RECOMMENDED ADDITIONAL DATA COLLECTION
DRY LAKE SOLAR ENERGY ZONE

Introduction

The Solar PEIS provides in-depth data collection and environmental analysis for solar energy zones (SEZs). The primary purpose of this rigorous analysis is to provide documentation from which the BLM can tier future project authorizations, thereby limiting the required scope and effort of project-specific NEPA analyses in these priority areas. As part of the Solar Energy Program, the BLM committed to collecting additional SEZ-specific data and conducting additional analysis in order to more effectively facilitate future development in SEZs. In the Supplement to the Draft Solar PEIS (BLM and DOE 2011), the BLM presented an action plan for each SEZ; that action plan, with appropriate updates, was used as the basis for recommended additional data collection for the Dry Lake SEZ presented below. Action plans described useful additional data for individual SEZs and proposed data sources and methods for collecting that additional data. Additional data and analyses for SEZs will be publicly released through the Solar Energy Program Implementation Web Site (http://blmsolar.anl.gov) as they become available.

The Dry Lake SEZ has a total area of 5,717 acres (23 km^2). It is located in Clark County in southern Nevada (Figure C.4.2-1). The towns of Moapa and Overton are about 18 mi (29 km) northeast of, and 23 mi (37 km) east of, the SEZ, respectively.

Recommended Additional Data Collection for the Dry Lake SEZ

Military and Civilian Aviation

The BLM should continue to consult with the U.S. Department of Defense regarding potential issues with military operations.

Minerals

Additional information to inform the Department of the Interior's decision on a proposed 20-year withdrawal of SEZ lands has been provided through six Mineral Reports addressing each SEZ (one report for each state in the study area). The Mineral Report for Nevada addresses the status of Minerals within the Dry Lake SEZ (BLM 2012).

Water Resources

The Final Solar PEIS provided a planning-level water resources inventory of the Garnet Valley basin, an assessment of ephemeral stream reaches sensitive to land disturbance, and a simplified one-dimensional groundwater modeling analysis of potential groundwater withdrawal impacts associated with solar development. The following additional data and actions would help further characterize potential impacts on water resources for the Dry Lake SEZ. A more detailed

discussion of each of these activities is included in the water resources action plan for the SEZs (Attachment A).

- Identify additional ephemeral stream channels and alluvial fan features for non-development areas through consultation with Nevada BLM, Nevada Division of Water Resources, U.S. Environmental Protection Agency, and U.S. Army Corps of Engineers (USACE) with a focus on:
  - Ephemeral stream channels/unnamed washes located throughout the SEZ (draining from the Las Vegas Range, the Arrow Canyon Range, and the Dry Lake Range toward Dry Lake), and
  - Alluvial fan features in the northwestern portion of the SEZ (adjacent to the Arrow Canyon Range).

- Coordinate with the USACE (Sacramento District) regarding jurisdictional water determinations for the SEZ. Water features to be considered include:
  - Unnamed washes.

- Perform field surveys and hydrologic analyses to support jurisdictional water determinations, if USACE consultation suggests field surveys are needed. Tasks may include:
  - Surveying any unnamed washes identified previously for surface elevations, high water marks, and sediment conditions.

- Monitoring and adaptive management for the SEZ should include the formation of a stakeholder committee to conduct long-term monitoring of water resources. This activity would entail:
  - Identifying key stakeholder agencies,
  - Discussing general features of a monitoring program, and
  - Working with the U.S. Geological Survey to develop groundwater monitoring well design and numerical groundwater models.

- Perform groundwater modeling analyses for the Garnet Valley basin to estimate potential impacts of full build-out groundwater pumping scenarios (according to estimated, technology-specific water requirements). Tasks include:
  - Develop a superposition-type groundwater model for the Garnet Valley basin, and
  - Assess the potential for drawdown impacts on water levels in the basin, other groundwater uses, the carbonate aquifer system, and surface water-groundwater connectivity.
    (Note: This work is being conducted as a part of follow-on analyses for the Solar PEIS.)

