BIOLOGICAL RESOURCES TECHNICAL REPORT
SILVER STATE SOLAR SOUTH
CLARK COUNTY, NEVADA

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SUMMARY

Silver State Solar Power South, LLC has requested a right-of-way grant from the Bureau of Land Management (BLM) to construct and operate a new solar photovoltaic energy generating facility in Clark County, Nevada, northeast of Primm (Stateline), Clark County, Nevada. The Silver State Project consists of two sites: Silver State North and Silver State Solar South. Silver State North was constructed in 2011 and was substantially complete in March 2012. Silver State Solar South is in the process of final design and permitting. This technical report provides information on biological resources found within the study area for Silver State South.

This report provides a comprehensive description of methods and results of biological resource surveys and investigations conducted between April and May 2011 within the Study Area. In addition, results of surveys conducted in 2008 and 2009 and clearance data reported from the Silver State North project are included. The purpose of the surveys was to provide information supporting consultation between BLM and U.S. Fish and Wildlife Service (FWS), with respect to the Federal Endangered Species Act and National Environmental Policy Act (NEPA).

Focused surveys for desert tortoise (*Gopherus agassizii*), a federally listed (Threatened) and State-protected species and focused surveys for special status plant species were conducted in spring of 2011. All incidental wildlife and plant species, including other special status species, observed during the surveys were recorded. Previous sampling was conducted for desert tortoise in 2008 and 2009. Based on the U.S. Fish and Wildlife Service (USFWS) density formulas, the Study Area was estimated to support adult desert tortoise densities ranging from six to nineteen tortoises per square mile (point estimate). The Study Area is located outside the boundaries of an Area of Critical Environmental Concern, Desert Wildlife Management Area, Wilderness Area, or designated Critical Habitat Unit.

Other special status wildlife species that were observed within the Study Area include: golden eagle (*Aquila chrysaetos*), burrowing owl (*Athene cunicularia*), prairie falcon (*Falco mexicanus*), loggerhead shrike (*Lanius ludovicianus*), Brewer's sparrow (*Spizella breweri*), crissal thrasher (*Toxostoma crissale*), LeConte's thrasher (*Toxostoma lecontei*), and desert kit fox (*Vulpes macrotis*).

Focused botanical surveys resulted in the documentation of three special status plant species including Death Valley ephedra (*Ephedra funerea*), white margined beardtongue (*Penstemon albomarginata*), and yellow two-toned beardtongue (*Penestemon bicolor ssp bicolor).* More than 150 species of plants were identified during the surveys. No Federal- or State-listed (endangered or threatened) plant species were observed.

1.0 INTRODUCTION

1.1 Purpose

This Biological Resources Technical Report (BRTR) provides a comprehensive description of methods and results of focused desert tortoise and special status plant surveys conducted in 2011 within the Study Area for Silver State Solar South (Project) as proposed by Silver State Solar Power South, LLC. Results of biological surveys conducted in previous years are also summarized in this report. The purpose of these surveys was to determine the presence or absence of desert tortoise, special status plants, and other special status species. The information presented in this report provides a basis for determining potential impacts on special status species and potential need for further coordination between Bureau of Land Management (BLM), U.S. Fish and Wildlife Service (USFWS), Nevada Department of Wildlife (NDOW), and Clark County. The data contained within this report also provides information to comply with requirements of the National Environmental Policy Act (NEPA).

1.2 Site Location

The site is located in unincorporated Clark County, Nevada near the boundary of California and Nevada, less than one mile east of the town of Primm (Stateline) (Figure 1). The site is located east of Interstate 15 and Roach Lake and can be found on the Desert and Roach 7.5-Minute U.S. Geological Survey topographic quadrangles. The site is located outside the boundaries of an Area of Critical Environmental Concern (ACEC), Desert Wildlife Management Area (DWMA), Wilderness Area, or USFWS designated critical habitat unit (CHU) for desert tortoise. The site is located one mile north of the Ivanpah Valley DWMA/ACEC and 9.5 miles west of the South McCullough Wilderness Area (Figure 2). The site is also located 3.8 miles north of the Ivanpah CHU and seven miles west of the Piute-Eldorado CHU.

1.3 Site Characteristics

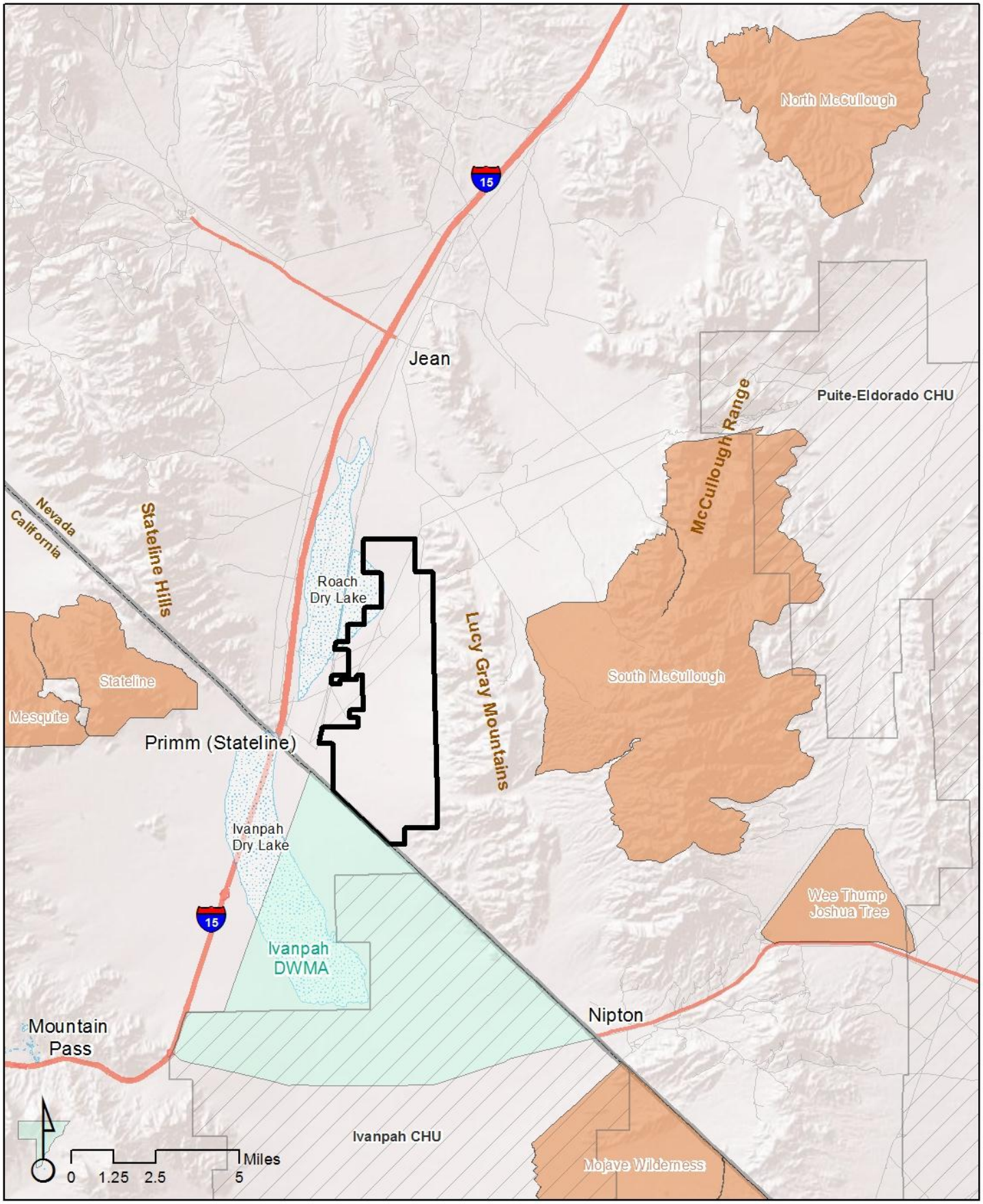
Soils on the site vary from sand to gravel to rock within a broad alluvial fan originating in the Lucy Gray Mountains. Elevation at the site ranges from approximately 2,600 to 3,500 feet above mean sea level (amsl). Slopes within the site range from approximately 0 to 5 percent with a general west-facing aspect. Human disturbances within the site include moderate levels of off-highway vehicle (OHV) activity, existing utility corridors (i.e., overhead power transmission lines and underground petroleum pipeline) and associated access roads.

1.4 Study Area

For the purpose of this report, the Study Area is defined by the area of land subject to biological resource surveys and which falls within Silver State Solar Power South, LLC's Right-of-Way (ROW) application boundary filed in the current Plan of Development (POD). The Study Area is considerably larger than the area proposed for site design. Figure 3 provides the boundaries of Biological Resource Study Area, which equaled approximately 13,309 acres.

Silver State Solar South

Figure 1
Regional Setting



Study Area

Desert Tortoise Critical Habitat

BLM Area of Environmental Concern

Wilderness Area

Silver State Solar South

Figure 2
Study Area

1.5 Regulatory Framework

This report provides information regarding biological resources regulated by several local, State and Federal laws including, but not limited to, the following environmental policies.

Endangered Species Act

The Endangered Species Act (ESA) was passed by the U.S. Congress in 1973 and provides for the protection of threatened and endangered plants and animals and their critical habitat. The U.S. Fish and Wildlife Service (USFWS) is the responsible federal agency for implementing the ESA for all terrestrial species. Consultation with the USFWS is performed though Section 10 (no federal nexus) or Section 7 (federal agency involved).

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) prohibits the "take" (i.e., killing, harassing, trapping, or attempting to do so) of native migratory bird species. The MBTA makes it unlawful to pursue, hunt, take, capture, kill, or sell birds listed under the MBTA. The statute does not discriminate between live or dead birds, and grants full protection to any bird parts, including feathers, eggs, and nests.

Bald and Golden Eagle Protection Act

Bald and Golden Eagle Protection Act prohibits any form of possession or taking of both bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*). Under current regulations, limited take through disturbance or mortality may be authorized for otherwise lawful activities.

BLM Cacti and Yucca Salvaging Guidelines

The BLM typically requires transplanting and salvage of native plant species that would otherwise be affected by development on their lands (BLM 2001). Species of cacti, yucca, and ocotillo are usually considered for transplanting and salvage.

Invasive Plants and Noxious Weeds

The BLM manages invasive plant species and noxious weeds through coordination with the National Invasive Species Council and State of Nevada. The BLM defines noxious weeds as "a plant that interferes with management objectives for a given area of land at a given point in time." State of Nevada defines noxious weeds as "any species of plant which is, or liable to be, detrimental or destructive and difficult to control or eradicate [Nevada Revised Statute (NRS) 555.005]." The BLM Las Vegas Office has committed to focusing on the Nevada state list of noxious weeds, as these species are recognized for having major impacts on ecosystem health and natural resources (BLM 2006). The Nevada Department of Agriculture maintains the list of noxious weeds and has developed a rating system that reflects the statewide importance of the noxious weed, the likelihood that eradication or control efforts would be successful, and the present distribution of noxious weeds within Nevada.

Nevada Revised Statute 501

NRS 501, which is supplemented by the Nevada Administrative Code (NAC), is the Nevada state law that covers administration and enforcement of wildlife resources within the state. NDOW is the state agency responsible for implementation of NRS 501, including the designation of protected species and issuance of authorizations for impacts to protected species. Species designations are maintained by the Nevada Natural Heritage Program, Department of Conservation and Natural Resources.

Nevada Revised Statute 527

NRS 527.060–527.120, supplemented by the NAC, protects and regulates the removal of Christmas trees, yuccas, and cacti for commercial purposes. Such removal or possession requires a permit and tags from the Nevada Spur Forester Fire Warden, Nevada Division of Forestry.

Clark County Multiple Species Habitat Conservation Plan (MSHCP)

The Clark County MSHCP and associated Environmental Impact Statement (EIS) were developed by its applicants (Clark County; the Cities of Las Vegas, North Las Vegas, Boulder City, Mesquite, and Henderson; and the Nevada Department of Transportation) in November 2000 (CCDCP 2000). The primary objectives of the MSHCP are to allow the incidental take of Covered Species (including ESA listed species), streamline incidental take permitting process for applicants and regulators, and ensure conservation of Covered Species within Clark County.

2.0 METHODS

2.1 Special Status Species Definition

For assessment purposes in this report, a special status species has been defined as a plant or wildlife species that meets the following criteria:

- designated as threatened or endangered by the U.S. Fish and Wildlife Service (USFWS) and is protected under the Federal Endangered Species Act (FESA);
- candidate species being considered or proposed for listing under FESA;
- protected under Nevada Revised Statutes and Nevada Administrative Code Sections 501, 503 and 527; and/or
- designated sensitive by the Bureau of Land Management (BLM 1996).

2.2 Literature Search

Prior to conducting the focused surveys, a biological resources literature search was performed. This included referencing relevant lists and publications from the BLM, USFWS, and Nevada Natural Heritage Program (NNHP), as well as researching information from regional documents such as the Clark County Multiple Species Habitat Conservation Plan (MSHCP). Biological reports prepared on behalf of other projects within the region were reviewed for relevant information.

2.3 Focused Desert Tortoise Surveys/Sampling

In October 20-31, 2008 and August 26-28, 2009, desert tortoise surveys were conducted using a modified TRED methodology (Sundance 2009). The USFWS and the BLM were consulted prior to initiating desert tortoise surveys in October 2008, and TRED sampling methodology was determined to be an acceptable method in estimating desert tortoise densities. TRED sampling was performed again in 2009 within additional sections within the Study Area. A total of 52 transects were conducted over approximately fifteen square miles associated with Alternative C [Alternative 2 of the FEIS (BLM 2010)]. Each transect was 1.5 miles in length and covered and area of 10 meters wide. Clearance surveys were also conducted on the Silver State North project site in spring of 2011. Clearance surveys were conducted utilizing the current USFWS protocols and in accordance with the Biological Opinion for the Silver State Solar Project (USFWS 2010a).

Full-coverage desert tortoise surveys were conducted between April 4 and May 27, 2011, following the USFWS revised survey protocol (USFWS 2010b). The full coverage survey option described in the revised protocols was unchanged from the previous protocol (USFWS 1992). The revised protocol also provided methods to estimate the abundance of tortoises occurring within the action area. Full-coverage survey transects were spaced ten meters apart. All tortoise sign (e.g., live tortoises, shell/bone/scutes, scats, burrows/pallets, tracks, egg shell fragments, and courtship rings) were recorded (Table 1). The location of all tortoise sign was recorded on a Garmin Global Positioning System (GPS) unit (GPS 72, 76, or 60CSx) using a unique identification code. The code included a two-character acronym for the type of sign (e.g., TO-live tortoise, BU-burrow, SC-scat), two-character initials for the lead surveyor of the crew, and a unique sequential

number. In addition to recording sign with the GPS unit, standardized paper datasheets were completed. All data was entered from these data sheets into a Microsoft Excel spreadsheet and incorporated into Geographical Information Systems (GIS) for spatial representation of the distribution of desert tortoise sign.

