-disturbance plant recovery and success in the Mojave and Sonoran deserts, Abella (2010) demonstrated that reestablishment of perennial shrub cover (to amounts occurring on undisturbed areas) generally occurs within 100 years but no fewer than 40 years in some situations. He also determined 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.

Based on the work by Nussear et al. (2009), we calculated that approximately 3,462,505 acres or 67.8 percent of the 5,106,939 acres within the Northeastern Mojave Recovery Unit is considered habitat modeled at the 0.5 or greater "predicted habitat potential level" for desert tortoise (Don Harper, 2011, pers. comm.). The habitat that would be disturbed on a long-term basis (i.e., up to 951.5 acres) constitutes less than 0.01 percent of the modeled habitat at the 0.5 level in the Northeastern Mojave Recovery Unit. While the model does not take into account anthropomorphic disturbances that have historically or are currently affecting the species, it is unlikely that consideration of these would result in a substantial change in this estimate.

While this percentage does not constitute a numerically significant portion of the Northeastern Mojave Recovery Unit, we do not have the ability to place a numerical value on edge effects, habitat degradation, and overall fragmentation that the proposed action may cause or that occurs in the recovery unit as a whole. As a result, the low percentage of habitat within the recovery unit that would be lost underestimates impact of the proposed project 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.

If the facility is decommissioned instead of transferred to the Tribe at the end of the lease, the Applicant would implement restoration activities such as decompacting soils, seeding, and nonnative species control. Because we do not have sufficient information regarding the method or extent of these activities, we cannot determine the level of take that would be associated. Consequently, we are not granting an exemption from the prohibitions against take for these activities. These actions would require reinitiating consultation.

Desert Tortoise Handling and Relocation Effects

Capturing, handling, and moving tortoises for the purposes of relocating them out of the SPGF or moving them out of harm's way on other components of the project may result in accidental death or injury if these methods are 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 using new latex gloves for each new tortoise handled, pathogens may be spread among individuals. Because the Applicant would employ desert tortoise biologists approved by the Service (See *Conservation Measures and Monitoring* section above) and adhere to the most recent Service guidance in addition to implementing the conservation measures outlined in the proposed action, we anticipate it is unlikely that relocating or moving individuals will result in their mortality or injury.

Based on pre-project survey results, we expect 2 (and up to 10) adult and subadult (≥160 mm MCL) tortoises and 0 to 56 juvenile and hatchling (<160 mm MCL) tortoises will be captured and relocated from harm's way as a result of the development of the SPGF; we estimate between 1 and 46 eggs occur in the SPGF area. Because of the difficulty in locating juvenile desert tortoises and eggs, some but not all are likely to be relocated from the SPGF. We anticipate that no individuals larger than 160 mm MCL will be unobserved in the SPGF; therefore, all individuals occurring in the SPGF in this age class will be relocated. Effects to juvenile desert tortoises and eggs that are undetected on the project sites are discussed later in this section.

We anticipate that the Applicant will capture and relocate all adult and subadult desert tortoises from the fenced SPGF and from any portion of the action area where individuals may be in harm's way of project activities. Based on pre-project survey results, we expect up to 9 adult

and subadult desert tortoises may be encountered, captured, and moved from harm's way on the linear ROWs of the project; however, if this number is exceeded, the Applicant will capture and move any additional tortoises that are encountered in harm's way. Desert tortoises that are encountered on linear features of the project in harm's way will be moved the minimal distance out of harm's way to secure and appropriate habitat but no more than 1,000 feet in accordance with the Desert Tortoise Field Manual (Service 2009). Desert tortoises will not be unnecessarily handled (e.g., no marking, no manipulating the tortoise beyond relocating it) or result in an increase in the time necessary to relocate the individual. Because the protocol in the Desert Tortoise Field Manual will be followed; tortoises will be minimally handled; and the distance an individual tortoise is moved is expected to be within its home range, we do not anticipate moving individual tortoises in harm's way will result in mortality or injury of that individual. We do not expect the level of activities during O&M to require an authorized desert tortoise biologist.

Based on the number of tortoises estimated to occur within the solar facility project area and draft Service guidance (Service 2012), development of a desert tortoise translocation plan for this project is not being required. However, desert tortoises that are captured in the SPGF will be relocated in accordance with each individual's Service-approved disposition plan (Conservation Measure 17), which may require temporarily holding tortoises in a facility while health assessments are completed. Information and data from translocation projects have informed this biological opinion; therefore, for the purposes of these analyses, we use the words relocate and translocate interchangeably to describe desert tortoises that will be removed from the SPGF and relocated outside the facility's fence.

All tortoises will be relocated from the fenced SPGF to suitable habitat in as close proximity to the point where they are encountered as possible. Based on the project size and configuration, the furthest distance a desert tortoise may be encountered from the nearest edge of the SPGF is 966 m (0.6 mile). Thus, we do not expect tortoises will need to be relocated much further than 0.6 mile. Prior to relocating tortoises captured in the SPGF, health assessments, which include visual inspection relative to body condition, clinical signs of disease, and collection of biological samples for disease screening (i.e., blood samples to test for antibodies to pathogens), will be completed for each individual in accordance with the most recent Service guidance (Service 2013) and a disposition plan will be prepared. All areas to which tortoises will be relocated from the SPGF will be approved by the Service prior to the tortoise's release to ensure habitat suitability (Conservation Measures 15 and 17). After disease screening results, and approval of disposition plans, the Applicant will relocate all desert tortoises to their respective relocation area. Capture and relocation of individual desert tortoises occurring in the SPGF may result in accidental death and injury due to stress or disease transmission associated with handling; and stress associated with moving individuals outside of their established home range. Relocated individuals and residents in the relocation area may be adversely impacted by resource competition or stress from artificially increasing the density of tortoises in areas outside the SPGF.

Following release, desert tortoises are expected to disperse, but we cannot predict the movement patterns that all relocated individuals are likely to exhibit. Dispersal distances following relocation appear to be influenced by several variables including the distance they are moved from their home range and the availability of resources in the area to which they are moved.

Desert tortoises moved relatively short distances (i.e., less than 1,640 ft) from their home ranges tend to travel shorter distances from their release points than desert tortoises moved more than 1,640 feet. Nussear (2004) reported that for adult desert tortoises moved greater than 1,640 feet, the mean straight-line dispersal distance for both males and females ranged from 0.6 to 3.7 miles. Walde et al. (2008) reported that the mean straight-line dispersal distances for adult desert tortoises using two experimental treatments was approximately 1.6 miles and 2.6 miles for males and 0.9 mile and 1.4 miles for females. Maximum straight-line dispersal distances for translocated adult males ranged from 3.9 miles (Field et al. 2007) to 7.8 miles in the first year following translocation (Walde et al. 2008). Based on the SPGF's size and configuration and the small number of tortoises estimated to occur in the SPGF, we anticipate a small number (e.g., <5), if any, tortoises will be relocated more than 1,640 feet.

The degree to which relocated desert tortoises expand the area they use depends on whether tortoises are released into typical or atypical habitat; that is, if the relocation area supports habitat that is similar to that of the source area, desert tortoises are likely to move less (Nussear 2004). Translocated desert tortoises appear to reduce movement distances following their first post-translocation hibernation to a level that is not significantly different from resident populations (Field et al. 2007; Nussear 2004). As time increases from the date of translocation, most desert tortoises alter their movement patterns from dispersed, random patterns to more constrained patterns, which may indicate establishment of a new home range (Nussear 2004). Just as we cannot predict the distances translocated desert tortoises will move, we also cannot predict the direction these individuals are likely to move. Berry (1986) observed that translocated desert tortoises have exhibited a tendency to orient toward the location of their capture and attempt to move in that direction, and Hinderle (2011) determined that translocation distance but not sex had an effect on the ability of a tortoise to navigate home; other research showed no discernible homing tendency in translocation individuals (Field et al. 2007). Data specific to short-distance relocation indicate that at least some individuals will attempt to return to their former home ranges after release (Rakestraw 1997, Stitt et al. 2003).

Previous translocation studies generally have shown that straight-line dispersal distances from release points vary during the first year following translocation. While the mean straight-line distances reported for several studies are close to or less than 1.6 miles, some translocated desert tortoises move much farther (Nussear 2004, Field et al. 2007, and Gowan and Berry 2009). Based on our analysis of the available data, we expect the movements of most tortoises relocated more than 1,640 feet to remain within 4.0 miles of their release points. This distance was derived by examining the upper limits of the 95 percent confidence intervals for available data. However, as mentioned above, relocated individuals also significantly expand the area they occupy in the first year following translocation (e.g., 3.9 to 6.9 mi^2 at a Nevada site and from 0.2 to 10.3 mi^2 at a Utah site). The distance of 4 miles was chosen to define the maximum anticipated dispersal area for recipient areas.