Ecological Resources

Vegetation and Plant Communities. The following additional data-gathering actions would help further characterize potential impacts on vegetation and plant communities for the Dry Lake SEZ:

- Identify and map the location and areal extent of desert dry washes, dry wash woodland, desert chenopod scrub, and wetland habitats within the SEZ. Identify and map the location and areal extent of these habitats, as well as playa and mesquite communities, outside the SEZ that may be affected by hydrologic changes, including groundwater elevations, and changes in water, sediment, and contaminant inputs associated with runoff. Such efforts could help determine habitat characteristics, including water source, hydrologic regime, and dominant plant species.

- Identify and map the location of cactus, including cholla and others, and Yucca species within the SEZ.

Wildlife. The following additional data-gathering actions would help further characterize potential impacts on wildlife resources for the SEZ:

- Conduct pre-disturbance surveys within the SEZ to determine the use of the SEZ as a movement/migratory corridor or as important habitat for mule deer.
- Identify and map the location and areal extent of wash and playa habitats within the SEZ. These areas are important habitat for a number of wildlife species.

Aquatic Biota. Investigations recommended under the water resources action plan would be useful in characterizing and protecting habitat available to aquatic biota. Washes and wetlands in the SEZ are typically dry and contain water only for brief periods. They may or may not contain aquatic biota; therefore, preliminary evaluations of these surface water features could be conducted to determine the potential for aquatic communities to be present.

Special Status Species. The following additional data-gathering actions would be useful in further characterizing and protecting habitat available to special status species:

- Conduct pre-disturbance surveys within the SEZ to determine the presence and abundance of those special status species that are (1) federally listed, proposed for listing, or candidates for listing under the Endangered Species Act; (2) protected by the state of Nevada;[1] or (3) designated as sensitive by the Nevada BLM State Office. These species are listed in Table 1. Surveys should focus on areas identified as potentially suitable, and the suitability of these habitats to support these special status species should be determined in

[1] State-protected species for the state of Nevada are those protected under *Nevada Revised Statues* (NRS) 501.110 (animals) or NRS 527 (plants).

TABLE 1 Special Status Species That May Occur on the Dry Lake SEZ[a]