Table 1 - Desert Tortoise Data Recorded

Type of Sign	Measurements	Estimates	Other
Live tortoise		Sex, age class	Location, activity
Cover site (burrow, pallet)	Width, height	Depth	Condition (active [excellent], inactive [good, fair, or poor]) and location. Each burrow was investigated by using a handheld mirror and/or flashlight to detect if a tortoise was present
Scat	Quantity	Age class	Condition (this year or not this year), location
Shell or bone (carcass or fragments)		Sex, age class, time since death	Location
Tracks		Age	Location
Eggs or fragments		# of eggs	Condition, location
Courtship rings		Width	Location

2.4 Botanical Survey

The purpose of the botanical survey was to provide information on targeted special status plants and existing vegetation communities. Surveys were performed to maximize the likelihood of locating special status plant species within the Study Area. The primary objective was to identify all plant species within the Study Area to the taxonomic level (i.e., species, subspecies, or variety) necessary to determine rarity status. The botanical study followed the guidelines set forth in *Survey Protocols Required for NEPA/ESA Compliance for BLM Special Status Plant Species* (BLM 2009). The BLM Las Vegas Office was contacted to obtain further details regarding targeted plants species (Edwards 2011).

The botanical survey coincided with the primary blooming period for targeted special status species and was performed during several separate field efforts during April and May, 2011. The survey team included personnel familiar with the identification of flora in the Mojave Desert of Southern Nevada and consisted of highly qualified botanists: Kent Hughes, Glenn Rink, Marc Baker, Tim Thomas, Michael Honer, Steve Till, Corey Mitchell, Lehong Chow, and Brian Sandstrom. Information on potential special status species was reviewed by the survey team to obtain an effective search image. Records of all plant species observed were maintained daily. A checklist was developed based on previous surveys and reviewed during each subsequent day of survey. For the majority of the Study Area, survey methodology followed the intuitive controlled survey method, which is suitable for large survey areas and highly skilled investigators (BLM 2009). The field botanists conducted meandering pedestrian transects throughout the entire Study Area. Tighter transects spaced between 10 and 15 meters apart were conducted in habitats with the highest potential for supporting the target species.

Additional survey coverage was attained through collecting data on targeted special status plant species during the full coverage tortoise surveys. Crews were trained in the identification of target species. All observations were recorded on standardized datasheets. Each crew included at least one experienced desert botanist. Additional time was spent (in the field and after the day's survey) keying plant taxonomy. If a plant of unknown identification was found, a GPS record was taken and a unique identification number was assigned so that if after proper identification, it was determined to be a special status species, the population could be revisited to collect additional data. All data were incorporated into GIS.

2.5 Additional Special Status Wildlife Species

In addition to recording desert tortoise and special status plant species, surveyors recorded all wildlife species, regardless of status, that were encountered during the survey. All special status species recorded as incidental data were also recorded by GPS and assigned a unique identifier. All other species were tallied at the end of each transect and recorded throughout each day by each crew. All data were entered from these datasheets and were incorporated into GIS.

2.6 Rainfall Analysis

Measurements of total and average precipitation during winter periods (October through March) are important in determining the efficacy of both desert tortoise and special status plant surveys. Per the USFWS desert tortoise protocol, data was obtained from the Western Regional Climate Center (2011). The Mountain Pass Cooperative Observer Program (COOP) weather station (elevation above 4,700ft and approximately 15 miles southwest of the Study Area) is the most proximate station to the Study Area; however, rainfall data is not available after 1997. Subsequently, monthly precipitation totals were obtained from the two next closest weather stations providing current data: Horse Thief Springs California Remote Automated Weather Stations (RAWS) (elevation 5,000ft and approximately 25 miles northwest of the Study Area) and Mid Hills California RAWS (elevation 5,413ft and approximately 30 miles south of the Study Area). These stations occur at elevations approximately 2,000 feet greater than the Study Area, which may not be ideal for use as surrogate sites. The next closest weather station is located in Searchlight, Nevada (elevation 3,540ft and approximately 30 miles southeast of the Study Area). Although the Searchlight station is slightly further from the Study Area, it is located at a similar elevation.

Rainfall data derived from the Searchlight and Mountain Pass stations were utilized in a previous desert tortoise study within the greater Ivanpah Valley, which indicated a long term average of total winter rainfall between 1961 and 1996 of 4.1 inches (Christopher et. al 1999). Available historical winter rainfall data from Searchlight and Mountain Pass was summarized to obtain a useful average for the Study Area (Table 2).

Table 2 - Historical Winter Rainfall Data[1] (inches)

	October	November	December	January	February	March	Total	Monthly Average
Searchlight[2]	0.94	0.97	0.78	0.52	0.43	0.80	4.44	0.74
Mountain Pass[3]	0.54	0.68	0.63	0.92	0.89	0.89	4.55	0.76
Mean	0.74	0.83	0.71	0.72	0.66	0.85	4.50	0.75

[1] Western Regional Climate Center (2011)
[2] Range of data from 1931 to 2011
[3] Range of data from 1955 to 1997

Due to the absence of rainfall data for the Mountain Pass station since 1997, data obtained from the Horse Thief Wash and Mid Hills stations were used as a surrogate for recent year averages. Total winter rainfall data from Searchlight, Horse Thief Wash, and Mid Hills from the previous six winter periods were tabulated separately, provided in Appendix A, and were then averaged (Table 3).

Table 3 - Recent Winter Rainfall Data[1] (inches)

	October	November	December	January	February	March	Total	Monthly Average
2005-2006	1.79	0.00	0.03	0.24	0.42	1.44	3.92	0.65
2006-2007	1.08	0.32	0.58	0.91	0.67	0.02	3.58	0.60
2007-2008	0.25	0.63	1.01	1.06	0.50	0.09	3.53	0.59
2008-2009	0.02	0.91	0.85	0.14	1.59	0.03	3.53	0.59
2009-2010	0.00	0.06	1.12	2.80	1.91	0.36	6.25	1.04
2010-2011	1.67	0.27	7.45	0.05	1.29	0.50	11.23	1.87

[1] Western Regional Climate Center (2011): Searchlight, Mid Hills, and Horse Thief Wash Stations

The historical average rainfall for the Study Area during the winter months was estimated to be 0.75 inches. By comparison, below-average winter rainfall occurred from 2005 to 2009. This four-year period was characterized by gradually decreasing rainfall for each subsequent year. Winter rainfall was above average from 2009 to 2011, with the highest amount of rainfall occurring during the most-recent winter of 2010-2011.

3.0 RESULTS

3.1 Vegetation Communities

The Study Area supports three vegetation alliances that are based on the Nevada Natural Heritage Program classification: *Larrea tridentata-Ambrosia dumosa* Shrubland, *Yucca schidigera-Larrea tridentata-Ambrosia dumosa* Shrubland, and *Atriplex polycarpa* Shrubland (Figure 3). Representative site photographs are found in Appendix A. Over 150 species of plants were identified within Study Area during the surveys (Appendix B).

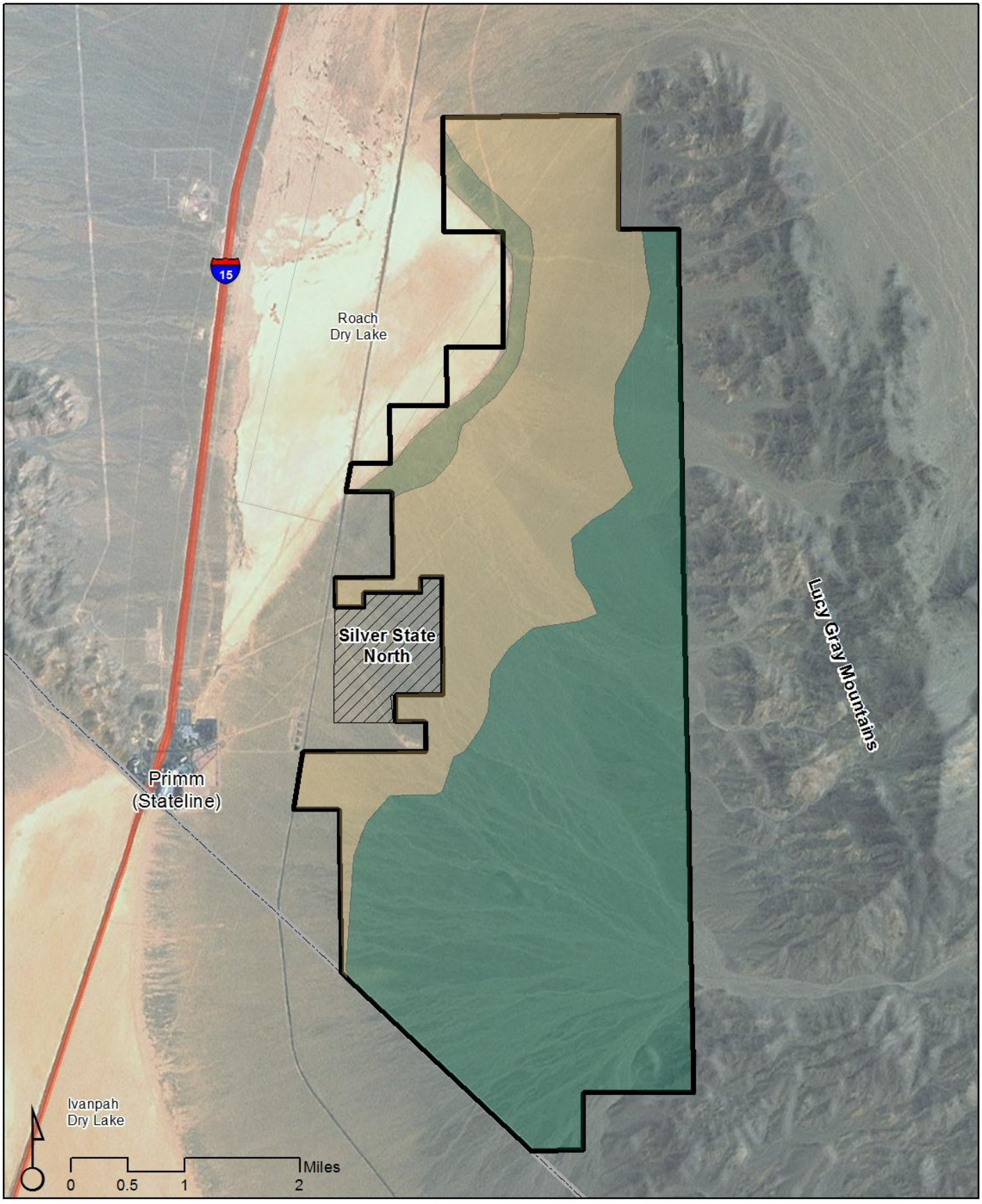
Larrea tridentata-Ambrosia dumosa Shrubland is dominated by creosote bush (*Larrea tridentata*) and burro brush (*Ambrosia dumosa).* This alliance is most prevalent within the Study Area and primarily occurs in the mid-elevation range. Additional plant species characteristic of these alliances include Death Valley ephedra (*Ephedra funerea*), littleleaf ratany (*Krameria erecta*), California buckwheat (*Eriogonum fasciculatum*), beavertail cactus (*Cylindropuntia basilaris*), and golden cholla (*Cylindropuntia echinocarpa*). Common herbaceous species include desert chicory (*Rafinesquia neomexicana*), combseed (*Pectocarya platycarpa*), rigid spineflower (*Chorizanthe rigida*), cryptantha (*Cryptantha* spp.), sun cup (*Camissonia* spp.), and desert pincushion (*Chaenactis fremontii*).

Yucca schidigera-Larrea tridentata-Ambrosia dumosa Shrubland is dominated by creosote bush, burro brush and Mojave yucca (*Yucca schidigera*). This alliance occurs higher in the alluvial fan within soils that contain higher proportion of gravel and rocks. Plant diversity and cacti/yucca density is higher in these regions as compared to the *Larrea tridentata-Ambrosia dumosa* Shrubland alliance.

Atriplex polycarpa Shrubland occurs at the lowest elevation range within the Study Area along the edges of Roach Lake where soils are relatively fine. This alliance is dominated by allscale (Atriplex polycarpa) and contains other shrubs including creosote bush, burro brush and big galleta (*Pleuraphis rigida).*

3.2 Wildlife Species

All wildlife species observed or detected within the Study Area are listed in Appendix C. Wildlife observed within the Study Area were representative of the northeastern Mojave Desert. Thirty-five bird species were detected within the Study Area. Bird species relatively common to the Study Area, listed in order of most-to-least frequently observed during the surveys, included black-throated sparrow (*Amphispiza bilineata*), horned lark (*Eremophila alpestris*), ash-throated flycatcher (*Myiarchus cinerascens*), common raven (*Corvus corax*), common poorwill (*Phalaenoptilus nuttallii),* cactus wren (*Campylorhynchus brunneicapillus*), and lesser nighthawk (*Chordeiles acutipennis*). Thirteen species of reptiles were detected within the Study Area.



Silver State Solar South

Study Area

Atriplex polycarpa Shrubland

Larrea tridentata-Ambrosia dumosa Shrubland

Yucca schidigera-Larrea tridentata-Ambrosia dumosa Shrubland

Figure 3
Vegetation Alliances

Reptile species relatively common to the Study Area, listed in order of most-to-least frequently observed during the surveys, included western whiptail (*Cnemidophorus tigris*), side-blotched lizard (*Uta stansburiana*), zebra-tailed lizard (*Callisaurus draconoides*), long-nosed leopard lizard (*Gambelia wislizenii*), desert iguana (*Dipsosaurus dorsalis*), and desert horned lizard (*Phrynosoma platyrhinos*), and coachwhip (*Masticophis flagellum*). Six species of mammals were detected within the Study Area. Mammal species relatively common to the Study Area, listed in order of most-to-least frequently observed during the surveys, included black-tailed jackrabbit (*Lepus californicus*), antelope ground squirrel (*Ammospermophilus leucurus*), and desert woodrat (Neotoma lepida). Small mammals (*Dipodomys* spp., *Chaetodipus* spp., and *Perognathus* spp.) likely inhabit the Study Area, although focused trapping was not conducted. No fish or amphibian species are likely to inhabit the Study Area or immediately surrounding areas because of the absence of suitable aquatic habitat.

3.3 Special Status Plant Species

Thirteen special status species were reviewed for their potential to occur within the Study Area (Table 4). Correspondence was made with the BLM Las Vegas Office regarding target special status species near the Study Area (Edwards 2011). None of the species are federal-listed (endangered or threatened), but all are considered special status by the BLM, NNHP, and/or State of Nevada. Descriptions of species occurring within the Study Area follow the table. A list of all common and special-status plant species observed during the surveys is found in Appendix B.