In one study, the majority of dispersal movement away from the release site occurred during the first 2 weeks after translocation (Field et al. 2007). During this time and over the period prior to establishment of a new home range, translocated desert tortoises may experience higher potential for mortality because they are moving through unfamiliar habitats and are less likely to have established cover sites that provide protection. Studies have documented various sources of

mortality for translocated individuals, including predation, exposure, fire, disease, and flooding (Nussear 2004; Field et al. 2007; Berry 1986; U.S. Army 2009, 2010). Of these, mammal predation appeared to be the primary source of mortality in most translocation studies (Nussear 2004; Field et al. 2007; U.S. Army 2009, 2010).

Various studies have documented mortality rates of 0, 15, 21, and 21.4 percent of translocated desert tortoises in other areas (Nussear 2004, Field et al. 2007). Nussear (2004) demonstrated that mortality rates among translocated desert tortoises were not statistically different from that observed in resident populations. However, this study did not compare mortality rates in resident populations to those in control groups; therefore, we cannot determine if the translocation caused increased mortality rates in the resident population. Recent studies in support of the Fort Irwin expansion (U.S. Army 2009 and 2010) compared mortality rates associated with resident and translocated desert tortoise populations with that of control populations; preliminary results indicated translocation did not increase mortality above natural levels (Esque et al. 2010). This and other fieldwork indicate that desert tortoise mortality is most likely to occur during the first year after release. After the first year, translocated individuals are likely to establish new home ranges and mortality is likely to decrease.

Juvenile desert tortoises will comprise a portion of the overall mortality predicted within resident and translocated populations. In general, this life stage experiences higher mortality rates than subadults and adults under natural circumstances and are more susceptible to predation. We estimate that the Applicant will locate and move half of the 20 to 83 juvenile desert tortoises on the proposed solar site. Because of the difficulty in locating juvenile desert tortoises, individuals that are not translocated are likely to die during construction. However, as stated above for direct effects from construction and O&M, based on the estimated desert tortoises expected to occur within the action area and the conservation measures that have been identified for each project component, we conclude that death and injury resulting from translocation of juvenile desert tortoises will not appreciably reduce the desert tortoise population or reproductive success within the Northeastern Mojave Recovery Unit.

Based on the available data on translocation and consistent with the findings in Esque et al. (2010), we conclude that mortality rates in the resident and relocated tortoises are unlikely to be elevated above levels that these populations would experience in the absence of capture and relocation of tortoises in the SPGF. Therefore, we anticipate that death or injury of a small number (see Table 3), if any, subadults, adults, juveniles, or eggs will be the direct result of relocation.

In conclusion, we do not anticipate that moving desert tortoises out of harm's way from the SPGF or the project's linear ROWs would result in death or injury because these individuals would remain near or within their existing home range, which is not likely to result in significant social or competitive impacts to resident desert tortoises in the area. Following release of a desert tortoise relocated outside of its home range, a small number may die due to exposure, stress, dehydration, inadequate food resources, and increased predation. We anticipate most of this mortality is likely to occur in the first year after release, during the period that relocated animals are attempting to adjust or establish new home ranges. However, we cannot determine if mortality rates in relocated individuals would be above natural mortality levels.

Based on draft Service guidance (Service 2012), we are not requiring relocated desert tortoises to be monitored using radiotelemetry after release. However, we will require the exterior of SPGF desert tortoise fence to be monitored on a daily basis during the active desert tortoise season (mid-March through May and September through mid-November) for a minimum of one year post-construction to document any desert tortoises that may be in the area or in stress. If tortoises are still being documented along the fence at the end of the first year, additional monitoring may need to be required. Fencing will be checked monthly and after precipitation that could result in erosion along the base of the fence for the life of the project (See Term and Condition 3.b. below for more information).

Indirect Effects

Indirect effects of the proposed project also result in death or injury to desert tortoises. Some of these effects include increased predation by common ravens, loss or fragmentation of habitat linkages important to maintaining population and genetic connectivity, degradation of habitat and the diet of desert tortoises from the spread of nonnative plant species, and noise and lighting from project construction and operations.

Predator Subsidies

Common ravens and coyotes are attracted to human activities in the desert because food and water subsidies, and roosting and nesting substrates that would otherwise be unavailable. Human activities also facilitate expansion of raven and coyote populations into areas where they were previously absent or in low abundance. Ravens likely will frequent the project areas because of the potential availability of such subsidies. Aside from the Tribal community, no other human communities occur in the action area. Road-kill of wildlife along I-15 provides additional attractants and subsidies for opportunistic predators and scavengers; road-kill is not likely to increase appreciably as a result of the project as I-15 is a heavily traveled highway.

Facility infrastructure, such as power poles, fences, buildings, and other structures on the project site, may provide perching, roosting, and nesting opportunities for ravens and other avian predators. Natural predation rates may be altered or increased when natural habitats are disturbed or modified. As stated above, common raven populations in some areas of the Mojave Desert have increased 1,500 percent from 1968 to 1988 in response to expanding human use of the desert (Boarman 2002). Since ravens were scarce in the Mojave Desert prior to 1940, the existing level of raven predation on juvenile desert tortoises is considered an unnatural occurrence (BLM 1990). In addition to ravens, feral dogs have emerged as significant predators of desert tortoises adjacent to residential areas. Though feral dogs may range several miles into the desert and have been observed digging up and killing tortoises (Evans 2001), we are not aware of any reports of feral dogs in the project area.

To avoid and minimize the availability of project sources of subsidies for predators, subsidies will be minimized by Conservation Measure 12 which proposes monitoring for the presence of ravens and other predators. A predator-control plan will be implemented if predator densities substantially increase in the vicinity of the facility. Specific minimization actions to be

implemented include onsite trash management, elimination of available water sources, designing structures to discourage potential nest sites, use of hazing to discourage raven presence, and active monitoring of the site for presence of ravens.

Nonnative Plant Species

Another indirect effect from the development of the proposed project is the potential introduction and spread of nonnative, potentially invasive plant species into habitats adjacent to the project sites. Construction and O&M activities of the proposed project components may increase distribution and abundance of nonnative species within the action area due to ground-disturbing activities that favor these species. Project 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 (Brooks et al. 2003) and changes in forage opportunities for desert tortoises.

The Applicant proposed conservation measures as part of the proposed action to address the potential effects from nonnative plant species. Conservation Measure 4 includes controls at entry locations to facilitate weed management and invasive species control from offsite sources. Trucks and other large equipment would be randomly checked before entering the site for any invasive species debris or seed. Conservation Measure 13 describes a Weed Management Plan, which will be approved by the BIA, BLM, and the Tribe which will be implemented prior to the initiation of ground-disturbing activities. Measures in the Weed Management Plan include: worker awareness training; limiting ground disturbance to designated areas only; maintenance of vehicle wash and inspection stations and close monitoring of materials brought onto the site to minimize the potential for weed introduction; reestablishment of native vegetation in disturbed areas to prevent weeds from colonizing newly disturbed areas; and, regularly scheduled monitoring to quickly detect new infestations of weeds, coupled with rapid implementation of control measures to prevent further infiltration.

While we cannot reasonably predict the increase in nonnative species abundance that this project may cause within the action area, the degradation of habitat due to spread of nonnative plants would be minimized through the measures outlined above and in the Weed Management Plan.

Edge Effects

Increased noise levels, ground vibrations, and artificial lighting may affect desert tortoise behavior during construction and O&M of the MSEC over a 30-year period. Effects from construction noise would occur primarily during the 24 months that construction of the MSEC project is expected to take (BIA 2013). While limited data exist on the effect of noise on desert tortoises, Bowles et al. (1999) demonstrated that the species has relatively sensitive hearing (mean = 34 dB SPL), but few physiological effects were observed with short-term exposures to jet aircraft noise and sonic booms. These results cannot be extrapolated to chronic exposures over the lifetime of an individual or a population. In addition during the construction period, traffic would be the primary source of ground vibrations affecting the desert tortoise. Although variable throughout the construction period, approximately 100 daily round trips are expected. Effects from artificial lighting would occur during O&M primarily near the main entrance to the

SPGF and the substations. The Service's 1994 Recovery Plan cited noise and vibration as having potentially significant effects on the desert tortoise's behavior, communication, and hearing apparatus, but limited additional data have been obtained regarding these issues (Service 1994). Noise, ground vibrations, and artificial lighting can affect wildlife in various manners that include physiological damage, masking and behavioral disruption, and chronic stress (Ruby et al. 1994, Longcore and Rich 2004, Blickley and Patricelli 2010). However, we do not have sufficient data documenting the effects of construction noise, ground vibrations, or artificial lighting on desert tortoise behavior and therefore, cannot reasonably predict the magnitude of effects from noise, ground vibrations, or artificial lighting on desert tortoise populations. Based on the ability of other species to adapt to disturbance from noise (Rabin et al. 2003); noise attenuation as distance from the project increases; the short time period when traffic volume will be high; and limited lighting which will be focused downward to avoid lighting habitat beyond the SPGF (Conservation Measure 10), we do not expect any desert tortoises to be injured or killed as a result of project-related noise impacts.