Common Name	Scientific Name	Listing Status[b]	Habitat[c]
Plants			
Halfring milkvetch	*Astragalus mohavensis* var. *hemigyrus*	BLM-S	Endemic to Nevada on carbonate gravels and derivative soils on terraced hills and ledges, open slopes, and along washes within the creosote-bursage, blackbrush, and mixed-shrub habitat communities. Elevation ranges between 3,000 and 5,600 ft.[d] Nearest recorded occurrence is 15 mi[e] northwest of the SEZ in the Desert N WR. About 422,200 acres[f] of potentially suitable habitat occurs in the SEZ region.
Las Vegas bearpoppy[g]	***Arctomecon californica***	NV-P	Open, dry, spongy or powdery, often dissected or hummocked soils with high gypsum content, typically with well-developed soil crust, in areas of generally low relief on all aspects and slopes, with a sparse cover of other gypsum-tolerant species. Elevation ranges between 1,050 and 3,650 ft. Nearest recorded occurrence is 5 mi south of the SEZ. About 65,400 acres of potentially suitable habitat occurs in the SEZ region.
Las Vegas buckwheat	*Eriogonum corymbosum* var. *nilesii*	ESA-C; BLM-S	Restricted to southern Nevada in the vicinity of Las Vegas on or near gypsum soils, in washes, drainages, or in areas of generally low relief. Elevation ranges between 1,900 and 3,850 ft. Nearest recorded occurrence is 12 mi southwest of the SEZ. About 63,000 acres of potentially suitable habitat occurs in the SEZ region.
Parish's phacelia	*Phacelia parishii*	BLM-S	Aquatic habitats and wetlands in moist to superficially dry, open, flat, mostly barren, salt-crusted silty-clay soils on valley bottoms, lake deposits, playa edges in proximity to seepage areas surrounded by saltbush scrub vegetation. Elevation ranges from 2,200 to 5,950 ft. Nearest recorded occurrence is 19 mi southwest of the SEZ. About 81,700 acres of potentially suitable habitat occurs in the SEZ region.
Rock phacelia	*Phacelia petrosa*	BLM-S	Dry limestone and volcanic talus slopes of foothills, washes, and gravelly canyon bottoms on substrates derived from calcareous material. Inhabits mixed desert scrub, creosotebush, and blackbrush at elevations between 2,500 and 5,800 ft. Nearest recorded occurrence is 9 mi west of the SEZ in the Desert NWR. About 4,242,700 acres of potentially suitable habitat occurs in the SEZ region.
Rosy two-tone beard-tongue	***Penstemon bicolor* ssp. *roseus***	BLM-S	Calcareous, granitic, or volcanic soils in washes, roadsides, scree at outcrop bases, rock crevices, or similar places receiving runoff, within creosote-bursage, blackbrush, and mixed-shrub. Elevation ranges between 1,800 and 4,850 ft. Known to occur on the SEZ and throughout the affected area. About 524,100 acres of potentially suitable habitat occurs in the SEZ region.
Rough dwarf greasebush	*Glossopetalon pungens* var. *pungens*	BLM-S;	Endemic to the Spring and Sheep ranges in southern Nevada, where the species is known from seven occurrences in the crevices of carbonate cliffs and outcrops, generally avoiding southerly exposures, within pinyon-juniper, mountain mahogany, and montane conifer communities. Elevation ranges from 4,400 to 7,800 ft. Nearest recorded occurrence is 17 mi west of the SEZ in the DNWR. About 606,000 acres of potentially suitable habitat occurs in the SEZ region.

TABLE -1 (Cont.)

Common Name	Scientific Name	Listing Status[b]	Habitat[c]
Plants (Cont.)			
Sheep fleabane	*Erigeron ovinus*	BLM-S	Endemic to Mount Irish and the Sheep and Groom ranges in southern Nevada, where the species is known from fewer than 15 occurrences in crevices of carbonate cliffs and ridgeline outcrops within pinyon-juniper and montane conifer woodland. Elevation ranges from 3,600 to 8,400 ft. Nearest recorded occurrence is 17 mi northwest of the SEZ in the Desert NWR. About 576,650 acres of potentially suitable habitat occurs in the SEZ region.
Sheep Mountain milkvetch	*Astragalus amphioxys* var. *musimonum*	BLM-S	Restricted to the foothills of the Sheep Mountains in southern Nevada (historically occurred in Arizona). Occurs in carbonate alluvial gravels, particularly along drainages, roadsides, and in other microsites with enhanced runoff, at elevations between 4,400 and 6,000 ft. Nearest recorded occurrence is 6 mi northwest of the SEZ in the Desert NWR. About 3,884,600 acres of potentially suitable habitat occurs in the SEZ region.
Silverleaf sunray	*Enceliopsis argophylla*	BLM-S	Nearly entirely confined to Clark County, Nevada, in dry, open, relatively barren areas on gypsum badlands, volcanic gravels, or loose sands, within creosote-bursage habitat. Elevation ranges from 1,200 to 2,400 ft. Nearest recorded occurrence is 15 mi east of the SEZ. About 89,100 acres of potentially suitable habitat occurs in the SEZ region.
Sticky buckwheat	*Eriogonum viscidulum*	NV-P	Known only from Clark County, Nevada, and Mohave County, Arizona, on deep, loose sandy soils in washes, flats, roadsides, steep aeolian slopes, and stabilized dunes. Elevation ranges from 1,200 to 2,200 ft. Nearest recorded occurrence is 21 mi northeast of the SEZ. About 65,000 acres of potentially suitable habitat occurs in the SEZ region.
Sticky ringstem	*Anulocaulis leisolenus*	BLM-S; NV-S2	Known from southern Nevada, northern Arizona, and New Mexico, Texas, and Mexico. Occupies loose soils of calcareous shales and clay, loose talus, and gypsum at elevations between 1,700 and 4,000 ft.i About 65,400 acresj of potentially suitable habitat occurs in the SEZ region.
Threecorner milkvetch	***Astragalus geyeri* var. *triquetrus***	NV-P	Known only from Clark County, Nevada, and Mohave County, Arizona on open, deep sandy soils, desert washes, or dunes, generally stabilized by vegetation and/or a gravel veneer. Elevations range from 1,500 to 2,500 ft. Nearest recorded occurrence is about 1 mi east of the SEZ. About 105,700 acres of potentially suitable habitat occurs in the SEZ region.
White bearpoppy	*Arctomecon merriamii*	BLM-S	Endemic to the Mojave Desert of California and Nevada in barren gravelly areas, rocky slopes, and limestone outcrops at elevations between 2,000 and 5,900 ft. Nearest recorded occurrence is 19 mi southwest of the SEZ. About 358,000 acres of potentially suitable habitat occurs in the SEZ region.