Table 4 - Special Status Plants Species

Common Name ***Scientific Name***	**Status**		**Habitat**	**Flower Period**	**Survey Results**
Arctomecon merriami white bearpoppy	FWS: BLM: State: NNHP: MSHCP:	none sensitive none S3 covered	Desert saltbush scrub and Mojave desert scrub. Limestone and dolomite soils; on ridges, rocky slopes, gravelly canyon washes. 2,000 to 6,200 feet.	Apr - Jun	**Not Found**
Arctomecon californica Las Vegas bearpoppy	FWS: BLM: State: NNHP: MSHCP:	none sensitive CE S3 covered	Mojave desert scrub and Desert saltbush scrub on gypsum soils. 1,300 to 2,700 feet.	Apr - May	**Not Found**
Astragalus nyensis Nye milk-vetch	FWS: BLM: State: NNHP: MSHCP:	none none none S3 not covered	Mojave desert scrub. Foothills of desert mountains on calcareous outwash fans and gravelly flats. 1,100 to 5,600 feet.	Apr - May	**Not Found**
Astragalus mahavensis var. mohavensis Mohave milk-vetch	FWS: BLM: State: NNHP: MSHCP:	none none none S2S3 not covered	Mojave desert scrub. Dry rocky often limestone substrates. 2,640 to 5,577 feet.	Feb - Jun	**Not Found**

Common Name ***Scientific Name***	**Status**		**Habitat**	**Flower Period**	**Survey Results**
Astragalus remotus Spring Mountains milkvetch	FWS: BLM: State: NNHP: MSHCP:	none sensitive none S2 covered	Mojave desert scrub. Rocky, gravelly, and/or sandy calcareous soils. 3,400 to 7,050 feet.	Apr - May	**Not Found**
Cryptantha tumulosa New York Mountains catseye	FWS: BLM: State: NNHP: MSHCP:	none none none S2 watch list	Mojave desert scrub and pinyon and juniper woodland. Granitic/ carbonate gravelly or clay substrates. 3,000 to 9,990 feet.	Apr - Jul	**Not Found**
Ephedra funerea Death Valley ephedra	FWS: BLM: State: NNHP: MSHCP:	none none none watch list not covered	Mojave desert scrub. Sandy, dry soil and rocky soils. 1,640 to 4,920 feet.	Mar - Apr	**Present** Widespread through mid-high elevations in sandy and rocky soils.
Eriogonum heermannii var. clokeyi Clokey buchwheat	FWS: BLM: State: NNHP: MSHCP:	none sensitive none S2 evaluated	Mojave desert scrub, shadscale, and blackbrush. Carbonate outcrops, talus, scree slopes, and gravelly washes. 4,000 to 6,000 feet.	Jun - Sept	**Not Found**
Littlefield [Astragalus] preussii var. *laxiflorus* Littlefield milkvetch	FWS: BLM: State: NNHP: MSHCP:	none none none S1S2 none	Chenopod scrub with dune or deep sand habitats.	Mar - May	**Not Found**
Penstemon albomarginatus White-margined beardtongue	FWS: BLM: State: NNHP: MSHCP:	none sensitive none S2 covered	Mojave desert scrub, blackbrush, and stabilized dunes with sandy soils. 2,100 to 5,890 feet.	Mar - May	**Present** Northern extent of Study Area within sandy soils.
Penstemon bicolor ssp. *bicolor* yellow two-toned beardtongue	FWS: BLM: State: NNHP: MSHCP:	none sensitive none S2 covered	Creosote-bursage, blackbrush, and mixed scrub. Calcareous or carbonate soils in washes, roadsides, rock crevices, outcrops. 2,500 to 5,480 feet.	Apr - Jun	**Present** Southeastern extent of Study Area within wash system.
Penstemon bicolor ssp. *roseus* rosy twotone beardtongue	FWS: BLM: State: NNHP: MSHCP:	none sensitive none S3 none	Creosote-bursage, blackbrush, and mixed scrub communities. Rocky calcareous, granitic, or volcanic soils. 1,800 to 4,839 feet.	Mar - Sept	**Not Found**
Phacelia analesonii Aven Nelson phacelia	FWS: BLM: State: NNHP: MSHCP:	none none none watch list not covered	Joshua tree woodland and pinyon and juniper woodland. 3,940 to 5,020 feet.	Apr - May	**Not Found**

FWS - U.S. Fish and Wildlife Service
NNHP - Nevada Natural Heritage Program
MSHCP – Clark County Multiple Species Habitat Conservation Plan

Nevada State Protected Classification
CE - critically endangered

NNHP State Ranks for Threats and Vulnerability
S1 – critically imperiled and especially vulnerable to extinction or extirpation due to extreme rarity, imminent threats or other factors
S2 - imperiled due to rarity or other demonstrable factors
S3 - vulnerable to decline because of rare and local throughout its range, or with very restricted range

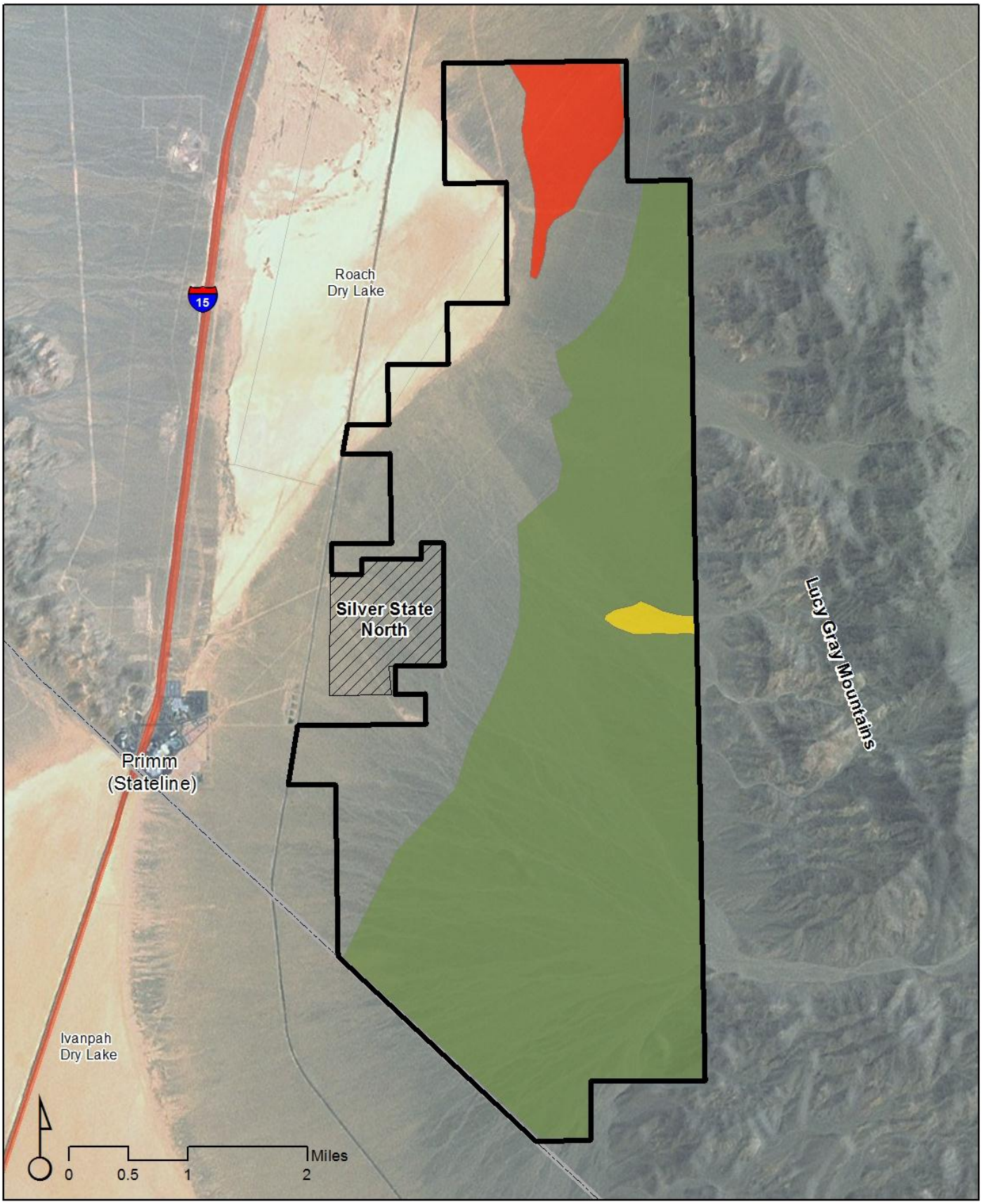
Death Valley ephedra (*Ephedra funerea*) is a Nevada Special Watch List Species. This species is a perennial shrub typically occurring in sandy and/or rocky soils within desert scrub communities at elevations ranging from 1,640 to 4,920 feet amsl. The range of this species primarily occurs in California and to a lesser extent in Nevada. Death Valley ephedra was widespread within the Study Area and was the most common *Ephedra* sp. present during the surveys. Due to the large size of the Study Area and the abundance of this species, individual plants were not recorded and it is estimated that thousands of individual plants occur within the 9,930-acre Study Area (Figure 4).

White-margined beardtongue (*Penstemon albomarginatus*) is a Nevada Special Status Species and designated Sensitive by the BLM State Office. This species is ranked by the NNHP as being imperiled due to rarity. White-margined beardtongue is a perennial herb that is historically known to occur in Mojave Desert scrub, and less frequently in blackbrush scrub, on sand bottoms of outwash canyons and the leeward side of lake beds at elevations ranging from 1,500 feet to 3,500 feet amsl. This species is dependent on sand transport systems from dry lakebeds towards lower slopes. It is endemic to the eastern Mojave Desert and has been recorded in Hidden Valley, Jean Lake, and Roach Lake. White-margined beardtongue was detected within the northern extent of the Study Area. It occurred within sandy soils associated with the washes that wrap around the northern tip of the Lucy Gray Mountains (Figure 4). This species was also found within the northern edges of Roach Lake. Over 1,700 individual plants were recorded.

Yellow two-toned beardtongue (*Penstemon bicolor* ssp. *bicolor*) is a Nevada Special Status Species and designated Sensitive by the BLM State Office. This species is ranked by the NNHP as being imperiled due to rarity. This species is an herbaceous short-lived perennial known to occur in creosote-bursage, blackbrush, and mixed scrub communities on calcareous or carbonate soils; typically found in active gravel washes, rock crevices, and outcrops at elevations from 2,500 feet to 5,500 feet amsl. Yellow two-tone beardtongue is endemic to southern Nevada and known to occur in lower elevations of the Spring Mountains and the McCullough Range. This species was found within the southeastern extent of the Study Area within a broad wash system (Figure 4).

3.4 Cacti and Yucca

Cacti and yucca, as well as evergreen trees, are protected and regulated by BLM and Nevada policy. These regulations cover the removal or possession at commercial rates of cacti, yucca, and evergreen trees. Cactus and yucca were relatively denser within upper elevations of the alluvial fan in areas supporting *Yucca schidigera-Larrea tridentata-Ambrosia dumosa* Shrubland (Figure 3). Due to the large size of the Study Area, individual counts of these species were not obtained. The relative abundance of cacti and yucca is provided (Table 5).



Approximate Distribution (2011)

- White-margined beardtongue (Penstemon albomarginatus)
- Yellow twotone beardtongue (Penstemon bicolor ssp. bicolor)
- Death Valley ephedra (Ephedra funerea)

Study Area

Silver State Solar South

Figure 4
Special Status Plants

Table 5 - Cacti and Yucca Abundance

Scientific Name	Common Name	Relative Abundance
Cylindropuntia acanthocarpa var. *coloradensis*	buckhorn cholla	low to high[1]
Opuntia basilaris ssp. *basilaris*	beavertail	Low
Cylindropuntia echinocarpa	golden cholla	low to high[1]
Cylindropuntia ramossisima	pencil cholla	Low
Echinocactus polycephalus	cottontop	Low
Echinocereus engelmanii	calico cactus	Low
Ferocactus cylindraceus var. *cylindraceus*	barrel cactus	low to high[1]
Grusonia parishii	matted cholla	Low
Mammillaria tetrancistra	Common fishhook cactus	Low
Opuntia erinacea var. *erinacea*	Mojave pricklypear	very low
Yucca schidigera	Mojave yucca	low to high[1]

[1] Abundance correlated with elevation within the alluvial fan with lower densities at low elevations and higher densities within upper elevations.

3.5 Invasive Plant Species

One invasive plant species designated by the Nevada Department of Agriculture as a Category B weed species was found within the Study Area: Sahara Mustard (*Brassica tournefortii*). Category B species are defined as "weeds established in scattered populations in some counties of the state; actively excluded where possible, actively eradicated from nursery stock dealer premises; control required by the state in areas where populations are not well established or previously unknown to occur." Other invasive species found within the Study Area included Mediterranean grass (*Schismus barbatus*), cheat grass (*Bromus tectorum*), red brome (*Bromus madritensis* ssp. *rubens*), Russian thistle (*Salsola tragus*), and salt cedar (*Tamarisk* sp.). Many of these species are recognized for their widespread distribution and are typically not considered to be feasibly controlled on a large scale.

3.6 Special Status Wildlife Species

Fourteen special status wildlife species were evaluated for their potential to occur (Table 6). One wildlife species that is Federal-listed (Threatened) and State-protected occurs within the Study Area: the desert tortoise. Seven additional special status wildlife species were detected within the Study Area: burrowing owl (*Athene cunicularia*), prairie falcon (*Falco mexicanus*), loggerhead shrike (*Lanius ludovicianus*), Brewer's sparrow (*Spizella breweri*), crissal thrasher (*Toxostoma crissale*), LeConte's thrasher (*Toxostoma lecontei*), and desert kit fox (*Vulpes macrotis*). Special status species that were detected within the Study Area are shown in Table 6 and discussed further in this section.

Table 6 - Special Status Wildlife Species

Scientific Name **Common Name**	**Status**		**Survey Results**
REPTILES			
Gopherus agassizii desert tortoise	FWS:	threatened	**Present**
	BLM:	sensitive	81 adult and 21 immature tortoises were recorded within the Study Area.
	State:	protected	
	NNHP:	S2S3	
	MSHCP:	Covered	
Heloderma suspectum cinctum Gila monster	FWS:	none	**Not Detected – Moderate Potential**
	BLM:	sensitive	Moderate potential to occur in higher elevations of the alluvial fan within rocky substrates.
	State:	protected	
	NNHP:	S2	
	MSHCP:	None	
Sauromalus obsesus chuckwalla	FWS:	none	**Not Detected – Moderate Potential**
	BLM:	sensitive	Moderate potential to occur in higher elevations of the alluvial fan within rocky substrates.
	State:	none	
	NNHP:	S3	
	MSHCP:	None	
BIRDS			
Aquila chrysaetos golden eagle	FWS:	none	**Present**
	BLM:	sensitive	One pair was observed in flight over Study Area. Nesting habitat absent from Study Area. Potential territories located over five miles west near the Stateline Hills.
	State:	protected	
	NNHP:	S4	
	MSHCP:	None	
Athene cunicularia burrowing owl	FWS:	none	**Present**
	BLM:	sensitive	No live owls were observed. Historical sign (whitewash, feathers and pellets) were observed at four burrow locations.
	State:	protected	
	NNHP:	S3B	
	MSHCP:	None	
Falco mexicanus prairie falcon	FWS:	none	**Present**
	BLM:	sensitive	One individual observed adjacent to Study Area.
	State:	protected	
	NNHP:	S4	
	MSHCP:	None	
Lanius ludovicianus loggerhead shrike	FWS:	none	**Present**
	BLM:	sensitive	Eleven individual shrikes, including two pairs, were recorded within Study Area.
	State:	protected	
	NNHP:	S4	
	MSHCP:	None	
Spizella breweri Brewer's sparrow	FWS:	none	**Present**
	BLM:	none	At least thirty individuals detected within the Study Area.
	State:	protected	
	NNHP:	S4B	
	MSHCP:	None	
Toxostoma crissale Crissal thrasher	FWS:	none	**Present**
	BLM:	sensitive	One individual was detected within the Study Area. Essential habitat limited, but may occur in dense vegetation associated with larger wash systems in the upper alluvial fan.
	State:	protected	
	NNHP:	S3	
	MSHCP	Evaluated	
Toxostoma lecontei Le Conte's thrasher	FWS:	none	**Present**
	BLM:	sensitive	Twenty-eight individuals, including five pairs and three nests, were observed within the Study Area.
	State:	protected	
	NNHP:	S2	
	MSHCP:	Evaluated	