Because few data exist relative to edge effects from noise, vibrations, and lighting during construction and O&M activities, we cannot determine how these potential impacts may affect desert tortoise populations adjacent to the development sites. The lack of information is especially relevant when evaluating effects to individuals that would be impacted by the proposed project. 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 temporarily or permanently and move elsewhere.

Effects on Population Connectivity

We expect minimal effects to local tortoise population connectivity. 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 determined 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. Project access roads are not anticipated to decrease local population connectivity substantially beyond the existing conditions. However, we expect the fenced SPGF could limit habitat connectivity and tortoise movement at a local level (see *Construction and O&M Effects* section above for additional information). We are unaware of existing data to inform a determination of the magnitude and extent of these effects, but we expect movement patterns of individual tortoises occurring in the Action Area could be altered once the fence for the SPGF is installed.

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) can limit gene flow and the ability of desert tortoises to move between larger blocks of suitable habitat and populations.

Averill-Murray et al. (2013) modeled habitat linkages between [desert] tortoise conservation areas (TCAs). Protection of habitat within TCAs is expected 1) to ensure tortoise populations remain distributed throughout the species' historic range and 2) to conserve the genetic breadth of the species (Service 2011). TCAs are considered to be the minimum baseline areas within which recovery efforts should be focused (Service 2011). Therefore, the preservation of the habitat linkages identified by Averill-Murray et al. (2013) is expected to maintain the movement and therefore gene flow of tortoises between TCAs, thereby increasing the functionality of TCAs and potentially desert tortoise recovery.

The proposed solar facility would be constructed in Dry Lake Valley, a closed northeast-trending basin, bounded on the northwest by the Arrow Canyon Range and on the southeast by the Dry Lake Range (BLM 2012). These topographic features may to some extent isolate the desert tortoises in Dry Lake Valley from other adjacent populations, and Dry Lake Valley was not identified in modeling least-cost pathways for desert tortoise gene flows based on geographic distance, barriers to dispersal, and landscape friction (Hagerty et al. 2010). We do not know what the overall importance of Dry Lake Valley to tortoise population connectivity and recovery is, but Dry Lake Valley where the Action Area is has not been identified as a linkage corridor in current modeling or as a TCA (Averill-Murray et al. 2013). Therefore, based on the information currently available, we do not anticipate the proposed project would significantly modify current opportunities for desert tortoise connectivity. However, we cannot predict how the importance of the proposed project area and Dry Lake Valley may change as development resulting in habitat loss continues within the modeled habitat linkages or as new information regarding effects from climate change within these linkages becomes available (Averill-Murray et al. 2013).

Effectiveness of Conservation Measures at Minimizing Potential Effects to Desert Tortoises

Below is a summary of the effectiveness expected to result from the implementation of the BIA, BLM, and applicant-proposed conservation measures in minimizing potential project effects to the desert tortoise.

Conservation Measure 1: Establish sediment control devices and implement BMPs.

Sediment controls will allow existing water flow patterns to remain and maintain natural sediment transport and flow speeds through and off the site. Silt fence or hay bales will be placed around stock piles to prevent erosion during rain events. Slopes and ravine edges susceptible to sheet flow will be protected by installing control measures such as silt fence, hay bales or gravel bags. Stabilize non-active areas as soon as practicable after construction and no later than 14 days after activity on that portion of the site has temporarily or permanently ceased. Place covers over stockpiled dirt prior to storm or high wind events. Gabions will be constructed and placed within drainages at engineered locations to minimize flow velocity and sediment transport downstream. Construction will be planned so that vegetation is left undisturbed until immediately prior to grading. Sediment control measures would minimize erosion and habitat degradation.

Conservation Measure 2: Worker environmental awareness program (WEAP).

The WEAP will be administered to all onsite personnel prior to starting work on the project. The WEAP would enhance the effectiveness of onsite personnel to improve detection and avoidance of desert tortoises, provide instruction to workers if a tortoise is observed, and ensure compliance with the measures in this biological opinion during construction and O&M activities. The record of participants in the WEAP will provide a means to ensure that all workers have been trained.

Conservation Measures 3, 5, 6, 8, and 22: Monitor construction activities.

Authorized desert tortoise biologists and monitors will be provided and responsible for ensuring that all measures in this biological opinion are properly implemented including: reporting all non-compliance issues; all tortoises encountered in harm's way will be moved to safe areas and reported; project vehicles and equipment activity remain in designated areas; and minimizing the risk to tortoises on project access roads. This measure would reduce the risk to desert tortoises that were not encountered during clearance surveys or enter project areas from adjacent habitat.

Conservation Measures 4 and 13: Weed-control.

Introduction of weeds and invasive species into project and surrounding areas will be controlled using a weed management plan including management and operational measures to avoid the introduction or spread of invasive non-native species in the action area.

Conservation Measures 5 and 25: Install tortoise exclusionary fencing and remove tortoises; Conservation Measures 15 and 17: Desert tortoise relocation and health assessments.

Prior to construction, the solar facility boundary would be permanently fenced with desert tortoise exclusion fencing. Surveys will be conducted prior to habitat disturbance for each phase to locate all desert tortoises within the solar facility site. Tortoises located would be handled by authorized desert tortoise biologists in accordance with Service (2009) protocols and relocated to designated areas. The health status of all tortoises proposed for relocation from the SPGF will be evaluated to minimize the potential spread of disease. The goal of these measures is to ensure that all tortoises are moved from harm's way into suitable habitat and are healthy. The disposition plan will describe in detail the specific procedures that will be implemented to achieve this goal.

The fence would prevent tortoises from entering the project site during construction and O&M activities, including tortoises displaced from the project site. Monitoring fence construction would minimize impacts to tortoises that may occur along the fence.

Conservation Measure 7: Fees.

The Applicant will pay remuneration fees based on acres of anticipated disturbance to the Tribe (885.4 acres) and BLM (66.1 acres). The fees provided to the Tribe will be used for tortoise conservation in consultation with the Service (See Term and Condition 5.h below). BLM actions may involve habitat acquisition, population or habitat enhancement, increasing knowledge of the

species biological requirements, reducing loss of individual animals, documenting the species' current status and trends, and preserving distinct population attributes.

Conservation Measure 9: Speed limits.

The proposed speed limit of 25 mph for vehicles and equipment would allow operators more time to see a desert tortoise in their path or harm's way. Low speeds increase the ability of operators to see tortoises in the path of their vehicle or equipment thus avoiding collision with the tortoise.

Conservation Measure 10: Lighting.

The effects of artificial lighting on desert tortoises are not well known. Potential lighting effects would be minimized by focusing lighting toward the solar facility and downward to avoid lighting areas beyond the project perimeter.

Conservation Measure 12: Ravens and other subsidized tortoise predators.

The presence of ravens and other potential human subsidized predators will be monitored and controlled if predator densities substantially increase in the vicinity of the facility. Attraction of ravens and other subsidized predators will be minimized by onsite trash management, elimination of available water sources, designing structures to discourage potential nest sites, and use of hazing.

Conservation Measure 19: Salvage cacti and yuccas; Conservation Measure 20: Mark work areas and locate staging activities in previously-disturbed areas; and Conservation Measure 21: Restore temporary disturbances.

Cacti and yuccas that cannot be avoided during construction on linear ROWs will be salvaged and used to restore temporary disturbances, particularly along the linear project areas, which will speed the recovery of disturbed habitat. To the extent possible, staging areas will be located in previously disturbed areas, minimizing new disturbance. Visibly delineating works areas would inform workers where they may conduct activities and minimize the potential egress of activity beyond these areas. Restoration of disturbances will minimize the habitat loss and minimize spread of non-native plants on the ROW. Where feasible, perennial vegetation will be avoided, thus reducing the loss of shelter and cover habitat for desert tortoises in the action area.

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.