TABLE -1 (Cont.)

Common Name	Scientific Name	Listing Status[b]	Habitat[c]
Yellow two-tone beard-tongue	***Penstemon bicolor* ssp. *bicolor***	BLM-S	Endemic to Clark County, Nevada, on mostly BLM lands in the vicinity of Las Vegas on calcareous or carbonate soils in washes, roadsides, rock crevices, or outcrops at elevations between 2,500 and 5,500 ft. Nearest recorded occurrence is from a dry lake approximately 2 mi west of the SEZ. About 524,100 acres of potentially suitable habitat occurs in the SEZ region.
Invertebrates			
Mojave gypsum bee	*Andrena balsamorhizae*	BLM-S	Endemic to Nevada on gypsum soils associated with habitats of its single larval host plant, silverleaf sunray. Such habitats include warm desert shrub communities on dry slopes and sandy washes. Nearest recorded occurrence is 8 mi south of the SEZ. About 3,819,500 acres of potentially suitable habitat occurs in the SEZ region.
Mojave poppy bee	*Perdita meconis*	BLM-S	Known only from Clark County, Nevada where the species is dependent on poppy plants (genus *Arctomecon*). in roadsides, washes, and barren desert areas on gypsum soils. Nearest recorded occurrence is in the vicinity of Lake Mead, approximately 17 mi south of the SEZ. About 418,000 acres of potentially suitable habitat occurs in the SEZ region.
Reptiles			
Desert tortoise	***Gopherus agassizii***	ESA-T; NV-P	Desert creosotebush communities on firm soils for digging burrows along riverbanks, washes, canyon bottoms, creosote flats, and desert oases. Known to occur on the SEZ and throughout the affected area. About 2,762,500 acres of potentially suitable habitat occurs in the SEZ region.
Gila monster	*Heloderma suspectum*	BLM-S; NV-P	Rocky, deeply incised areas of desert scrub, thorn scrub, desert riparian, oak woodland, and semidesert grassland. Occurs in lower mountain slopes, rocky bajadas, canyon bottoms, and arroyos at elevations below 3,950 ft. Known to occur in Clark County, Nevada. About 3,175,900 acres of potentially suitable habitat occurs in the SEZ region.
Birds			
American peregrine falcon	*Falco peregrinus*	BLM-S; NV-P	Year-round resident in open habitats, including deserts, shrublands, and woodlands associated with high, near vertical cliffs and bluffs above 200 ft. When not breeding, activity is concentrated in areas with ample prey, such as farmlands, marshes, lakes, rivers, and urban areas. Nearest recorded occurrences are from the metropolitan area of Las Vegas, Nevada, approximately 22 mi southwest of the SEZ. About 4,171,400 acres of potentially suitable habitat occurs in the SEZ region.
Crissal thrasher	*Toxostoma crissale*	BLM-S	Year-round resident in project area. Nests in dense thickets of mesquite or low trees in desert riparian and desert wash habitats. Also occurs in washes within pinyon-juniper habitats. Known to occur in Clark County, Nevada. About 81,000 acres of potentially suitable habitat occurs in the SEZ region.