MAMMALS			
Antrozous pallidus	FWS:	none	**Not Detected – Moderate Potential**
Pallid bat	BLM:	sensitive	Moderate potential to occur within rocky substrate in upper
	State:	protected	elevations of the Study Area.
	NNHP:	S3	
	MSHCP:	none	
Corynorhinus townsendii	FWS:	none	**Not Detected – Low Potential**
	BLM:	sensitive	Large cavities for roosting and hibernation not located within
Townsend's big-eared bat	State:	protected	Study Area.
	NNHP:	S2	
	MSHCP:	none	
Myotis californicus	FWS:	none	**Not Detected – Moderate Potential**
California myotis	BLM:	sensitive	Moderate potential to occur within rocky substrate in upper
	State:	none	elevations of the Study Area.
	NNHP:	S4	
	MSHCP:	none	
Myotis ciliolabrum	FWS:	none	**Not Detected – Moderate Potential**
western small-footed	BLM:	sensitive	Moderate potential to occur within rocky substrate in upper
myotis bat	State:	none	elevations of the Study Area.
	NNHP:	S3	
	MSHCP:	evaluated	
Myotis yumanensis	FWS:	none	**Not Detected – Low Potential**
Yuma myotis bat	BLM:	sensitive	Typically associated with bodies of water, which is not
	State:	none	present within the Study Area.
	NNHP:	S3S4	
	MSHCP:	watch list	
Tadarida brasiliensis	FWS:	none	**Not Detected – Moderate Potential**
Brazilian free-tailed	BLM:	sensitive	Moderate potential to occur within rocky substrate in upper
bat	State:	protected	elevations of the Study Area.
	NNHP:	S3S4	
	MSHCP:	none	
Vulpes macrotis	FWS:	none	**Present**
desert kit fox	BLM:	none	Two burrow complexes with recent kit fox sign were
	State:	protected	recorded. Numerous canid burrows exhibiting various
	NNHP:	S3	degrees of use were observed.
	MSHCP:	none	

FWS - U.S. Fish and Wildlife Service
NNHP - Nevada Natural Heritage Program
MSHCP –Clark County Multiple Species Habitat Conservation Plan
Protected - NRS 501

NNHP State Ranks for Threats and Vulnerability
S1 - critically imperiled and especially vulnerable to extinction or extirpation due to extreme rarity, imminent threats or other factors
S2 - imperiled due to rarity or other demonstrable factors
S3 - vulnerable to decline because of rare and local throughout its range, or with very restricted range
S4 - long-term concern, though now apparently secure; usually rare in parts of its range, especially at its periphery
B - breeding status within Nevada

3.6.1 Reptiles

Desert tortoise (*Gopherus agassizii*) is a Federal-listed (Threatened), BLM-sensitive, and State-protected species. The desert tortoise inhabits flats, bajadas, and foothills supporting desert scrub, desert wash and Joshua tree habitats throughout the Mojave and Sonora deserts with appropriate soils for burrowing, and prefers areas with friable soils consisting of sand and fine gravel. Tortoises typically prefer habitats with abundant annual forbs, grasses and cacti, which constitute its primary food sources. Studies within the Eastern Mojave indicated that tortoises consumed *Camissonia boothii*, *Cryptantha angustifolia*, *Malacothrix glabrata*, *Opuntia basilaris*, *Rafinesquia neomexicana*, *Schismus barbata*, *Stephanomeria exigua* and other species (Avery 1998). Current research has suggested that plant species that have high potassium excretion potential (high-PEP) may be important to the diet of desert tortoise (Oftedal 2002; Oftedal et. al 2002). A plant with a high PEP index has a surplus of nitrogen and water, and low amounts of potassium. Excess potassium can be detrimental to the health tortoises. When excreting potassium salts from their bladder, tortoises risk expelling valuable water and protein in the process.

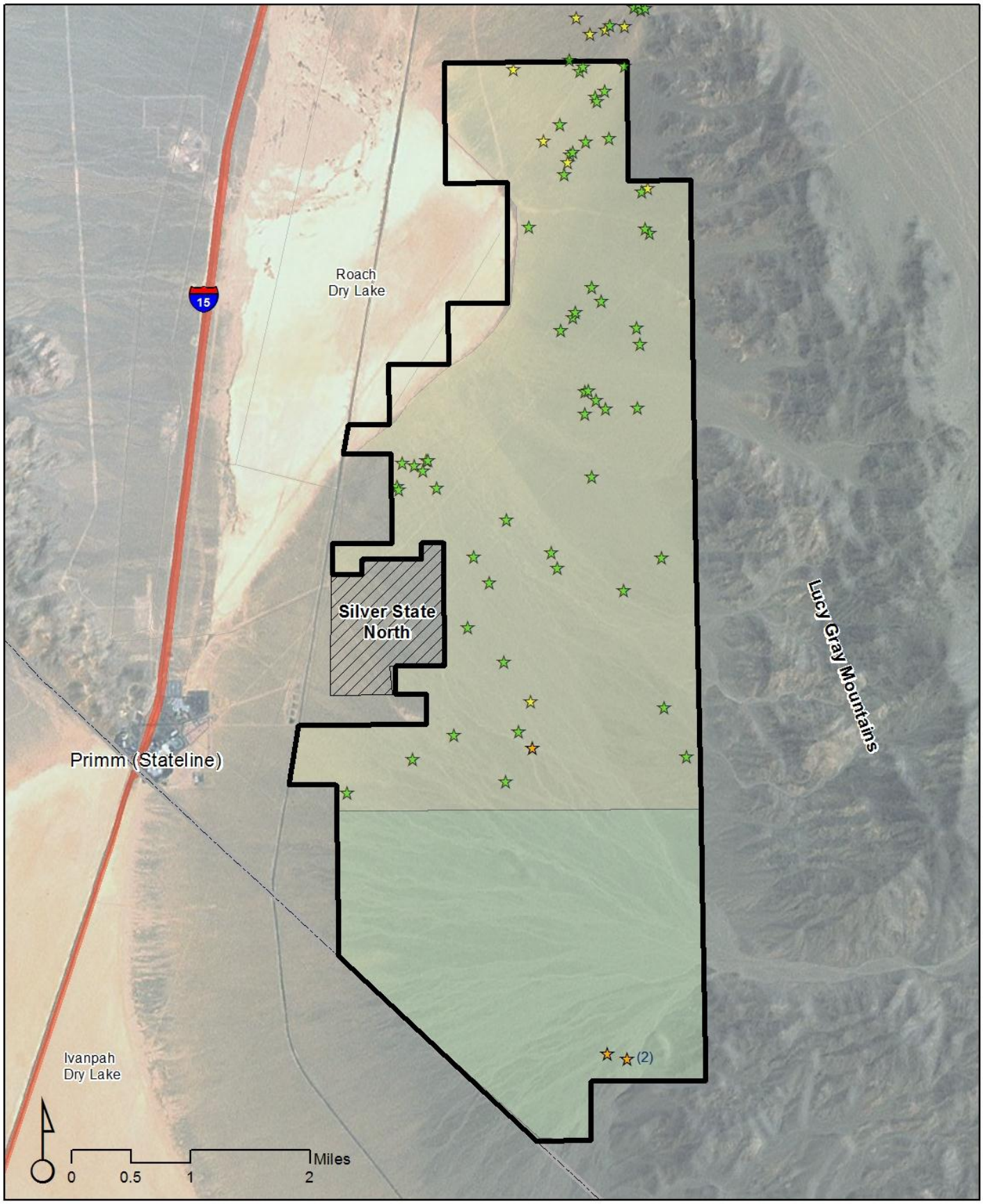
Desert tortoises generally reach sexual maturity around 12 to 15 years of age [approximately 180mm mean carapace length (MCL)]. Eggs are generally laid in friable soil at or near burrow entrances between April and June and occasionally September and October. Eggs hatch within 3 to 4 months. Activity and movement is generally influenced by temperature and recent precipitation, which correlates with potential food and water resources. Extreme temperatures, both high and low, and periods of drought typically result in reduced tortoise activity (Franks et al 2011). Desert tortoises occupy core areas, or home ranges, which often overlap between individuals. Home ranges of females are considerably smaller than of males. Annual home ranges have been calculated to vary from 10 to over 450 acres depending on demographic factors including sex, age, and density as well as environmental factors including time of year and resource availability (USFWS 1994). Across their range, female desert tortoises are known to occupy annual home ranges averaging 35 to 40 acres, while male's home ranges are generally three times the size of female's (USFWS 2010b). In Ivanpah and Roach Valleys, average female annual home ranges in 2000 and 2001 were calculated to be 21 acres (Franks et al 2011). A multiyear study conducted at Bird Spring Valley, located approximately 20 miles north of Silver State Solar South project, indicated larger average annual home ranges for both male and female tortoises. These data indicated an average annual home range of 41 acres for females and 64 acres for males (Nussear 2011). It is understood that home ranges change in size and location from year to year and an individual tortoise may occupy an area larger than its annual home range over the course if its lifetime; however, published data is limited.

The results of the 2008/2009 sampling surveys documented that desert tortoises were present within the Study Area and subsequently had the potential to be present in all areas of the project. Secondary evidence of desert tortoise presence (e.g., burrows, excrement, tracks, shell remains, etc.) was observed in almost all surveyed sections. Four live tortoises were detected during the

sampling effort. The desert tortoise survey report uses calibration values from past projects. Density estimates were calculated as less than or equal to 20 tortoises per square mile in twelve sections (square mile) and 20 to 50 tortoises per square mile in six sections. Clearance surveys that took place on the Silver State North site were completed in 2011. Those surveys revealed seven tortoises which had to be removed from the site before construction could begin. The total area encompassing Silver State North, including all areas excluded by tortoise fencing, totaled 423 acres. These data indicate an actual density of 10.6 tortoises per square mile within Silver State North.

The 2011 full coverage surveys resulted in sign of desert tortoise (i.e., live tortoises, active burrows/pallets, recent scat, and tracks) throughout the Study Area; however, live tortoise observations were not evenly distributed (Figure 5). An overall density estimate 8.1 desert tortoises per square mile was calculated for the 8,725-acres under full-coverage surveys using the formula in the USFWS 2010 revised survey protocol. Qualitative evidence of recruitment was indicated by the fact that 7% of all tortoises observed were immature (less than 160mm MCL). The large majority of immature tortoises were observed in the northern half of the Study Area (Figure 5). Ninety-one burrows of excellent condition, 289 burrows of fair to good condition, and twenty-eight burrows of poor condition were observed. Over 170 observations of scat were recorded, with the majority estimated to have been deposited within the previous year. The distribution of burrows (excellent condition) and recent scat were similar to the distribution of live tortoises (Figure 6). Four carcasses with a time-since-death (TSD) estimate of less than one year, eighty-nine carcasses with a TSD of one-to-four years, and 122 carcasses with a TSD estimate of greater than four years were observed (Figure 7). The majority of carcasses were recorded in the southern half of the Study Area. Many appeared to have died approximately four years prior and may correlate with a notable drought period that lasted through 2008. Additional surveys extending north of Silver State Solar Power South, LLC's ROW boundary showed the greatest concentration of tortoises located northwest of the Lucy Gray Mountains. This area also indicated recruitment with more than 20% of tortoises being immature, including four measuring less than 80mm MCL.

The Study Area is substantially larger than the alternative site layouts, which allows project features to be adjusted for avoidance of high tortoise concentrations while still meeting project objectives. Additional calculations were performed for each of the three currently proposed alternative site layouts (Table 7). Tortoise estimates were derived using both the 2008/2009 TRED sampling [as referenced in the FEIS (BLM 2010)] for Alternative C and the 2011 full coverage survey data [using the USFWS estimation formula (USFWS 2010b)] for Alternatives B and D. Confidence intervals, or ranges, were generally wider for estimates derived from sampling when compared to full coverage. Each alternative's abundance and density estimates are discussed following Table 7.



Study Area

2011 Full Coverage

2008-2009 TRED Sampling

2011 Full Coverage

Adult Tortoise (>160mm MCL)

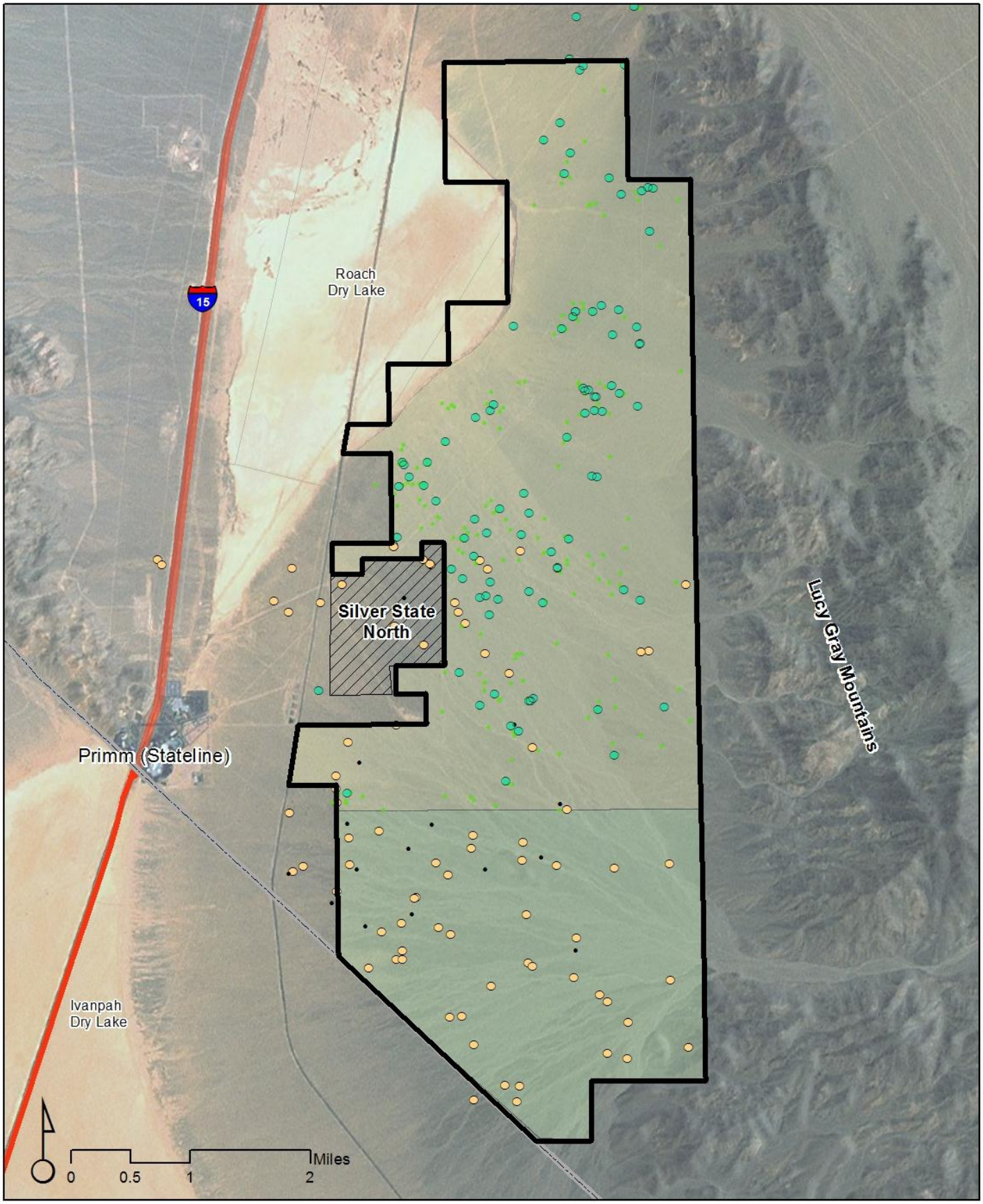
Immature Tortoise (<160mm MCL)