Increased development would cause continued habitat loss, degradation, and fragmentation for the local desert tortoise population; as well as increased harm and harassment of individual

desert tortoises, contributing to the cumulative degradation of the area. Planned future actions such as future transmission line and road corridors, electrical power substations, and industrial solar power plants would likely continue this trend. However, we know of no specific proposal by any non-Federal entity in the action area. The Service determined that most other future actions in the action area would likely require section 7 consultation since the action area is managed by the BIA or BLM.

CONCLUSION

After reviewing the current status of the Moapa dace and the Mojave desert tortoise, 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. We have reached this conclusion based on the following factors:

- The effects of the proposed action on the Moapa dace are within the scope of the actions and effects analyzed in the associated non-jeopardy PBO (File No. 1-5-05-FW-536).

- The BIA, BLM, the applicant, and their contractors will implement numerous conservation measures outlined above to ensure that most tortoises are located and moved out of harm's way and potential desert tortoise injury and mortality is minimized on project work sites (e.g., clearance surveys, authorized desert tortoise biologists, desert tortoise monitors). Since these measures will be implemented, we anticipate that the level of take of desert tortoises will be low (Table 3).

- The BIA, BLM, the applicant, and their contractors will implement measures that are outlined above to ensure that impacts to desert tortoise habitat are minimized.

- The project would not significantly affect the rangewide number, distribution, population connectivity, or reproduction of the desert tortoise; desert tortoises that are moved out of harm's way and placed within their home range will remain in the wild with no long-term adverse effects to survival and reproduction; and the number of tortoises moved out of harm's way and out of their home ranges will be small.

- The potential spread of non-native plant species would be minimized through implementation of an invasive weed management plan.

- Compensation requirements through the BIA, Tribe, and BLM would result in implementing recovery actions for the desert tortoise, as identified by the BIA, Tribe, the BLM, and Service.

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 as intentional or negligent actions that create the likelihood of injury to a 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.

The measures described below for desert tortoises are non-discretionary and must be undertaken by the BIA and BLM so that they become binding conditions of any grant or permit issued to the applicants/permittees, as appropriate, for the exemption in section 7(o)(2) to apply. The BIA and BLM have a continuing duty to regulate the activity covered by this incidental take statement. If the BIA or BLM: 1) fail to assume and implement the terms and conditions; or 2) fail to require the Applicant to adhere to the terms and conditions of the incidental take statement through enforceable stipulations that are incorporated into the permit or grant document, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, the BIA and BLM 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)].

AMOUNT AND EXTENT OF TAKE

Moapa Dace

The Service anticipates that incidental take of Moapa dace through harm (i.e., habitat modification or degradation that results in death or injury) will occur, but the actual death or injury of fish will be difficult to detect for the following reasons: the species has a small body size and finding a dead or impaired specimen is unlikely in a flowing stream environment. On the other hand, significant habitat modification or degradation that could result in take of Moapa dace will be detectable and measurable. Therefore, we are expressing take of Moapa dace in terms of habitat loss resulting from changes in habitat characteristics, such as water temperature or chemistry and water flows. Although the extent of effects to the species as a result of the proposed action is not yet known, future and on-going biological/hydrological studies will assist us in determining how flow reductions and thermal load losses will affect Moapa dace habitat, food availability, reproduction, and fecundity.

Perhaps the most significant impact to Moapa dace habitat that could result from implementation of the proposed action, as a result of decreased discharge and subsequent wetted area, is the reduction of overall volume of water that would be available to the species within the channel, thereby limiting the chance for long-term survival. 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.

We have estimated that withdrawal of 50 afy of groundwater estimated to be needed during the 2 years of construction of the proposed project and 30 afy of groundwater estimated to be needed during 25 years of O&M of the MSEC will contribute to the incidental take of Moapa dace by potentially reducing riffle and pool habitat as described in the 2006 PBO. However, habitat loss and associated incidental take of Moapa dace specific to the proposed solar 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 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 2.7 cfs. Incidental take is not authorized under the 2006 PBO but deferred to project-specific (tiered) opinions. However, as described above, measuring take of dace is difficult; therefore, 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 2.7 cfs, the amount of incidental take for all tiered actions under the MOA, including the MSEC, would be exceeded for the Moapa dace.

Desert Tortoise

The proposed action will result in take (primarily by capture) of all desert tortoises that occur within the fenced perimeter of the proposed solar facility and in harm's way within the development areas of the transmission lines, water pipeline, and access road; and areas where tortoise exclusion fencing would be installed. Table 3 identifies the incidental take threshold for all age classes of desert tortoises during construction activities. Additional desert tortoises in the action area, including buffer areas, may be affected by the project to the extent that incidental take may occur; however, such effects are anticipated to be minor and involve mostly alteration in feeding, sheltering, and reproduction behavior due to reduction or fragmentation of their home ranges.

We acknowledge that we cannot precisely quantify the amount of take that will occur during all project activities. Some of the constraints that make it difficult to determine desert tortoise densities and abundance include the cryptic nature of the species (i.e., individuals spend much of their lives underground or concealed under shrubs), inactivity in years of low rainfall, and low abundance across a broad distribution within several different habitat types. In addition, population numbers and distribution of individuals fluctuate in response to weather patterns and other biotic and abiotic factors over time. The number of juvenile desert tortoises and eggs is even more difficult to quantify because of small size, their location underground, and low detection probabilities during surveys. The following paragraphs define the form of take and the number of individuals we anticipate will be taken by project activities.

All desert tortoises and most nests with eggs within the proposed fence perimeter for the solar facility will be taken as result of the project. The actual number of individuals missed during clearance surveys and killed during construction is unknown. We expect most tortoises missed would be hatchlings and juveniles. Locating the carcasses of small tortoises or egg fragments is

unlikely. To address this issue, we have used the threshold for capture of subadult and adult individuals (up to 10 tortoises) on the proposed project sites as a surrogate measure of mortality of the smaller size classes and eggs. Using this threshold as a surrogate assumes that our method of calculating the number of reproductive females, which is based on the estimated abundance of subadult and adult desert tortoises on the proposed project sites, allows us to also calculate the number of juveniles and eggs that may be affected. Consequently, detecting more than 10 subadult and adult desert tortoises on the solar facility site would indicate that a larger number of juveniles and eggs may be killed or destroyed during construction.

The following take of tortoises is based on the pre-project desert tortoise survey data, the proposed action, and the measures proposed by the BIA and BLM. Up to 10 adult and sub-adults and up to 56 juvenile tortoises may be captured within the SPGF fence perimeter and relocated; and 1 adult or sub-adult desert tortoise may be incidentally killed or injured. As discussed above, an unknown number of hatchlings and juveniles will be killed or injured, and an unknown number of tortoise eggs will be destroyed as a result of the project.

We do not know how many desert tortoises will be encountered in harm's way outside the fenced solar site along the ROWs; however, *take* in the form of capture and relocation of all desert tortoises resulting from these incidental encounters is exempted to ensure mortality and injury of desert tortoises is minimized. Based on the survey data and tortoise encounters of similar projects, we estimate that 9 subadult and adult desert tortoises would be captured and moved out of harm's way along the linear ROWs and outside the fenced SPGF and no more than one subadult or adult desert tortoise and two hatchling or juvenile tortoises would be killed or injured during construction activities. Should the number of desert tortoises captured and moved on the linear components of the MSEC be exceeded, the Service should be notified by the BIA or BLM in order to determine if consultation of the proposed action should be reinitiated.

O&M activities may result in incidental take, in the form of mortality or injury, of no more than one subadult or adult desert tortoise for the life of the project; one hatchling or juvenile desert tortoise in a single year, not to exceed 4 for the life of the project; and no eggs should be taken (Table 3). In addition, take in the form of capture from O&M activities may result in the incidental take of no more than 2 subadult and adult tortoises in a single year, not to exceed 10 for the life of the project; 2 hatchling or juvenile tortoises in a single year, not to exceed 10 for the life of the project; and no eggs should be taken (Table 3).

Table 3. Desert Tortoise Incidental Take Thresholds for the MSEC project.

Type of take	**Within fenced perimeter of SPGF**	**Outside fenced perimeter during construction**[1]	**O&M activities**	**Totals for all activities**
Death or injury – subadults & adults	1	1	1 for the life of the project	3
Death or injury – hatchlings & juveniles	unknown[2]	2	1 per year; not to exceed 4 for the life of the project	6

Type of take	Within fenced perimeter of SPGF	Outside fenced perimeter during construction[1]	O&M activities	Totals for all activities
Capture – subadults & adults	10	all in harm's way; estimate = 9	all in harm's way; 2 per year not to exceed 10 for the life of the project	29
Capture – hatchling & juveniles	56	all in harm's way; estimate = unknown[2]	all in harm's way; 2 per year not to exceed 10 for the life of the project	Unknown[2]; estimate = 66
Eggs destroyed	unknown[2]	0	0	unknown

[1]Includes all ROWs.