TABLE -1 (Cont.)

Common Name	Scientific Name	Listing Status[b]	Habitat[c]
Ferruginous hawk	*Buteo regalis*	BLM-S	Winter resident in project area in grasslands, sagebrush, and saltbrush habitats, as well as the periphery of pinyon-juniper woodland. Known to occur in Clark County, Nevada. About 417,500 acres of potentially suitable habitat occurs in the SEZ region.
Golden eagle	*Aquila chrysaetos*	BLM-S	An uncommon to common permanent resident and migrant in southern Nevada. Habitat includes rolling foothills, mountain areas, and desert shrublands. Nests on cliff faces and in large trees in open areas. About 4,500,000 acres of potentially suitable habitat occurs within the SEZ region.
Gray vireo	*Vireo vicinior*	BLM-S	An uncommon summer resident in arid environments such as inyonjuniper, chaparral, and desert shrublands. Builds open-cup nests of plant material in forked branches of shrubs or small trees. About 650,000 acres of potentially suitable habitat occurs within the SEZ region.
LeConte's thrasher	*Toxostoma lecontei*	BLM-S; NV-P	Year-round resident in project area in saltbush-cholla scrub communities in desert flats, dunes, or alluvial fans. Known to occur in Clark County, Nevada. About 3,817,950 acres of potentially suitable habitat occurs in the SEZ region.
Loggerhead shrike	*Lanius ludovicianus*	BLM-S	A common winter resident in lowlands and foothills in southern Nevada. Prefers open habitats with shrubs, trees, utility lines, or other perches. Highest density occurs in open-canopied foothill forests. About 2,000,000 acres of potentially suitable habitat occurs within the SEZ region.
Long eared owl	*Asio otus*	BLM-S	An uncommon year-long resident in southern Nevada. Occurs in desert shrubland environments in proximity to riparian areas such as desert washes. Nests in trees using old nests from other birds or squirrels. About 4,100,000 acres of potentially suitable habitat occurs within the SEZ region.
Lucy's warbler	*Vermivora luciae*	BLM-S	An uncommon summer resident and breeder in desert riparian areas. Occurs in desert wash habitats, especially those dominated by mesquite and saltcedar. Nests in tiny cavities in riparian woodlands. About 81,000 acres of potentially suitable habitat occurs within the SEZ region.
Phainopepla	*Phainopepla nitens*	BLM-S; NV-P	Year-round resident in project area in desert scrub, mesquite, pinyon-juniper woodland, desert riparian areas and orchards. Nests in trees or shrubs. Nearest recorded occurrences are from the Meadow Valley Wash and Muddy River systems, approximately 20 mi east of the SEZ. About 1,038,500 acres of potentially suitable habitat occurs in the SEZ region.
Western burrowing owl	*Athene cunicularia hypugaea*	BLM-S	Open grasslands and prairies, as well as disturbed sites such as golf courses, cemeteries, and airports throughout the SEZ region. Nests in burrows constructed by mammals (prairie dog, badger, and the like). Known to occur in Clark County, Nevada. About 4,034,600 acres of potentially suitable habitat occurs in the SEZ region.

TABLE -1 (Cont.)