2008-2009 TRED Sampling

Adult Tortoise (>160mm MCL)

Silver State Solar South

Figure 5
Live Tortoise Observations



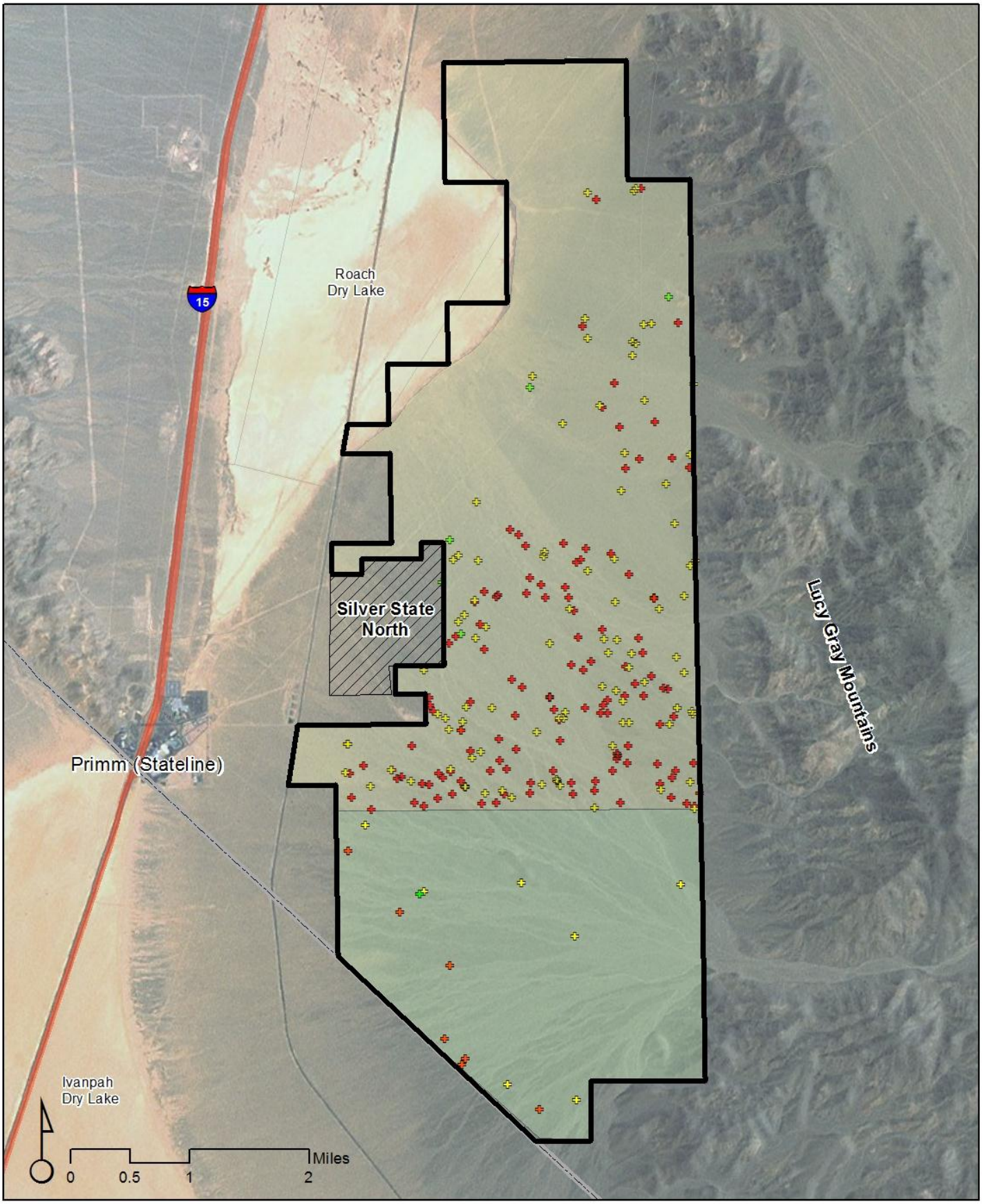
Study Area
2011 Full Coverage
2008-2009 TRED Sampling

2011 Full Coverage
Burrow (excellent condition)
Scat (this year)

2008-2009 TRED Sampling
Burrow
Scat (this year)

Silver State Solar South

Figure 6
Additional Active Tortoise Sign



Study Area
2011 Full Coverage
2008-2009 TRED Sampling

Time Since Death
<1 yrs
2-4 yrs
>4 yrs

Silver State Solar South

Figure 7
Tortoise Carcasses

Table 7 - Comparison of Desert Tortoise[1] Calculations per Alternative

Alternative/Site	Size (acres)	Point Estimate (Tortoises)	Range Estimate (Tortoises)	Density Point Estimate (tortoises/mi^2)	Density Range Estimate (tortoises/mi^2)
Alternative B	3,855	41[2]	19 to 85	7	3 to 14
Alternative C[3]	2,515	76	36 to 105	19	9 to 27
Alternative D[4]	3,102	29[2]	13 to 64	6	3 to 13

[1] Adult Tortoises (>160mm MCL) - range estimates based on lower and higher 95% confidence interval

[2] Estimates derived from full coverage surveys and USFWS formula (USFWS 2010b)

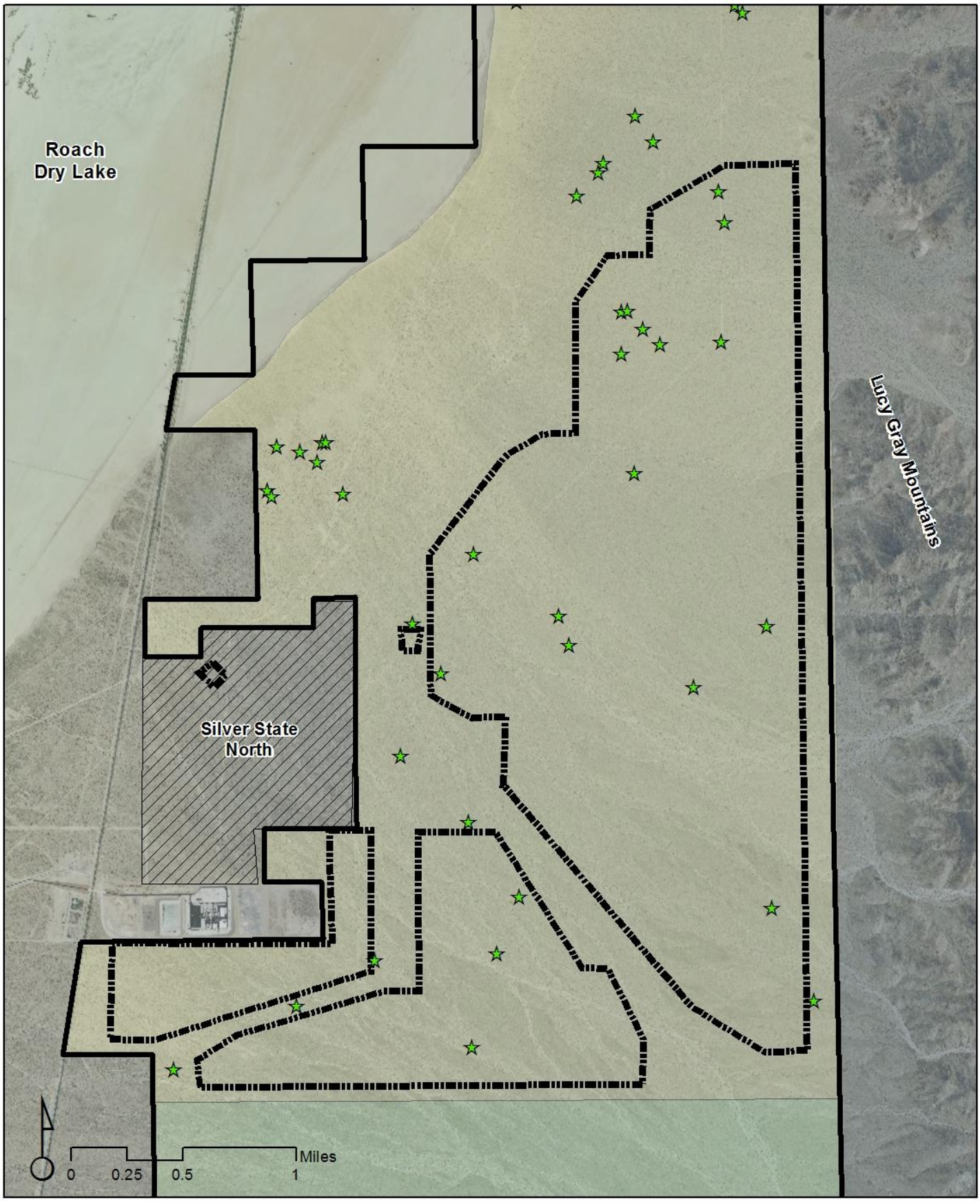
[3] Estimates from TRED sampling (BLM 2010). Estimates scaled down to excludes Silver State North (developed)

[4] Estimates scaled up to include linear components and associated project features.

Alternative B was completely surveyed during the 2011 full coverage transects. Twenty adult tortoises were recorded within the 3,855-acre footprint (Figure 8). Although the number of adult tortoises observed was higher than in the other alternatives, the size of the site layout was considerably larger, resulting in a relatively low density (point estimate of seven tortoises per mi^2). Alternative B was estimated to support between nineteen to eighty-five adult tortoises, with a point estimate of forty-one adult tortoises.

Alternative C was surveyed in 2008 and 2009 via TRED methodology. Four individual tortoises were located during the sampling surveys. Calculations yield an estimate of 88 tortoises for 2,967 acres. The 2,515 acres of undeveloped footprint (which excludes the developed Silver State North site and associated linear features) was deducted utilizing the data collected for the entire 2,967 acre site. The undeveloped areas of alternative C were estimated to support between thirty-six to one hundred and five adult tortoises, with a point estimate of seventy-six adult tortoises.

Alternative D was completely surveyed during the 2011 full coverage transects, with the exception of a narrow strip along the southern boundary and a small extension of the proposed basins, which total less than ninety acres. Fourteen adult tortoises were recorded within the 3,102 acre footprint of Alternative D (Figure 10). Alternative D is estimated to support between thirteen to sixty-four adult tortoises, with a point estimate of twenty-nine adult tortoises. The alignment of Alternative D shifts the project's impact area to an area of lower tortoise density (approximately six adult tortoises per mi^2) and tighter confidence interval than the previous Alternatives B and C. The calculations for Alternative D relied on density extrapolation for the ninety acres that fell outside the full coverage survey area and additional linear features. These areas were included in the overall estimate by using density data from the remaining 97% of Alternative D that was covered by full coverage surveys. The calculations for Alternative D included habitat between the project site fenced boundary and upslope detention basins. These areas would technically remain desert tortoise habitat but are effectively secluded by the project. Although the additional acreage is not technically part of the solar farm footprint, the small areas of tortoise habitat included in the calculation will likely be affected due to their locations between project features.



Silver State Solar South

Figure 8
Alternative B
Live Tortoise Observations

2008-2009 TRED Sampling

Study Area

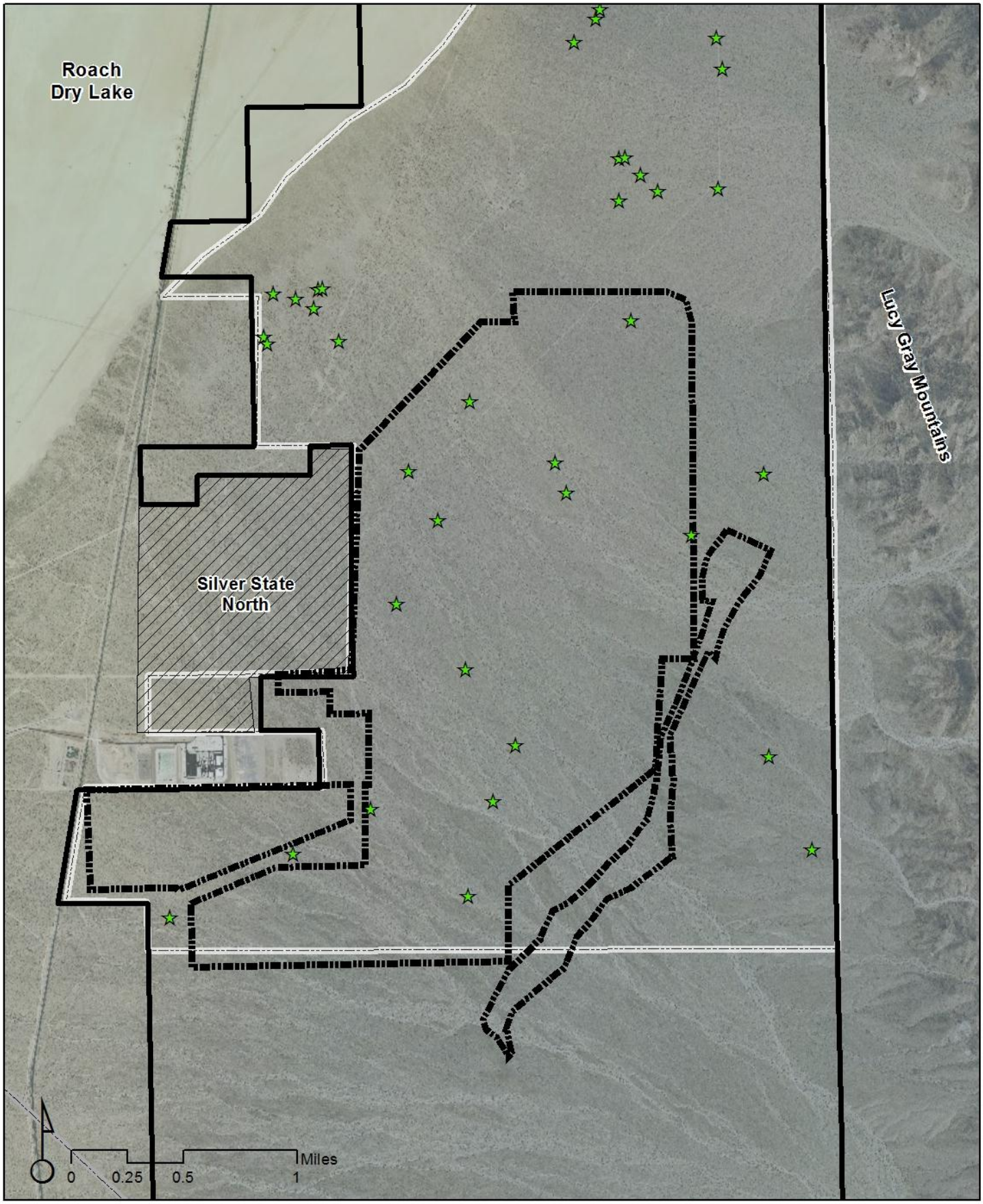
Alternative C

< 20 tortoises per mi2

21 to 50 tortoise per mi2

Silver State Solar South

Figure 9
Alternative C
TRED Sampling Densities



Study Area

Alternative D

Adult Tortoise
(>160mm MCL)

Silver State Solar South

Figure 10
Alternative D
Live Tortoise Observations

3.6.2 Birds

Golden eagle (*Aquila chrysaetos*) is a BLM-sensitive, State-protected species subject to the federal Migratory Bird Treaty Act (MBTA) and Bald and Golden Eagle Protection Act. This large eagle is found throughout the United States typically occurring in open country, prairies, tundra, open coniferous forest and barren areas, especially in hilly or mountainous regions. Within the desert regions, this species usually builds nests on cliff ledges. Breeding in Southern California starts in January, nest building and egg laying in February to March, and hatching and raising the young eagles occur from April through June. Once the young eagles are flying on their own, the adult eagles will continue to feed them and teach them to hunt until late November. Due to the large investment in energy and time that an adult golden eagle is required to provide in raising young, some eagles will forgo a season of reproduction even when food supply is abundant (WRI 2010). One pair of golden eagles was observed soaring overhead near the eastern boundary of the Study Area during the surveys. In 2010, Wildlife Research Institute (WRI) conducted aerial surveys of a ten-mile radius around the proposed Stateline project site west of Ivanpah Lake. These surveys extended east across the valley and included the Lucy Gray Mountains. WRI recorded no golden eagles within the Study Area limits or within the Lucy Gray Mountains; however, they detected four possible golden eagle territories within ten miles of the Silver State Solar South Study Area: Umberci Mine (approximately 8 miles west), Devil's Peak (approximately 7 miles west), Stateline Hills (approximately 7 miles west), and Ivanpah Valley (approximately 5 miles west). The next proximate potential golden eagle nesting habitat is located over seven miles east of the Study Area within the McCullough Range. Relevant data that may become available from other studies within the vicinity of Silver State South (e.g., Eldorado-Ivanpah Transmission Project) will be evaluated as it becomes available.