[2]Take threshold determined by the number of subadults and adults.

The disturbance of up to 951.5 acres of habitat from construction of the proposed solar project including transmission lines, pipeline, and road construction or upgrade activities may result in harm to desert tortoises that use this area as part of their home range. If the proposed project-related activities result in impacts to desert tortoise habitat beyond this acreage, the amount or extent of take will be exceeded.

Although the release of up to 10 adult and subadult tortoises and up to 56 hatchling and juvenile tortoises may disrupt normal behaviors of resident tortoises in the relocation areas, we do not believe this level of disruption will result in incidental take of more than a small number (e.g., <5) of individuals. We do not anticipate that the collection of blood samples of those animals that will be relocated out of the SPGF will result in the death or injury of any individuals because Service-approved authorized desert tortoise biologists will perform health assessments in accordance with the most recent Service guidance (Service 2013).

Effect of Take

In the accompanying biological opinion, the Service determined that the levels of anticipated take associated with this project alone are not likely to jeopardize the continued existence or adversely affect the recovery of the Moapa dace or Mojave desert tortoise.

Reasonable and Prudent Measures (RPMs) with Terms and Conditions (T&Cs)

The BIA, BLM, Tribe, and Applicant will implement numerous conservation measures as part of the proposed action to minimize the incidental take of desert tortoises. Our evaluation of the proposed action is based on the assumption that the actions as set forth in the "Conservation Measures" section of this biological opinion will be implemented. Any proposed changes to the

conservation measures or in the conditions under which project activities were evaluated may constitute a modification of the proposed action. If this modification causes an effect to desert tortoises that was not considered in the biological opinion, reinitiation of formal consultation pursuant to the implementing regulations of section 7(a)(2) of the Act (50 CFR § 402.16) may be warranted. The following RPMs supplement and clarify conservation measures included as part of the proposed action. The RPMs are necessary and appropriate to minimize the impact of take on desert tortoises.

To be exempt from the prohibitions of section 9 of the Act, the BIA, BLM, Tribe and Applicant, including all agents, consultants, and contractors, must comply with the following terms and conditions, which implement the reasonable and prudent measures described above, and are intended to minimize the impact of incidental take on the Moapa dace and desert tortoise. These terms and conditions are non-discretionary.

1. Moapa Dace

RPM 1: *The BIA shall ensure that measures are implemented to minimize potential impacts to Moapa dace that may result from groundwater pumping associated with construction and O&M of the proposed solar project.*

Term and Condition – The following terms and condition implements RPM 1:

The BIA and Tribe shall implement all conservation measures outlined in the Muddy River MOA that are specific to the project applicant, as well as those measures to be carried out in conjunction with other Parties to the MOA. The specific measures applicable to the Tribe are detailed in the PBO (File No. 1-5-05-FW-536).

2. Desert Tortoise

RPM 2: *The BIA and BLM shall ensure the level of incidental take anticipated in this biological opinion is commensurate with the analysis contained herein.*

Term and Condition – The following terms and conditions implement RPM 2:

2.a. To ensure that the conservation measures are effective and properly implemented, the Service and all applicable entities shall be informed immediately upon discovery of a desert tortoise that has been killed or injured within the Action Area of the project. At that time, and in coordination with the Service, the BIA or BLM must review the circumstances surrounding the incident to determine whether additional protective measures are required. Project activities may continue during the outcome of the review, provided the conservation measures included as part of the proposed action (see "Conservation Measures" section) and the T&Cs in this biological opinion have been and continue to be fully implemented.

2.b. Authorized desert tortoise biologists (ADTBs) will be employed to monitor project activities within desert tortoise habitat and are responsible for locating desert tortoise and their sign (i.e., conduct clearance surveys). ADTBs must ensure proper implementation of protective measures, and make certain that the effects of the project on the desert tortoise and its habitat are minimized in accordance with this biological opinion. All incidents of noncompliance in accordance with this biological opinion must be recorded and reported.

Potential authorized desert tortoise biologists must submit their statement of qualifications to the Service's Nevada Fish and Wildlife Office 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*. Within 3 days of employment or assignment, the Applicant, BLM, or BIA shall provide the Service with the names of FCRs and biological monitors who will assist the authorized desert tortoise biologist.

2.c. FCRs will be assigned to the construction phase of the solar project components; additional FCRs will be assigned for the linear project components including the transmission lines, water pipeline, and access road, as needed. The FCR will be responsible for ensuring compliance to BMPs and other mitigation and minimization measures. Authorized desert tortoise biologists and the FCRs shall be onsite during all construction activities to ensure compliance with this biological opinion, including avoidance of inadvertently harming any desert tortoises that may wander onto the construction site. The authorized desert tortoise biologist and FCRs shall be responsible for: (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; and (5) ensuring compliance with the T&Cs of this biological opinion.

2.d. All desert tortoises in harm's way may be moved out of harm's way by an authorized desert tortoise biologist (T&C 3a). Tortoises shall not be unnecessarily handled (e.g., no marking, no health assessment beyond visual) or manipulated in any way that will result in an increase in handling time.

2.e. The BIA or BLM must reinitiate consultation on the proposed action if any of the following occur: more than 10 subadult or adult desert tortoises are identified for relocation during clearance surveys of the SPGF; desert tortoise mortalities on all project components exceed thresholds in Table 3; or desert tortoise incidental take along the linear ROWs outside the SPGF in the form of capture and handling exceed the number identified in Table 3.

2.f. Desert tortoises that are determined to be sick or injured, will be transferred to an

appropriate facility as directed by the Service. The Applicant is responsible for paying for care of desert tortoises taken an appropriate facility as directed by the Service.

RPM 3: *The BIA or BLM shall ensure that desert tortoises and their eggs in harm's way are located, properly handled, and moved to safety.*

Term and Condition – The following terms and conditions implement RPM 3:

3.a. A desert tortoise education program will be prepared and presented by an authorized desert tortoise biologist to all personnel onsite during construction activities. The program will contain information concerning the biology and distribution of the desert tortoise, its legal status and occurrence in the proposed project area, the definition of take and associated penalties, measures designed to minimize the effects of construction activities, the means by which employees can facilitate this process, and reporting requirements to be implemented when desert tortoises are encountered.

3.b. Tortoise-proof fencing shall be installed around the boundary of the SPGF. Fence specifications will be consistent with those approved by the Service in the Desert Tortoise Field Manual (Service 2009). Shade stations will be installed along the outside of the tortoise fence for tortoises that may travel along this area. Once exclusion fencing is installed, an authorized desert tortoise biologist will survey the SPGF area following standard protocols (Service 2009) to ensure that no tortoises or active burrows are present in the fenced area. An authorized desert tortoise biologist or monitor will be required to walk the entirety of the exterior of the SPGF fence on a daily basis during the desert tortoise active season (mid-March through May and September through mid-November) for a minimum of one year after the fence is constructed to document any desert tortoises that may be in the area or in stress. If tortoises are still being documented along the perimeter of the exterior of the fence at the end of the first year, the BIA will coordinate with the Service to extend the duration of this monitoring. Tortoises that are encountered along the perimeter of the fence that appear to be in stress may be transported to a veterinarian or wildlife rehabilitation facility with Service approval.

Fencing will be checked monthly and after precipitation that could result in erosion along the base of the fence for the life of the project. Repairs will be made in a timely manner upon discovery of potential breaches in the fencing. Monitoring and maintenance of the fencing 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.

Tortoise guards shall be placed at all road access points, where desert tortoise-proof fencing is interrupted, to exclude desert tortoises from the road and solar

facility. The Applicant shall coordinate with the Service on placement and design of tortoise guards and their connection with the fencing, to ensure that the guards provide a functional barrier to desert tortoises. Tortoise guards will be inspected quarterly and maintained to ensure they continue to function as a tortoise barrier.

3.c. Prior to surface-disturbing activities, authorized desert tortoise biologists, potentially assisted by project monitors, shall conduct a clearance survey in accordance with Service-approved protocol (Service 2009) to locate and remove all desert tortoises from areas to be disturbed or in harm's way using techniques that provide full coverage of all areas. Two passes of complete coverage will be accomplished. The authorized desert tortoise biologists shall also capture, handle, and relocate desert tortoises from harm's way in accordance with the Desert Tortoise Field Manual (Service 2009), as appropriate. Any tortoises encountered after clearance surveys in the SPGF will be handled in the same manner to those encountered during clearance surveys. Any desert tortoise eggs observed in harm's way will be relocated from harm's way by an authorized desert tortoise biologist in accordance with Service-approved protocol (Service 2009). Desert tortoise burrows that occur immediately outside work areas that can be avoided by project activities shall be clearly marked or flagged to prevent crushing. Burrows occupied by adult females will be examined thoroughly for nests and eggs during the months of May through October. For those burrows that can be avoided, no desert tortoises shall be prevented from exiting their burrows by placing rocks or other obstructions at their burrow entrances without written authorization from the Service.