Common Name	Scientific Name	Listing Status[b]	Habitat[c]
Mammals			
Big free-tailed bat	*Nyctinomops macrotis*	BLM-S	Roosts in rock crevices on cliff faces or in buildings. Forages primarily in coniferous forests and arid shrublands to feed on moths. Known to occur in Clark County, Nevada. About 4,048,200 acres of potentially suitable habitat occurs in the SEZ region.
Big brown bat	*Eptesicus fuscus*	BLM-S	Occurs throughout the southwestern United States in various habitat types. Uncommon in hot desert environments, but may occur in areas in close proximity to water sources such as lakes and washes. Roosts in buildings, caves, mines, and trees. About 3,700,000 acres of potentially suitable habitat occurs within the SEZ region.
Brazilian free-tailed bat	*Tadarida brasiliensis*	BLM-S	Forages in desert grassland, old field, savanna, shrubland, and woodland habitats as well as urban areas. Roosts in old buildings, caves, mines, and hollow trees. Known to occur in Clark County, Nevada. About 3,722,850 acres of potentially suitable habitat occurs in the SEZ region.
California myotis	*Myotis californicus*	BLM-S	A common year-round resident in southern Nevada. Occurs in a variety of habitats, including desert, chaparral, woodlands, and forests. Roosts primarily in crevices but will also use buildings, mines, and hollow trees. About 3,500,000 acres of potentially suitable habitat occurs within the SEZ region.
Hoary bat	*Lasiurus cinereus*	BLM-S	The most widespread North American bat species, occurs throughout southern Nevada in various habitat types. Occurs in habitats such as woodlands, foothills, desert shrublands, and chaparral. Roosts primarily in trees. About 3,500,000 acres of potentially suitable habitat occurs within the SEZ region.
Long-legged myotis	*Myotis volans*	BLM-S	Common to uncommon year-round resident in southern Nevada. Uncommon in desert and arid grassland environments. Most common in woodlands above 4,000-ft elevation. Forages in chaparral, scrub, woodlands, and desert shrublands. Roosts in trees, caves, and crevices. About 3,700,000 acres of potentially suitable habitat occurs within the SEZ region.
Pallid bat	*Antrozous pallidus*	BLM-S; NV-P	Low-elevation desert communities, including grasslands, shrublands, and woodlands. Roosts in caves, crevices, and mines. Nearest recorded occurrences are from the Desert NWR, approximately 10 mi west of the SEZ. About 3,706,300 acres of potentially suitable habitat occurs in the SEZ region.
Silver-haired bat	*Lasionycteris noctivagans*	BLM-S	High-elevation (1,600 to 8,500 ft) forested areas of aspen, cottonwood, white fir, pinyon-juniper, subalpine fir, willow, and spruce. Roosts in tree foliage, cavities, under loose bark, caves, mines, and under rock ledges. May also forage in arid shrublands. Rarely hibernates in caves. Nearest recorded occurrences are from the Muddy River, approximately 15 mi northeast of the SEZ. About 3,586,800 acres of potentially suitable habitat occurs in the SEZ region.

TABLE -1 (Cont.)

Common Name	Scientific Name	Listing Status[b]	Habitat[c]
Spotted bat	*Euderma maculatum*	BLM-S; NV-P	Near forests and shrubland habitats throughout the SEZ region. Roosts and hibernates in caves and rock crevices. Nearest recorded occurrences are from the vicinity of Las Vegas, approximately 16 mi southwest of the SEZ. About 4,404,950 acres of potentially suitable habitat occurs in the SEZ region.
Townsend's big-eared bat	*Corynorhinus townsendii*	BLM-S; NV-P	Near forests and shrubland habitats below 9,000 ft elevation throughout the SEZ region. Roosts in caves, mines, and buildings for day roosting. Nearest recorded occurrences are from the Desert NWR, approximately 10 mi west of the SEZ. About 3,861,200 acres of potentially suitable habitat occurs in the SEZ region.
Western pipistrelle	*Pipistrellus Hesperus*	BLM-S	A common year-round resident of deserts, grasslands, and woodlands in southern Nevada. Occurs in various habitats, including mountain foothill woodlands, desert shrublands, desert washes, and pinyon-juniper woodlands. Roosts primarily in rock crevices; occasionally in mines and caves. About 4,800,000 acres of potentially suitable habitat occurs within the SEZ region.
Western small-footed myotis	*Myotis ciliolabrum*	BLM-S	Woodland and riparian habitats at elevations below 9,000 ft. Roosts in caves, buildings, mines, and crevices of cliff faces. Nearest recorded occurrences are from the Desert NWR, approximately 10 mi west of the SEZ. About 4,325,600 acres of potentially suitable habitat occurs in the SEZ region.