Western burrowing owl (*Athene cunicularia*) is a BLM-sensitive, State-protected species and is protected by the MBTA. It is historically known to occur in open, dry grasslands, agricultural and range lands, and desert habitats often associated with burrowing animals. This species typically nests in mammal burrows although they may use man-made structures including culverts and debris piles. They exhibit strong nest site fidelity. Burrowing owls eat insects, small mammals and reptiles. Burrowing owls can be found from California to Texas and into Mexico. In some cases, owls migrate into southern deserts during the winter. Evidence of burrowing owl presence was recorded at four burrow locations (Figure 11). Burrowing owl sign consisted of whitewash excrement, pellets, and feathers. No live burrowing owls were observed. Burrowing owls may reside within the Study Area, but likely in low densities.

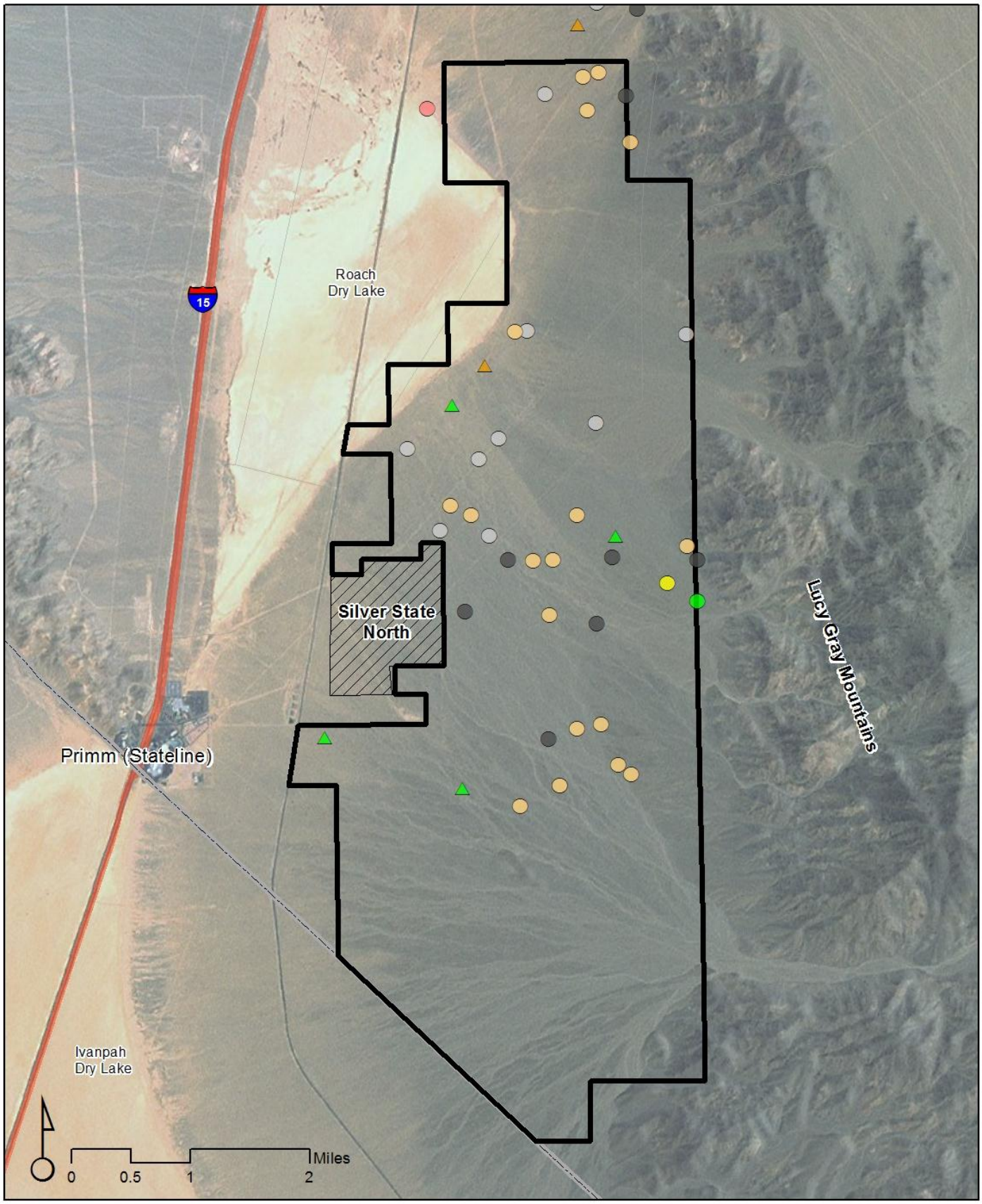
Prairie falcon (*Falco mexicanus*) is a BLM-sensitive, State-protected species and is protected by the MBTA. This large falcon typically builds nest sites on cliffs, similar to the golden eagle. In the desert they are found in most vegetation types, although sparse vegetation provides the best foraging habitat. In the Mojave, mean home range size has been found to be approximately 50 to 70 km² (Harmata et al. 1978).

A single prairie falcon was observed in flight just west of the Study Area north of Roach Lake (Figure 8). Nesting habitat for this species does not occur within the Study Area. The nearest possible nesting habitat is within the Lucy Gray Mountains. Prairie falcons are expected to be an infrequent forager within the Study Area.

Loggerhead shrike (*Lanius ludovicianus*) is a BLM-sensitive, State-protected species and is protected by the MBTA. It typically is found in open habitats with scattered shrubs, trees, posts, fences, utility lines, or other perches. As a predatory bird its diet consists of insects, amphibians, small reptiles, small mammals, and other birds. Shrikes typically build nests one to three meters above the ground depending on the height of the vegetation. Seven individual loggerhead shrikes were recorded during the surveys, including two pairs (Figure 11). This species can be considered present and may be a year-round resident within the Study Area.

Brewer's sparrow (*Spizella breweri*) is a State-protected species and is protected by the MBTA. This species typically breeds in shrub habitats, such as sagebrush habitats east of Sierra Nevada Range and in higher valleys of the Mojave Desert. It is somewhat common in open desert habitats during the winter. Brewer's sparrow feeds on insects and seeds on the ground or in low shrubs. This species primarily breeds from May through August with a peak in June. At least thirty individual Brewer's sparrows were detected through direct observation and/or vocalization within the Study Area. This species can be considered present and may be a year-round resident within the Study Area.

Crissal Thrasher (*Toxostoma crissale*) is State-protected and classified by the NNHP as vulnerable to decline because of its status as rare and local throughout its range, or with very restricted range. This species occupies a relatively large variety of desert riparian and scrub habitats from below sea level to over 6,000 feet amsl. Crissal thrashers are typically most abundant near riparian scrub or woodland at lower elevations (e.g., Colorado River valley), and low, dense shrublands associated with washes at higher elevations in the Mojave Desert (Shuford and Gardali 2008). Dominant plant species in occupied habitat include mesquite (*Prosopis* spp.), catclaw (*Acacia greggii*), ironwood (*Olneya tesota*), palo verde (*Cercidium* spp.), desert-thorn (*Lycium cooperi*), and saltbush (*Atriplex* spp.). Riparian scrub and woodland is not present within the Study Area; however, the larger wash systems that originate higher in the Lucy Gray Mountains may support dense, wash-dependent shrub and trees species that serve as habitat for this species. One individual crissal thrasher was observed along the eastern boundary of the Study Area. The distribution of appropriate habitat for this species within the Study Area is limited, but there is a potential for crissal thrashers to occupy the dense vegetation within the larger wash systems at higher elevations.



Study Area

Observations are not presented for southern study area.

- Brewer's sparrow
- Crissale thrasher
- Golden Eagle
- LeConte's Thrasher
- Loggerhead Shrike
- Prairie Falcon
- Burrowing Owl Sign
- Desert Kit Fox Complex

Silver State Solar South

Figure 11
Special Status Wildlife Species

Le Conte's thrasher (*Toxostoma lecontei*) is a BLM-sensitive, State-protected species and is protected by the MBTA. This species is a year-round desert resident that inhabits various desert scrub and wash habitats and typically breeds in desert areas that support cactus, Mojave yucca (*Yucca schidigera*), Joshua trees (*Yucca brevifolia*), and large thorny shrubs such as *Lycium* spp. This species is distributed from the Mojave Desert east into southern Utah and northern Arizona, and south into northern Mexico. Twenty-eight individual thrashers, including five pairs, were detected within and around the Study Area. Three nests belonging to this species were also observed. This species is likely a year-round resident within the Study Area.

3.6.3 Mammals

Focused surveys for bat species were not conducted. Four special status bat species have a moderate potential to occur including pallid bat (*Antrozous pallidus*), small-footed myotis (*Myotis ciliolabrum*), California myotis (*Myotis californicus*), and Brazilian free-tailed bat (*Tadarida brasiliensis*). These species have the potential to occur within the rocky substrate of the higher elevations within the Study Area where potential crevice roosting habitat occurs.

Desert kit fox (*Vulpes macrotis*) is a State-protected species and classified by the NNHP as vulnerable to decline because it is rare throughout its range. Kit foxes are primarily carnivorous and prey on black-tailed jackrabbits, desert cottontails, small mammals, insects, reptiles (sometimes small desert tortoises, and birds [including eggs]). They typically dig burrows and dens in open, level areas with loose-textured, sandy and loamy soils. These burrows may also be used by other species including burrowing owls. Dozens of canid burrows possibly used by desert kit fox were observed during the surveys. One burrow complex exhibited recent active sign of both tracks and scat (Figure 8). Kit fox is likely a year-round resident within the Study Area.

4.0 DISCUSSION AND RECOMMENDATIONS

4.1 Desert Tortoise

4.1.1 Project Alternatives

Observations of live desert tortoises and tortoise sign were not distributed evenly throughout the Study Area; rather, observations were sporadic and in some cases occurred in distinct concentrations. This type of distribution is typical of desert tortoises especially during the spring when activity and movement increases. Movement patterns during the spring are typically related to foraging and mating activities. Tortoise distribution is undoubtedly dynamic over time; however, the tortoise distribution illustrated in this report is valuable in showing large-scale conditions within the full Study Area and has allowed for project design to avoid direct impacts to areas of tortoise concentrations and higher density. Based on the data collected, project development located in the northern extents of the Study Area would be expected to have greater direct impacts to desert tortoises and connectivity than if located in the southern portion of the Study Area. Examination of various project alternatives supports this, with Alternative D showing both the lowest point estimates and densities for desert tortoises within the proposed development footprint. Consideration should be made when comparing density estimates for Alternative C with other alternatives as these estimates relied on sampling data, which has inherently larger confidence intervals. The point estimates for Alternative C may behigher as a result of the sampling methodology than compared to Alternatives B and D that relied on full coverage data.

4.1.2 Habitat and Genetic Connectivity

Effects to desert tortoises should further be evaluated in context with the Desert Tortoise Recovery Plan (USFWS 1994 and 2011c). The Recovery Plan addresses conservation and enhancement of desert tortoise populations as a whole and also within distinct recovery units. The USFWS recently provided guidance addressing that the preservation of habitat connectivity and genetic flow between large geographically distant populations, specifically the potential connectivity between the Ivanpah and Piute-Eldorado Critical Habitat Units (CHU), is of special importance (USFWS 2011a, 2011b, and 2012). Recent studies have indicated potential connectivity between these CHUs is located north-south through eastern Ivanpah/Roach Valley, which is in the vicinity of Silver State Solar South, and east-west through the northern McCullough Range south of Hidden Valley (Hagerty 2010 and Nussear 2009). Alternative B may constrict potential habitat connectivity between the project and the Lucy Gray Mountains due to the eastern extent of the layout. In comparison, Alternatives C and D are located further to the west to allow for higher potential of functional habitat connectivity between the project and the Lucy Gray Mountains.

Maintaining connectivity between large core habitat areas is important for preserving gene flow among individuals of a population. Gene flow promotes higher genetic variability, or heterozygosity, which improves overall fitness of a species. Peripheral, or isolated, populations can undergo genetic drift and a loss of heterozygosity, which may result in a loss of fitness and subsequently make the isolated population more vulnerable to environmental and demographic stochastic events. Even infrequent gene flow (e.g., one reproductive tortoise every ten years) across a constrained linkage could be sufficient to preserve genetic heterozygosity between two connected core areas (Bury et al. 1988). Some studies indicate that many tortoise generations are required to detect significant genetic drift in isolated populations (Bury et al. 1988). While others have been successful in illuminating genetic subpopulations resulting from anthropogenic features over a much shorter duration (Latch et al. 2011).

Within Ivanpah and Roach Valleys, baseline conditions include historical anthropogenic features that limit connectivity including Interstate 15, Primm developments, and the existing railroad. It is expected that these features have affected genetic flow within the tortoise population of both valleys. Further analysis is ongoing to determine the baseline condition for desert tortoise connectivity between the Ivanpah CHU and Piute-Eldorado CHU. Connectivity studies lead by Kenneth Nussear, research herpetologist with the U.S. Geological Survey (USGS), are underway in spring of 2012 to provide data on the rate of tortoise interaction within the high elevation passes within both the McCullough Range on the east side of Interstate 15 and Stateline Pass on the west.

Several recent studies and models have provided useful information regarding desert tortoise habitat connectivity. Habitat connectivity can be assessed on varying geographic scales. The identification of existing barriers and viable corridors at ground level is important to understanding the level of tortoise connectivity occurring under current conditions and within specific geographic locations. Conditions of functional habitat connectivity are site-specific and are dependent upon several factors including existing densities, habitat quality, demographics, existing threats, and size and dimension of available habitat. For a corridor to provide functional connectivity it should be occupied by desert tortoises in densities sufficient to allow for overlapping home ranges between males and females. This would allow for genetic exchange to occur through the corridor. Individual annual home ranges can be dynamic from year to year and be dependent on demographic factors including sex, age, and density as well as environmental factors including time of year and resource availability (USFWS 1994). Thus, the cumulative home range of resident tortoises should be considered; however, there is a lack of published data that provides such quantification.