3.d. All burrows detected within areas proposed for disturbance, whether occupied or vacant, shall be excavated by an authorized desert tortoise biologist and collapsed. All burrows will be excavated with hand tools to allow removal of desert tortoises or desert tortoise eggs. All desert tortoise handling and excavations, including nests, will be conducted by an authorized desert tortoise biologist in accordance with Service-approved protocol (Service 2009).

3.e. *Project areas outside the fenced solar facility:* All desert tortoises in harm's way shall be relocated to safe, secure areas with suitable shelter and habitat up to 1,000 feet from the point of capture in accordance with the Desert Tortoise Field Manual (Service 2009). If a tortoise is injured as a direct or indirect result of project activities, it shall be immediately transported to a veterinarian or wildlife rehabilitation facility and the Service will be notified by the close of the first business day subsequent to the incident.

Project areas inside the fenced solar facility: The Applicant will complete 1) health assessments, which may require temporarily holding the tortoises in a facility or temporary pen while the assessment is completed; and 2) development of a disposition plan for each tortoise encountered in the SPGF following Service-approved protocol (Service 2013). Disposition plans must be submitted to and approved by the Service's Desert Tortoise Recovery Office and Las Vegas office

prior to relocating any tortoises. Tortoises encountered within 1,000 feet outside of the fence boundary also may be considered for relocation to secure areas outside the fence if approved by the Service.

3.f. All trenches and holes shall be covered, fenced or backfilled to ensure desert tortoises do not become trapped unless alternate measures are in place as agreed to by the BIA, BLM, and 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 encountered in the trench will be reported and moved out of harm's way in accordance with handling protocols (Service 2009). In addition, wildlife escape ramps in open trench segments will be no greater than every 0.25 mile.

3.g. Any project-related activity that may endanger a desert tortoise shall cease if a desert tortoise is encountered on the project site. Project activities may resume after an authorized desert tortoise biologist removes the desert tortoise from danger or after the desert tortoise has moved to a safe area.

3.h. If a tortoise is encountered and relocated to a safe area, an authorized desert tortoise biologist, biological monitor, or FCR shall inform workers in the area to be particularly watchful for the tortoise as it may return to the work area.

No desert tortoises shall be prevented from exiting their burrows by placing rocks or other obstructions at their burrow entrances without written authorization from the Service.

3.i. Areas underneath parked project vehicles and equipment will be inspected for desert tortoises before moving them.

3.j. Vehicle speed within the project area will not exceed 25 mph. Speed limits will be clearly marked and all workers will be made aware of these limits.

3.k. Water used for fugitive dust control will not be allowed to pool on access roads or other project areas outside the fenced area, as this can attract desert tortoises. Similarly, leaks on water trucks and water tanks will be repaired to prevent pooling water.

3.l. Should any desert tortoise be injured or killed, all activities that have the potential for take will be halted, and the FCR or authorized desert tortoise biologist will be immediately contacted. The BIA, BLM, FCR or authorized desert tortoise biologist will notify the Las Vegas office of the Service by the close of the first business day subsequent to the incident.

3.m. The BIA, BLM, Tribe, and Applicant shall implement appropriate measures,

which may include measures not specified in this biological opinion, to ensure that desert tortoises captured and moved, or occur in harm's way do not die or become injured as a direct or indirect (e.g., predation, maladjustment to release areas) result of the project. Measures in this biological opinion may require modification or additional measures may be necessary in response to conditions and situations that pose a threat to the well-being of desert tortoises, in consultation with the Service.

RPM 4: *The BIA or BLM shall ensure implementation of measures to minimize predation on desert tortoises by ravens or other desert tortoise predators attracted to the action area.*

Term and Condition – The following terms and conditions implement RPM 4:

4.a. A litter control program shall be implemented to reduce the attractiveness of the area to opportunistic predators such as desert kit fox, coyotes, and common ravens. Trash and food items will be disposed properly in predator-proof containers with re-sealing lids. Trash containers will be emptied and construction waste will be removed daily from the project area and disposed of in an approved landfill.

4.b. The Applicant will monitor for the presence of ravens and other potential human-subsidized predators will be conducted and a control plan will be developed and implemented in coordination with the Service if predator densities substantially increase in the vicinity of the facility. In addition to trash management, the Applicant will implement BMPs to discourage the presence of ravens onsite including elimination of available water sources, designing structures to discourage potential nest sites, use of hazing to discourage raven presence, and active monitoring of the site for presence of ravens. Raven nesting material may be removed if no eggs or young are present in the nest.

4.c. Dogs will be prohibited in all project work areas.

RPM 5: *The BIA or BLM shall ensure implementation of measures to minimize loss and long-term degradation of desert tortoise habitat, such as soil compaction, erosion, crushed vegetation, or introduction of non-native invasive plants or weeds as a result of project activities.*

Term and Condition – The following terms and conditions implement RPM 5:

5.a. Perennial native vegetation will be flagged and avoided to the maximum extent practicable.

5.b. Cross-country travel and travel outside designated areas shall be prohibited.

5.c. The Applicant and Tribe will coordinate to salvage and relocate cacti, yuccas, and shrubs on linear ROWs and plant them back on temporarily disturbed portions of the ROWs similar to the efforts undertaken on adjacent BLM lands. If the Tribe chooses to salvage plants from the 847-acre solar facility, these plants may be held in a nursery or other temporary holding location until needed; no monitoring is required for these plants.

5.d. All work area boundaries will be conspicuously staked, flagged, or otherwise marked to minimize surface disturbance activities. All workers, equipment, vehicles, and construction materials shall remain within the ROW, existing roads, and designated areas. Staging areas will be located in previously-disturbed areas whenever possible.

5.e. The Applicant will develop a habitat restoration plan to be implemented for all temporary disturbances associated with construction of the project to be approved by the BIA, BLM (for disturbance of BLM land), Tribe, and the Service.

5.f. The proposed Weed Management Plan will be developed and implemented (Conservation Measure 15).

5.g. Final power transmission tower and associated spur road locations will be adjusted to avoid potentially active tortoise burrows to the maximum extent practicable.

5.h. In accordance with the project description, the Applicant will pay remuneration fees for the acres disturbed on Tribal and BLM lands, accordingly, prior to surface-disturbing activities associated with the MSEC. The fees on both Tribal and BLM lands would be assessed at the rate of $824 per acre of disturbance (Hastey et al. 1991). 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 is located on the internet at: http://www.bls.gov/news.release/cpi.toc.htm. The next adjustment will occur March 1, 2014. Fees may be paid at any time prior to surface-disturbing activities at the current fee rate of the date of payment.

BLM shall collect remuneration fees for compensation of 66.1 acres of desert tortoise habitat loss (Appendix A). At the current rate, total fees for project disturbance of desert tortoise habitat on BLM lands will be (66.1 acres x $824) $54,466.40. Remuneration fees shall be used for management actions, as identified by the BLM and Service, expected to promote recovery of the desert tortoise over time. 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. This fee will be paid directly to BLM.

The payment shall be accompanied by the Section 7 Fee Payment Form (Appendix A) and completed by the payee. Payment shall be certified check or money order payable to BLM, and delivered to:

DOI/BLM
ATTN: Information Access Center
The Bureau of Land Management
1340 Financial Boulevard
Reno, Nevada 89502
Contact: (775) 861-6400

The Tribe shall collect remuneration fees for compensation of 885.4 acres of desert tortoise habitat loss. At the current rate, total fees for project disturbance of desert tortoise habitat on Tribal lands will be (885.4 acres x $824) $729,569.60. The Tribe, BIA, and Service have worked cooperatively to develop the "Management and Conservation Plan for the Moapa River Indian Reservation" (Service et al. 2014), which identifies actions the Tribe can take to promote the conservation and recovery of the desert tortoise over time across the Reservation. The remuneration fees collected by the Tribe for development of the MSEC shall be used on specific actions selected from this plan. The Tribe, BIA, and Service will coordinate on the details of selected actions prior to implementation

RPM 6: *The* BIA or *BLM shall ensure implementation of measures to ensure compliance with the RPMs, Terms and Conditions, reporting requirements, and reinitiation requirements contained in this biological opinion.*

Term and Condition – The following terms and conditions implement RPM 6:

6.a. **Construction and O&M Reporting Requirements:** The BIA and BLM will be responsible for providing quarterly reports during construction and annual reports during O&M activities for actions on lands managed by the respective agency. The BIA and BLM may delegate this responsibility to the Tribe or Applicant. In addition, a final construction report will be submitted to the Service within 60 days of completion of construction of the project. All quarterly reports are due by the 10th of each of the following months (January, April, July, October), and annual reports are due February 1 of each year. The Service anticipates the first annual report by February 1, 2015, if construction or project activities occur in 2014. Annual status updates shall be provided to the Service during O&M activities for the life of the facility.