[a] The listings for (1) federally listed, proposed for listing, or candidates for listing under the ESA and (2) Nevada BLM State Office sensitive species have been updated since the release of the Draft Solar PEIS.

[b] BLM-S = listed as a sensitive species by the BLM; ESA-C = candidate for listing under the ESA; ESA-T = listed as threatened under the ESA; NV-P = protected in the state of Nevada under NRS 501.110 (animals) or NRS 527 (plants).

[c] For plant species, potentially suitable habitat was determined by using Southwest Regional Gap Analysis (SWReGAP) land cover types (USGS 20005). For terrestrial vertebrate species, potentially suitable habitat was determined by using SWReGAP habitat suitability and land cover models. Area of potentially suitable habitat for each species is presented for the SEZ region, which is defined as the area within 50 mi (80 km) of the SEZ center.

[d] To convert ft to m, multiply by 0.3048.

[e] To convert mi to km, multiply by 1.609.

[f] To convert acres to km^2, multiply by 0.004047.

[g] Species in bold text have been recorded or observed in the affected area.

the field. All field-determined suitable habitats for special status species should be mapped. Target species and survey protocols should be developed in coordination with the U.S. Fish and Wildlife Service (USFWS) and Nevada Department of Wildlife (NDOW).

- The Draft Solar PEIS presents a table of special status species for which potential impacts need to be evaluated prior to development in the Dry Lake SEZ The list of species presented in Table 11.3.12.1-1 of the Draft Solar PEIS includes rare species (ranked in the State of Nevada as S1 or S2 or listed as a species of concern by the USFWS). No additional special status species were identified as potentially present in the SEZ in the Final Solar PEIS. On the basis of design features presented in the Final Solar PEIS, the potential for impacts on these additional species will also need to be addressed before development could occur in the SEZ.

- Identify and map the location and areal extent of ephemeral wetland habitats, including desert wash and playa habitats within the SEZ. Habitat characteristics (including water source, hydrologic regime, and dominant plant species, both within the wetland boundaries and in adjacent non-wetland habitats) should be determined. Species potentially associated with these habitats include the halfring milkvetch, Las Vegas buckwheat, Parish's phacelia, rosy two-tone beardtongue, sticky buckwheat, threecorner milkvetch, and yellow two-tone beardtongue.

Visual Resources

A summary of the Final Solar PEIS visual contrast analysis for the Dry Lake SEZ is provided in Table 2. This table includes only those sensitive visual resource areas (SVRAs) and sensitive viewing locations (SVLs) that would be subject to moderate or strong visual contrast from solar energy development in the Dry Lake SEZ, which are the following:

- Desert National Wildlife Refuge (NWR)

- Old Spanish National Historic Trail

- Arrow Canyon Wilderness Area (WA)

- Muddy Mountains WA

- Nellis Dunes Special Recreation Management Area(SRMA)

In addition, the following other lands and resource areas would be subject to moderate or strong visual contrasts from solar development:

- I-15

- U.S. 93.