The best available scientific data that can be used is multiyear annual home range analysis. For Silver State Solar South, the most relevant (proximate) data should be derived from Ivanpah and Roach Valley and neighboring watersheds. When assuming a circular annual home range, its diameter serves as a starting point in this analysis. For example, a 500 acre circular home range, which is thought to be the maximum limit for a male tortoise, would have diameter of 1.0 mile. Studies conducted in the Ivanpah Valley indicated annual home range variance (males and females combined) from 0.10 to 0.66 mile in diameter (Berry 1986, Franks et al 2011, and Nussear 2011).

Existing studies, the results of ongoing studies, as well as continued coordination with the USFWS and USGS and their efforts to model tortoise habitat quality and further evaluate on the ground patterns of tortoise interaction and movement, would result in a greater understanding of habitat connectivity requirements for desert tortoise. These studies would provide the foundation for future monitoring which is described further in Section 4.1.3.

4.1.3 Effectiveness Monitoring Program

Studies analyzing home range and distribution of tortoises in the area surrounding the project site have recently been proposed for an approximately 13,000 acre research area in the Ivanpah and Roach Valleys within both California and Nevada. The goal of the research is to obtain preliminary ecological data for all resident desert tortoises by determining home range size, habitat use, disease, and contaminant prevalence and exposure. The home range and core areas of use will be determined and correlated with large-scale landscape features (mountains, lake beds), anthropogenic features (highways, power line corridors) and diseased conspecifics, providing baseline ecological data. Contaminant testing will be conducted on a subset of tortoises to establish baseline data for persistent organic compounds (POPs, associated with pesticides), polycyclic aromatic hydrocarbons (PAHs, associated with a traffic source), non-targeted analysis, screening for a wide range of organic chemicals (to establish preliminary data) and metal analysis, both toxic and rare earth metals (relating to mining activities in the region). These activities are anticipated to (1) contribute to the existing knowledge base for desert tortoises in the Ivanpah/Roach Valley, (2) explore how anthropogenic pollutants may impact desert tortoises, and (3) inform potential future translocation events resulting from projects in the valley. The proposed study has been designed and funded to render complete results, analysis, and reporting following one full year of data collection, which is planned for 2012.

As mentioned in the previous section, connectivity studies lead by Kenneth Nussear, research herpetologist with the USGS, are underway in spring of 2012 to provide data on the rate of tortoise interaction within the high elevation passes within both the McCullough Range on the east side of Interstate 15 and Stateline Pass on the west. With the overall goal of maintaining connectivity, it is crucial to know if existing corridors actually provide the desired connectivity. Gene flow is the ultimate goal of habitat connectivity; however this is difficult to determine when studying desert tortoise due to their long generation time. With the use of modern technology (i.e., proximity detectors or GPS data loggers) specific data and inferences can be obtained to

record animal to animal interaction. Ultimately, connectivity will be measured using the number and distribution of tortoise contacts through the corridor and can be compared to rates of tortoise contact and connectivity in open habitat.

Silver State Solar Power South, LLC has contributed funding for these surveys. In total, these studies would serve as baseline for the future effectiveness monitoring program. Continuation of effectiveness monitoring program would be expected to meet the requirements of the USFWS translocation guidelines (USFWS 2011d).

4.1.4 Protection Measures

Due to the expected presence of desert tortoise within the Project site, formal consultation between the BLM and USFWS would be necessary. A biological assessment that fully addresses the impacts to desert tortoise would be required to initiate formal consultation. The measures described in this section of the report reflect standard requirements and may be incorporated as part of the proposed Project, which would also be included in the biological assessment. The Biological Opinion (BiOp) would provide specific conditions and requirements that may supersede some of the following measures. A Lead Biologist should be designated for the Project and should be responsible for all aspects of clearance surveys, monitoring, desert tortoise translocation, contacts with agency personnel, reporting, and long-term monitoring and reporting.

Exclusion Fencing

Prior to beginning clearance surveys, desert tortoise exclusion fencing should be constructed in specified areas consistent with clearance survey areas. The Project site should be completely fenced with security and desert tortoise exclusion fencing, including desert tortoise exclusion gates at access points. Fence installation should be monitored as a linear component. Exclusion fencing should be maintained over the course of construction and operations, as necessary.

Preconstruction Clearance Surveys

Clearance surveys should be conducted consistent with the USFWS Desert Tortoise Field Manual and current translocation guidance (USFWS 2009 and 2011d). If a desert tortoise or active burrow is found within a planned area of construction, surveys should stop at that time until the tortoise is translocated in the active season. If two complete passes are completed in a construction area (north-south and east-west) without a desert tortoise being found, construction may commence within that area outside of active season. Fencing should continue to be checked on a daily basis throughout construction.

Translocation

A Desert Tortoise Translocation Plan should be prepared for the Project. The purpose of the plan is to describe the process of translocation, minimize mortality of desert tortoises, and assess the effectiveness of the translocation effort through a long-term monitoring program. Injured tortoises should be transported to a rehabilitation facility approved by the USFWS and NDOW. Tortoises found recently killed should be salvaged and transported to a veterinary pathologist,

who is familiar with desert tortoise and approved by the USFWS and NDOW. Procedures for salvaging and transport should generally follow Guidelines for the Field Evaluation of Desert Tortoise Health and Disease (Berry and Christopher 2001). Detailed health assessments on all live tortoises should be conducted following current USFWS guidance by individuals approved and permitted by the USFWS to conduct such assessments. Detailed health assessments should be performed prior to translocation and repeated periodically during long-term monitoring. Any individual tortoise that exhibits clinical signs of Upper Respiratory Tract Disease (URTD) should be transported to the Desert Tortoise Conservation Center (DTCC) near Las Vegas, Nevada for further evaluation. Tortoises should only be prepared for transport to the DTCC by individuals authorized for these activities under the BiOp. The tortoise should be transported to the DTCC within 48 hours of it being discovered with clinical signs of disease.

Avoidance – Construction

During the construction of linear features (fencing, transmission lines, and access roads), all live tortoises and active burrows should be avoided to the extent possible. All activities should be monitored by qualified biologists. The biological monitor should instruct crews to provide approximately one hour for a live tortoise to leave an active construction area without assistance. If the tortoise does not leave the area on its own an Authorized Biologist (listed under the BiOp to handle tortoises) should carefully move the tortoise out of the construction area and into a translocation area pursuant to the conditions of the BiOp. Biological monitors should flag an avoidance area approximately 20 meters from any active burrow to be avoided and construction activities should continue around this avoidance area while a biologist monitors the burrow. If an active burrow cannot be avoided by construction activities, the burrow should be excavated using protocols in USFWS Desert Tortoise Field Manual (USFWS 2009).

In addition, during the construction of non-linear project features, and after initial fencing and clearance, a biological monitor should be available during all ground disturbing activities. The project biologist should be available to ensure the conditions of the BiOp are being met, including worker education guidelines, avoidance and minimization measures, and construction monitoring requirements. Additional guidelines may include mitigation for common ravens and noxious weeds. General mitigation measures are listed in section 4.3.

Avoidance – Operations and Maintenance

During the operation phase of the project, all applicable desert tortoise protection measures identified under construction should be implemented. For example, this may include the need for a biological monitor outside the fenced facility during road, fence and utility maintenance involving ground disturbance, annual Worker Environmental Awareness Program refresher, actions to take if a tortoise is encountered, etc. Additionally, a biological monitor should be designated and responsible for overseeing compliance with the desert tortoise protection measures. The biological monitor should have a copy of all measures including the BiOp when work is being conducted on site. The monitor should be on site during all project maintenance activities to ensure compliance with the desert tortoise measures. The monitor should have the

authority to halt all non-emergency activities that are in violation of the measures. Work should proceed only after hazards to desert tortoise are removed, the species is no longer at risk, or the individual has been moved from harm's way by an authorized biologist. An annual compliance report should be submitted to the BLM annually.

4.2 Special Status Plant Species

Three special status plants species were identified within the Study Area: Death Valley ephedra, white-margined beardtongue, and yellow two-toned beardtongue. Depending on the location of the proposed site layout, some or all of these species may be affected. The majority of white margined beardtongue occurred north of the alignment of all three alternatives. In addition, the population of yellow two-toned beardtongue located in the study area occurred primarily to the east of Alternatives C and D, however this species would be affected by Alternative B. It is recommended that mitigation techniques possibly involving seed collection, nursery development, and/or transplantation are evaluated to determine the most effective approach if the selected alternative results in impacts to these species. Techniques may differ for each species, as well as each proposed alternative.

Further coordination between Bureau of Land Management, U.S. Fish and Wildlife Service, and Nevada Department of Wildlife may be necessary to determine the full scope of required permitting, implementation of specific protection measures, and/or compensatory mitigation. The following information is intended to provide the NEPA document preparers an outline for general avoidance and minimization measures potentially relevant to the Silver State South Project.

4.3 General Measures

This section describes a range of design features, construction and operation best management practices (BMPs), and avoidance practices that when implemented as part of Project construction and/or operation, should collectively avoid, reduce or eliminate potential adverse effects to biological resources. Each category of features, practices and plans is described separately below.

<u>Construction Related Plans</u>

The following construction related plans should be developed, as necessary. These plans have specific objectives that would indirectly help reduce potential adverse effects to biological resources.

- Storm Water Pollution Prevention Plan
- Dust Control Plan
- Waste Management Plan
- Spill Prevention Control and Countermeasure Plan
- Hazardous Materials Management Plan
- Fire Prevention Plan

Environmental Inspection and Compliance Monitoring Program and Plan

A comprehensive Environmental Inspection and Compliance Monitoring Program and Plan, covering both construction and operation and maintenance (O&M), should be developed. A qualified individual should be designated to serve as the Project Environmental Manager. The Environmental Manager should be responsible for:

- development and implementation of the overall Project compliance program,
- communication and coordination with the applicable regulatory agencies,
- ensuring compliance with the various conditions and requirements of permits and approvals,
- record keeping and reporting required by permits and approvals,
- ensuring that all applicable environmental plans are up to date,
- advising management of actual and potential compliance issues, and
- ensuring that Project planning takes appropriate account of compliance issues in advance.

Construction Related BMPs

The following general measures should be implemented during construction, which would assist with reducing potential adverse effects to biological resources:

- Construction and O&M activities should be limited to daylight hours to the extent possible,
- Water required for construction purposes should not be stored in open containers or structures and should be transported throughout the site in enclosed water trucks,
- Water sources (such as wells) should be checked periodically by monitors to ensure they are not creating open water sources through leaking or consistently overfilling trucks,
- All vehicles leaking fuel or other liquids should be immediately removed to the staging area and repaired – all spills should be cleaned up promptly and disposed of correctly,
- All construction activities conducted outside the fenced areas should be monitored by a qualified biological monitor,
- Vegetation removal should be limited to the smallest area necessary,
- Construction traffic should remain on existing roads when possible – new roads, passing areas, and turning areas should be limited to permitted area of direct effect,
- Speed limits on all unpaved areas of the Project site should be a maximum of 15 miles per hour,
- Trash should always be contained within raven-proof receptacles and removed from the site frequently, including trash collected in vehicles in the field,
- No dogs or firearms should be allowed on the Project site during construction or O&M, and
- Plant and wildlife collection by Project staff during construction or operation should be prohibited except as allowed by the Project's permits.

Worker Environmental Awareness Program

A formal Worker Environmental Awareness Program (WEAP) should be completed for every individual working on the Project site. All individuals completing the training should sign an attendance sheet and receive wallet cards and stickers to show they have completed this training. The training should include the following information and include photos of all resources:

- Discussion of the fragile desert ecosystem, vegetation and wildlife communities within and surrounding the Project site,
- Discussion of rare plant species and other sensitive species found within and surrounding the Project site,
- Desert tortoise ecology, threats, legal protections, permitting, and penalties (including both legal and imposed by Project permits),
- Project-specific protection measures, and
- Worker responsibilities, communication protocol, and monitor responsibilities, including the authority for monitors to halt Project activities if warranted.

4.4 Other Biological Resource Protection Measures

Integrated Weed Management Plan

An Integrated Weed Management Plan (IWMP) should be prepared to reduce and/or eliminate the propagation and further spread of noxious and invasive weeds in the Mojave Desert due to construction, operation and decommissioning of the Project. The objectives of the IWMP would be as follows:

- Identify weed species currently present within the Project components,
- Identify weeds not seen on the Project components that may have the potential to be present in the Project area and have the potential to invade the Project site due to construction activities,
- Identify construction and maintenance activities that may increase the presence of weeds or introduce new weed species on and adjacent to the Project components, and
- Specify steps that should be taken to ensure that the presence of weed populations on and adjacent to the Project components should not increase because of construction activities. These steps should be intended to: (1) prevent weeds not currently found on the Project site from becoming established there, and (2) prevent weeds already present on the site from spreading to other areas.

Avian and Bat Protection Plan

Due to the potential presence of golden eagle, raptors, and bat species within the Project site, an Avian and Bat Protection Plan (ABPP) should be developed. The goal of the ABPP would be to reduce the potential risks for avian and bat mortality potentially resulting from construction and operation of the Project. The objectives of this plan are as follows:

- Identify baseline conditions for raptor and bat species currently present at the Project components,
- Identify construction and operational activities that may increase the potential of adverse effects to these species on and adjacent to the Project components,
- Specify steps that should be taken to avoid, minimize and mitigate any potential adverse effects on these species, and
- Detail long-term monitoring and reporting goals.

Vegetation Management Plan

The Vegetation Management Plan (VMP) will address impacts to native vegetation and special status plant species during construction and maintenance of the solar facility. The Plan will include a discussion of the limited grading approach to ground preparation and include procedural descriptions for transplantation, restoration, and reclamation of affected areas. Objectives of the VMP include:

- Present methods of salvage and transplantation of succulent/yucca/cactus and other special-status plant species,
- Describe restoration of temporarily disturbed areas using salvaged topsoil and certified weed free native vegetation,
- Specify proper seasons and timing of restoration and reclamation activities, and
- Detail monitoring and reporting goals.

4.5 Compensatory Mitigation

To compensate for desert tortoise habitat loss, remuneration fees should be acquired to partially offset the potential adverse effects of the Project. Fees would be collected following guidance in BLM's August 17, 2010, instruction memorandum (NV-2010-062) as listed in the Biological Opinion for the Silver State Solar Project (USFWS 2010a). Continued coordination with the BLM, NDOW, and USFWS would be beneficial in identifying all possible compensatory mitigation opportunities as they arise.

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APPENDIX A
Site Photographs

Photo 1 - *Larrea tridentata-Ambrosia dumosa* Shrubland in foreground. *Yucca schidigera-Larrea tridentata-Ambrosia dumosa* Shrubland in upper alluvial fan. Lucy Gray Mountains in background.

Photo 2 - *Yucca schidigera-Larrea tridentata-Ambrosia dumosa* Shrubland in foreground.

Photo 3 – *Larrea tridentata-Ambrosia dumosa* Shrubland.

Photo 4 - *Atriplex polycarpa* Shrubland near playa. *Larrea tridentata-Ambrosia dumosa* Shrubland Alliance in background.