Tortoise monitoring reports are required quarterly during the duration of construction and annually during O&M for the life of the facility. Specifically, all reports must include Table 4 (see below) information on any instances when desert tortoises were killed, injured, or handled; the circumstances of such incidents; and any actions undertaken to prevent similar incidents from

reoccurring. Additionally, the reports should provide detailed information regarding each desert tortoise handled or observed. Information will include the following: location (GPS), date and time of observation, whether 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.

Table 4. Desert Tortoise Actual Incidental Take for the Moapa Solar Energy Center Project, Clark County, Nevada.

Activity	**Actual Mortality, Injury, and Destruction**		**Actual Harassment: Capture and Removal**		**Actual Habitat Loss (ac)**
	Adults / Subadults	Juveniles / Hatchlings	Adults / Subadults	Juveniles / Hatchlings	Non-critical
Construction					
Operation and Maintenance					
Predation					None
Minimization Measure Implemented		**Effectiveness and Recommendations**			

6.b. 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 will be documented immediately by the authorized desert tortoise biologist and included in the monitoring report.

CONSERVATION RECOMMENDATIONS

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

1. We recommend the BIA and Tribe continuously monitors the recorded groundwater level in the reservation production well that will be pumped for this project in order to validate the anticipated impacts from pumping.
2. We recommend the Tribe develops a Reservation-wide desert tortoise assessment based on desert tortoise and vegetation surveys that use methodologies approved by the FWS. This information can be used to 1) identify areas on the Reservation that will least impact tortoise and are therefore the most appropriate for development, and 2) develop a reserve design for desert tortoise habitat on the Reservation in consideration of the existing

6,000-ac conservation area associated with the K Road Solar Energy Project, contiguous and adjacent BLM land, and potential development areas.

3. We recommend that the Tribe and Applicant consider retrofitting the existing irrigation diversion of the Muddy River on the Reservation to function as a barrier to non-native fish which are a threat to the Moapa dace, as well as a diversion structure in consultation with the Service.
4. Desert tortoise fencing installed for the previously proposed Ash Grove Cement Project should be removed or breaches established to reduce fragmentation of the habitat and reduce the threat to tortoises and other wildlife.

REINITIATION NOTICE

This concludes formal consultation on BIA's proposal to approve the lease for development of a solar energy project and associated linear components and BLM's proposal to issue ROW grants to Moapa Solar LLC for construction of linear components on BLM-administered lands. Consistent with 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal involvement or control over the action has been retained (or is authorized by law) and if: 1) the amount or extent of 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 biological opinion; and 4) a new species is listed or critical habitat designated that may be affected by the action. In addition, if any of the stated assumptions used in our analysis are invalidated, BIA or BLM must reinitiate consultation.

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Personal Communications

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APPENDIX A. BLM REMUNERATION FEE PAYMENT FORM

Biological Opinion File Number: 84320-2013-F-0301

Biological Opinion Issued By: Nevada Fish and Wildlife Office, Las Vegas, Nevada

Species: Mojave Desert Tortoise (*Gopherus agassizii*)

Project Name: Moapa Solar Energy Center Project

Project Proponent: Moapa Solar LLC

Phone Number:

Payment Calculations:	Clark County		Lincoln 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	0	66.1	0	0		
Fee rate (per acre)	0	0	0	0		
Total cost per county	$ 0		$ 0		$ -	

Total payment required (all counties): $

Amount paid: _____ Date: _____ Check/Money Order #: _____

Authorizing agencies: Bureau of Land Management, Las Vegas, Nevada

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)*

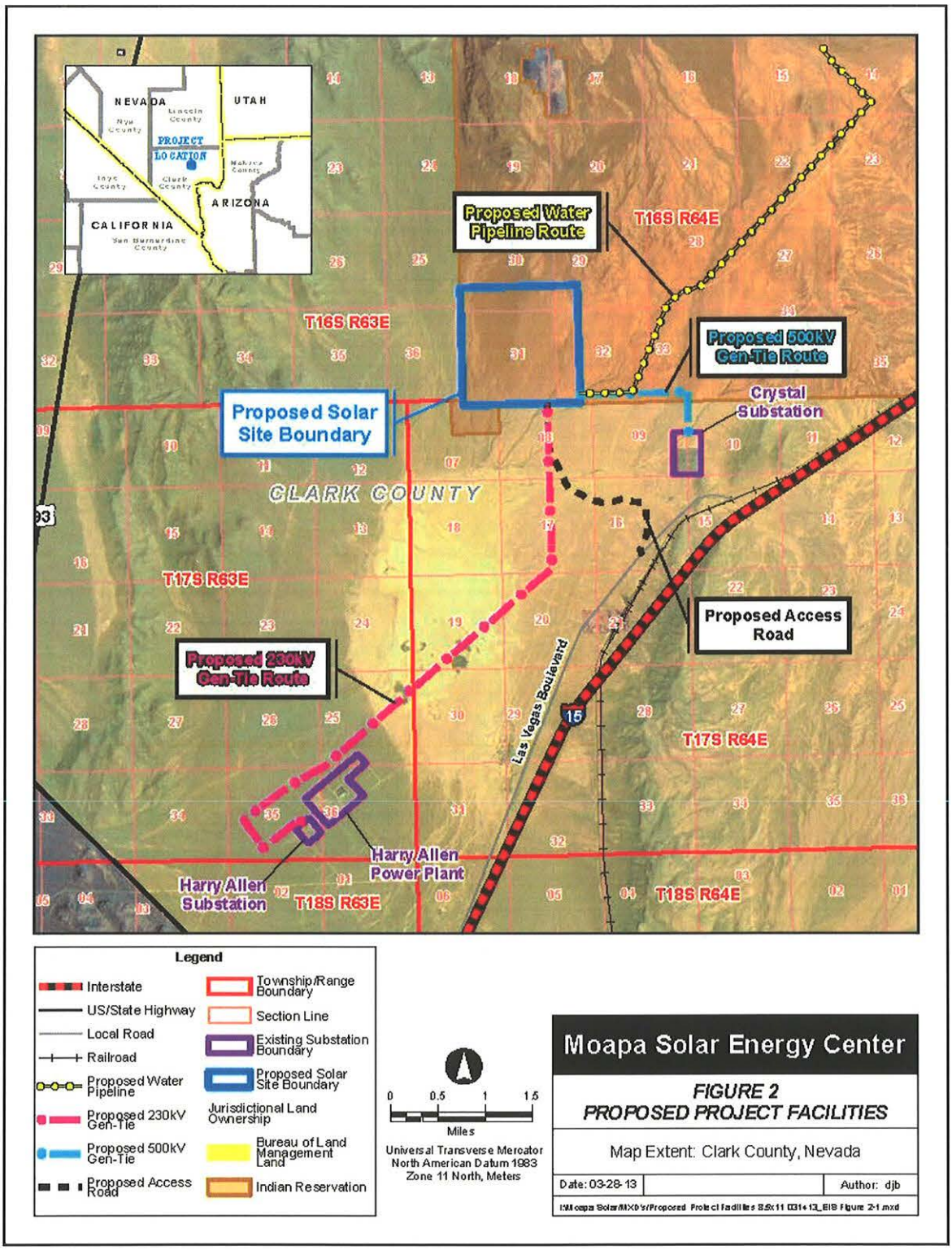


Figure 1. Approximate location of project features for the Moapa Solar Energy Center, Clark County, Nevada.

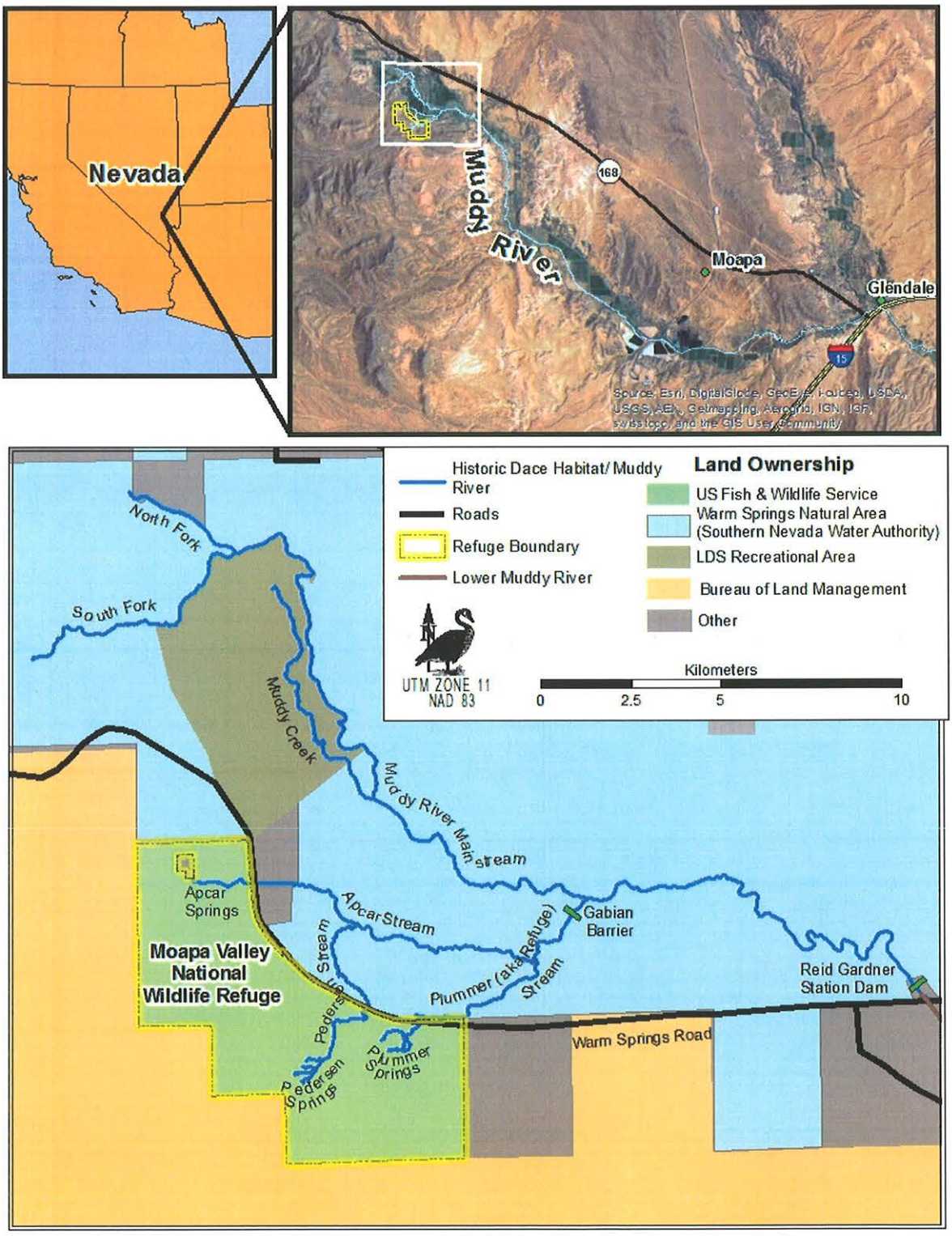
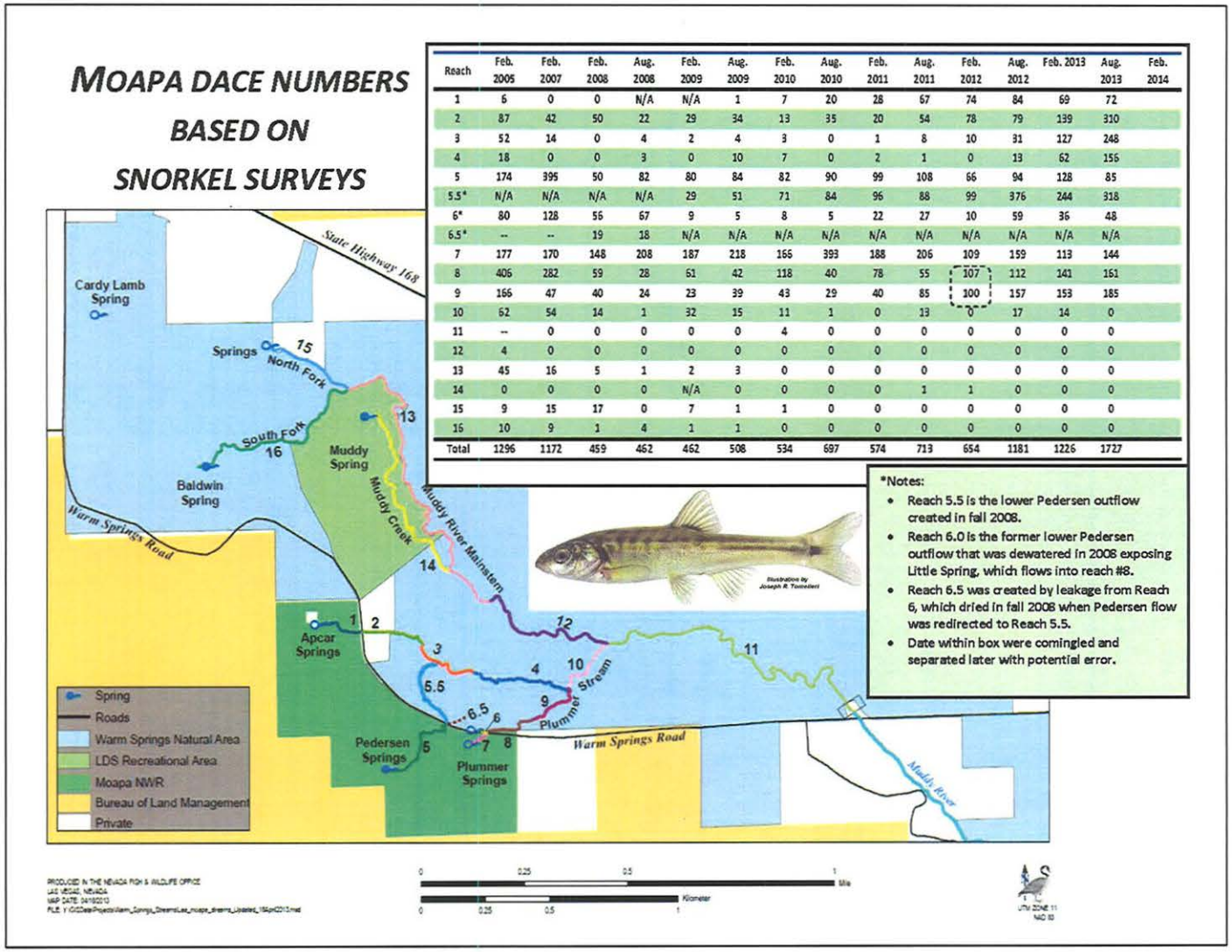


Figure 2. General and specific locations where the Moapa dace occurs.



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	Feb. 2013	Aug. 2013	Feb. 2014
1	6	0	0	N/A	N/A	1	7	20	28	67	74	84	69	72	
2	87	42	50	22	29	34	13	35	20	54	78	79	139	310	
3	52	14	0	4	2	4	3	0	1	8	10	31	127	248	
4	18	0	0	3	0	10	7	0	2	1	0	13	62	156	
5	174	395	50	82	80	84	82	90	99	108	66	94	128	85	
5.5*	N/A	N/A	N/A	N/A	29	51	71	84	96	88	99	376	244	318	
6*	80	128	56	67	9	5	8	5	22	27	10	59	36	48	
6.5*	--	--	19	18	N/A	N/A	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	113	144	
8	406	282	59	28	61	42	118	40	78	55	107	112	141	161	
9	166	47	40	24	23	39	43	29	40	85	100	157	153	185	
10	62	54	14	1	32	15	11	1	0	13	0	17	14	0	
11	--	0	0	0	0	0	4	0	0	0	0	0	0	0	
12	4	0	0	0	0	0	0	0	0	0	0	0	0	0	
13	45	16	5	1	2	3	0	0	0	0	0	0	0	0	
14	0	0	0	0	N/A	0	0	0	0	1	1	0	0	0	
15	9	15	17	0	7	1	1	0	0	0	0	0	0	0	
16	10	9	1	4	1	1	0	0	0	0	0	0	0	0	
Total	1296	1172	459	462	462	508	534	697	574	713	654	1181	1226	1727	

Figure 3. Overall trend in Moapa dace numbers since 2005.