APPENDIX B
Plant Species Detected

Genus	Species	Var./Sp.	Common name	Family	Status
Acacia	greggii		catclaw acacia	Fabaceae	
Acamptopappus	shockleyi		Shocklye's goldenhead	Asteraceae	
Acamptopappus	sphaerocephalus	var. hirtellus	goldenhead	Asteraceae	
Achnatherum	hymenoids		indian ricegrass	Poaceae	
Achnatherum	speciosum		desert needlegrass	Poaceae	
Adenophyllum	cooperi		Cooper's dogweed	Asteraceae	
Allionia	incarnata		trailing allonia	Nyctaginaceae	
Ambrosia	eriocentra		Wolly bursage	Asteraceae	
Ambrosia	salsola		cheesebush	Asteraceae	
Ambrosia	dumosa		white bur-sage	Asteraceae	
Amsinkia	tessellata	var. tessellata	devil's lettuce	Boraginaceae	
Antirrhinum	filipes		twining snapdragon	Scrophulariaceae	
Aristida	purpurea	var. nealleyi	three-awn	Poaceae	
Astragalus	didymocarpsu	var. dispermus	two-seeded milkvetch	Fabaceae	
Atriplex	canescens	ssp. canescens	four-wing saltbush	Chenopodiaceae	
Baccharis	brachyphylla		shortleaf baccharis	Asteraceae	
Baileya	pleniradiata		woolly marigold	Asteraceae	
Bebbia	juncea		sweetbush	Asteraceae	
Brassica	tournefortii		Sahara mustard	Cruciferae	Non-native
Brickellia	incana		Wolly bursage	Asteraceae	
Brickellia	desertorum			Asteraceae	
Bromus	madritensis	ssp. rubens	red brome	Poaceae	Non-native
Bromus	tectorum		June grass	Poaceae	Non-native
Camissonia	boothii		Booth's evening primrose	Onagraceae	
Camissonia	brevipes		yellow cups	Onagraceae	
Camissonia	chamaeneroides		long fruit suncup	Onagraceae	
Camissonia	claviformis		brown-eyed primrose	Onagraceae	
Camissonia	refracta		narrow-leafed suncup	Onagraceae	
Caulanthus	cooperi		Cooper's jewelflower	Brassicaceae	
Chaenactis	steviodes		Steve's pincusions	Asteraceae	
Chaenactis	carphoclinia		pebble pincushion	Asteraceae	
Chaenactis	fremontii		Fermont's pincushion	Asteraceae	
Chamaesyce	albomarginata		rattlesnake weekd	Euphorbiaceae	
Chorizanthe	brevicornu		brittle spineflower	Polygonaceae	
Chorizanthe	rigida		rigid spineflower	Polygonaceae	
Chrysothamnus	paniculatus		Black-banded rabbitbrush	Asteraceae	
Coleogyne	ramosissima		Blackbrush	Rosaceae	
Cryptantha	angustifolia		Panamint cryptantha	Boraginaceae	
Cryptantha	circumscissa		cushion cryptantha	Boraginaceae	
Cryptantha	dumetorum		bushloving cryptantha	Boraginaceae	
Cryptantha	maritima		Guadelupe cryptantha	Boraginaceae	
Cryptantha	micrantha		redroot crytantha	Boraginaceae	
Cryptantha	nevadensis		Nevada cryptantha	Boraginaceae	

Genus	Species	Var./Sp.	Common name	Family	Status
Cryptantha	pterocarya		wing nut cryptantha	Boraginaceae	
Cryptantha	recurvata		curvenut cryptantha	Boraginaceae	
Cucsuta	(denticulata)		dodder	Cuscutaceae	
Cucurbita	palmata		coyote melon	Cucurbitaceae	
Cylindropuntia	acanthocarpa	var. coloradensis	buckhorn cholla	Cactaceae	Cactus
Cylindropuntia	echinocarpa		silver cholla	Cactaceae	Cactus
Cylindropuntia	ramosissima		pencil cholla	Cactaceae	Cactus
Cynanchum	utahense		Utah vine milkweed	Asclepiadaceae	
Cyptogamic crust					
Dalea	mollissima		soft prairie clover	Fabaceae	
Delphinium	parishii		desert lark spur	Ranunculaceae	
Descurainia	pinnata	ssp. glabra	western tansymustard	Brassicaceae	
Descurainia	pinnata	ssp. halictorum	alkali tansymustard	Brassicaceae	
Dithyrea	californica		speckepod	Brassicaceae	
Echinocactus	polycephalus	var. polycepahlus	cottontop	Cactaceae	Cactus
Echinocereus	engelmanii		Calico cactus	Cactaceae	Cactus
Encelia	virginensis		Virgin River encelia	Asteraceae	
Ephedra	funerea		Death Valley jointfir	Ephedraceae	
Ephedra	viridis		Green ephedra	Ephedraceae	
Eriastrum	eremicum		Desert wolly star	Polemoniaceae	
Ericameria	cooperi		Cooper goldenbush	Asteraceae	
Eriogonum	angulosum		Anglestem buckwheat	Polygonaceae	
Eriogonum	deflexum	var. deflexum	skeleton weed	Polygonaceae	
Eriogonum	fasciculatum	ssp. polifolium	eastern Mojave buckwheat	Polygonaceae	
Eriogonum	inflatum	var. inflatum	desert trumpet	Polygonaceae	
Eriogonum	palmerianum		Palmer's buckwheat	Polygonaceae	
Eriogonum	reniforme		kidneyleaved buckwheat	Polygonaceae	
Eriogonum	thomasii		Thomas' buckwheat	Polygonaceae	
Eriogonum	trichopes		little desert buckwheat	Polygonaceae	
Eriogonum	nidularium		birdnest buckwheat	Polygonaceae	
Eriogonum	thruberi		Thurber's buckwheat	Polygonaceae	
Erioneuron	pulchellum		fluffgrass	Poaceae	
Eriophyllum	wallacei		Wallace's wooly daisy	Asteraceae	
Erodium	cicutarium		filaree	Geraniaceae	Non-native
Eschscholzia	glyptosperma		desert gold poppy	Papaveraceae	
Eschscholzia	minutiflora		small flowered desert poppy	Papaveraceae	
Eucrypta	micrantha		desert eucrypta	Hydrophyllaceae	
Ferocactus	cylindraceus	var. lecontei	barrelcactus	Cactaceae	Cactus
Filago	depressa		dwarf conttonrose	Asclepiadaceae	
Geraea	canescens		Desert sunflower	Polemoniaceae	
Gilia	scopulorum		rock gilia	Polemoniaceae	
Gilia	cana	ssp. speciformis	showy gilia	Polemoniaceae	
Gilia	stellata		star gilia	Polemoniaceae	
Gilia	sp			Polemoniaceae	

Genus	Species	Var./Sp.	Common name	Family	Status
Gilia	brecciarum		Nevada gilia	Polemoniaceae	
Grayia	spinosa		spiny hopsage	Chenopodiaceae	
Grusonia	parishii		matted cholla	Cactaceae	Cactus
Gutierrezea	sarothae		common snakeweed	Asteraceae	
Krameria	erecta		white rhatany	Krameriaceae	
Krascheninnikovia	lanata		winterfat	Chenopodiaceae	
Langloisia	setosissima	ssp. punctata	lilac sunbonnet	Polemoniaceae	
Langloisia	setosissima	ssp. setosissima	Great Basin sunbonnet	Polemoniaceae	
Larrea	tridentata		creosote bush	Zygophyllaceae	
Lepidium	fremontii	var. fremontii	desert peppergrass	Brassicaceae	
Lepidium	densiflorum		Common peppergrass	Brassicaceae	
Lepidium	lasiocarpum	var. lasiocarpum	shaggyfruit pepperweed	Brassicaceae	
Linanthus	aureus		golden gilia	Polemoniaceae	
Linanthus	jonesii		Jones' linanthus	Polemoniaceae	
Loeseliastrum	schottii		Schott's calico	Polemoniaceae	
Lupinus	brevicaulis		Sand lupine	Fabaceae	
Lupinus	concinnus		elegant lupine	Fabaceae	
Lycium	andersonii		Anderson's desert thorn	Solanaceae	
Lycium	cooperi		Cooper's boxthorn	Solanaceae	
Malacothrix	glabrata		desert dandylion	Asteraceae	
Malacothrix	coulteri		Coulter’s dandelion	Asteraceae	
Mammillaria	tetrancistra		fishhook cactus	Cactaceae	Cactus
Menodora	spinescens		spiny desert olive	Oleaceae	
Mentzelia	albicaulis		whitestem blazing star	Loasaceae	
Mirabilis	bigelovii		wishbone plant	Nyctaginaceae	
Monoptilon	belliodes		Mojave desert star	Asteraceae	
Muhlenbergia	porteri		Porter's bush muhly	Poaceae	
Nemacladus	sp. unknown			Campanulaceae	
Nemacladus	sigmoideus			Campanulaceae	
Nemacladus	orientalis		glandular threadplant	Campanulaceae	
Nicotiana	obtusifolia		desert tobacco	Solanaceae	
Oenothera	primaveris	ssp. bufonis	desert evening primrose	Onagraceae	
Opuntia	acanthocarpa	var. coloradensis	buckhorn cholla	Cactaceae	Cactus
Opuntia	basilaris	var. basilaris	beavertail	Cactaceae	Cactus
Opuntia	echinocarpa		silver cholla	Cactaceae	Cactus
Opuntia	erinacea	var. erinacea	Mojave prickleypear	Cactaceae	Cactus
Opuntia	ramosissima		pencil cholla	Cactaceae	Cactus
Orobanche	cooperi		Cooper's broomrape	Orobanchaceae	
Oxytheca	perfoliata		roundleaf puncturebract	Polygonaceae	
Pectocarya	heterocarpa		chuckwlla pectocarya	Boraginaceae	
Pectocarya	penincillata			Boraginaceae	
Pectocarya	platycarpa		broadfruit combseed	Boraginaceae	
Pectocarya	recurvata			Boraginaceae	
Penstemon	albomarginata		white-margined beardtongue	Scrophulariaceae	

Genus	Species	Var./Sp.	Common name	Family	Status
Penstemon	palmeri	var. palmeri	Palmer's penstemon	Scrophulariaceae	
Penstemon	bicolor		Two-color beardtongue	Scrophulariaceae	
Phacelia	crenulata		ntoch-leafed phacelia	Hydrophyllaceae	
Phacelia	fremontii		Fremont's phacelia	Hydrophyllaceae	
Phoradendron	californicum		desert mistletoe	Visaceae	
Physalis	crassifolia		ground cherry	Solanaceae	
Plagiobothrys	jonesii		Jone's popcorn flower	Boraginaceae	
Plantago	ovata		desert plantain	Plantaginaceae	
Pleuraphis	rigida		galleta grass	Poaceae	
Porophyllum	gracile		odora	Asteraceae	
Prenanthella	exigua		brightwhite	Asteraceae	
Psilostrophe	cooperi		paperflower	Asteraceae	
Rafinesquia	neomexicana		desert chicory	Asteraceae	
Salazaria	mexicana		paperbag bush	Lamiaceae	
Salsola	tragus		Russian thistle	Chenopodiaceae	Non-native
Salvia	mohavensis		Mojave sage	Lamiaceae	
Salvia	columbariae		chia	Lamiaceae	
Schismus	arabicus		matted cholla	Poaceae	Non-native
Schismus	barbatus		Mediterranean grass	Poaceae	Non-native
Sphaeralcea	ambigua		desert globemallow	Malvaceae	
Stephanomeria	exigua		Small wirelettuce	Asteraceae	
Stephanomeria	pauciflora		wirelettuce	Asteraceae	
Streptanthella	longirostris		longbeak streptanthella	Brassicaceae	
Stylocline	micropoides		woollyhead neststraw	Asteraceae	
Tiquilia	plicata		fanleaf crinklemat	Boraginaceae	
Viguiera	parishii		Parish's goldeneye	Asteraceae	
Vulpia	octoflora	var. octoflora	six weeks fescue	Poaceae	
Xylorhiza	tortifolia	var. tortifolia	Mojave aster	Asteraceae	
Yucca	schidigera		Mojave yucca	Liliaceae	

APPENDIX C
Wildlife Species Detected

Common Name	Scientific Name	Sign
Birds		
Ash-throated Flycatcher	*Myiarchus cinerascens*	O,V
Barn Swallow	*Hirundo rustica*	O
Black-headed Grosbeak	*Pheucticus melanocephalus*	O,V
Black-tailed Gnatcatcher	*Polioptila melanura*	O,V
Black-throated Sparrow	*Amphispiza bilineata*	O,V
Blue-gray Gnatcatcher	*Polioptila caerulea*	O,V
Brewer's Sparrow	*Spizella breweri*	O
Burrowing Owl	*Athene cunicularia*	O, S, F
Cactus Wren	*Campylorhynchus brunneicapillus*	O,V
Cliff Swallow	*Petrochelidon pyrrhonota*	O
Common Poorwill	*Phalaenoptilus nuttallii*	O
Common Raven	*Corvus corax*	O,V, N
Crissal Thrasher	*Toxostoma crissale*	O
Gambel's Quail	*Callipepla gambelii*	O,V
Golden Eagle	*Aquila chrysaetos*	O
Greater Roadrunner	*Geococcyx californianus*	O
Horned Lark	*Eremophila alpestris*	O,V
Le Conte's Thrasher	*Toxostoma lecontei*	O,V
Lesser Nighthawk	*Chordeiles acutipennis*	O
Loggerhead Shrike	*Lanius ludovicianus*	O,V
Mourning Dove	*Zenaida macroura*	O,V
Phainopepla	*Phainopepla nitens*	O,V
Prairie Falcon	*Falco mexicanus*	O,V, N
Red-tailed Hawk	*Buteo jamaicensis*	O,V, N
Sage Thrasher	*Oreoscoptes montanus*	O,V
Scott's Oriole	*Icterus parisorum*	O
Townsend’s Warbler	*Townsend’s Warbler*	O
Turkey Vulture	*Cathartes aura*	O
Verdin	*Auriparus flaviceps*	O
Western Kingbird	*Tyrannus verticalis*	O,V
Western Meadowlark	*Sturnella neglecta*	O,V
Western Tanager	*Piranga ludoviciana*	O
White-crowned Sparrow	*Zonotrichia leucophrys*	O,V
White-throated Swift	*Aeronautes saxatalis*	O
Wilson's Warbler	*Wilsonia pusilla*	O
Yellow-headed Black bird	*Xanthocephalus xanthocephalus*	O
Reptiles		
Desert Tortoise	*Gopherus agassizii*	O,B, T, S, C
Coachwhip	*Masticophis flagellum*	O
Desert Horned Lizard	*Phrynosoma platyrhinos*	O, S

Common Name	Scientific Name	Sign
Desert Iguana	*Dipsosaurus dorsalis*	O, S
Gopher Snake	*Pituophis melanoleucus*	O
Long-nosed Leopard Lizard	*Gambelia wislizenii*	O
Side-blotched Lizard	*Uta stansburiana*	O
Speckled Rattlesnake	*Crotalus mitchelli*	O
Western Patch-nosed Snake	*Salvadora hexalepis*	O
Western Shovel-nosed Snake	*Chionactis occipitalis*	O
Western Whiptail	*Cnemidophorus tigris*	O
Zebra-tailed Lizard	*Callisaurus draconoides*	O
Mammals		
Black-tailed Jackrabbit	*Lepus californicus*	O, T, S
Coyote	*Canis latrans*	T, S, B
Desert Cottontail	*Sylvilagus audubonii*	O, T, S, B
Desert Kit Fox	*Vulpes macrotis arsipus*	B, T, S
Desert Woodrat	*Neotoma lepida*	O, B
White-tailed Antelope Ground Squirrel	*Ammospermophilus leucurus*	O

O – Observed Directly
B – Burrow
T – Tracks
V – Vocalization
S – Scat
C – Carcass