TABLE 2 Selected Potentially Affected Sensitive Visual Resources within a 25-mi (40-km) Viewshed of the Dry Lake SEZ[a]

Feature Type	Feature Name (Total Acreage/Linear Distance)[b,c,d]	Feature Area or Linear Distance[e]		
		Visible within 5 mi	Visible Between 5 and 15 mi	Visible Between 15 and 25 mi
National Wildlife Refuge	Desert National (1,626,903 acres)	6,272 acres (0%)	22,203 acres (1%)	4,183 acres (0%)
National Historic Trail	Old Spanish[f] (2,700 mi)	4.2 mi (0%)	7.2 mi (0%)	2.1 mi (0%)
Wilderness Areas (WAs)	Arrow Canyon (27,521 acres)	0 acres (0%)	1,011 acres (4%)	204 acres (1%)
	Muddy Mountains (44,522 acres)	0 acres (0%)	3,891 acres (9%)	0 acres (0%)
	Nellis Dunes (8,924 acres)	380 acres (4%)	61 acres (1%)	0 acres (0%)

[a] As revised for the Final Solar PEIS, assuming a target height of 650 ft (198.1 m).

[b] To convert acres to km^2, multiply by 0.004047.

[c] To convert mi to km, multiply by 1.609.

[d] Meadow Valley Range WA, Mormon Mountains WA, and the Las Vegas Strip Scenic Byway are not included in this table. These areas were in the viewshed of the original proposed SEZ and were included in the corresponding table in the Draft Solar PEIS; however, these areas are not within the viewshed of the SEZ, as revised.

[e] Percentage of total feature acreage or road length viewable.

[f] Mileage of Old Spanish National Historic Trail (BLM 2011, Old Spanish National Historic Trail. Available at http://www.blm.gov/az/st/en/prog/blm_special_areas/hist_trails/old_span_tr.html).

[g] Mileage of Bitter Springs Backcountry Byway (America's Byways, 2012, Bitter Springs Back Country Byway. Available at http://www.byways.org/explore/byways/68962).

The following steps could be taken to better understand potential impacts on these areas from solar development in the Dry Lake SEZ:

- Identify key observation points (KOPs) within these areas through working with the management agency or other local stakeholders.
- Conduct viewshed analyses from the KOPs to determine how much of the SEZ would be in view from each KOP.
- As deemed necessary, based on viewshed analysis results, prepare wireframe Google Earth™ visualizations of hypothetical solar facilities in the SEZ depicting the 80% development scenario to better estimate potential impacts.

This additional analysis may help judge potential visual contrast more accurately for most KOPs. For KOPs of particularly high sensitivity, a site visit with photography and superimposition of the wireframe models onto the photos might be required or desired.

Paleontological Resources

The BLM Regional Paleontologist may have additional information regarding Potential Fossil Yield Classification (PFYC) identifications in Nevada. A preliminary paleontological survey could be conducted to determine the PFYC of the SEZ, in order to update the temporary assignment of PFYC Class 2 (90%) and Class 3b (10%) used in the Draft Solar PEIS.

Cultural Resources and Native American Concerns

The following additional data collection efforts could reduce the uncertainty about potential impacts:

- Verify that the surveys that have been conducted in the SEZ meet current survey standards. No Class II surveys are currently being recommended. A complete Class III survey of the SEZ is proposed.

- Identify high-potential segments of the Old Spanish National Historic Trail and viewshed analyses from key points along the trail, if warranted. High-potential segments of the trail have been identified just east of the SEZ. A portion of the Old Spanish Trail/Mormon Road that is not part of the National Historic Trail system goes through the SEZ and would need to be avoided.

  Continue with government-to-government consultation. The Dry Lake SEZ falls in the traditional use area of primarily the Southern Paiute. Potential topics presented in the Final Solar PEIS to be discussed during consultation include the Salt Song Trail and other trail systems, mountain springs, mineral resources, burial sites, ceremonial areas, the Moapa Valley, and plant and animal resources. A completed ethnographic study (SWCA and University of Arizona 2011) is available on the Dry Lake SEZ page of the BLM Solar Energy Program Implementation Web site (http://blmsolar.anl.gov/sez/nv/drylake/).

References

BLM and DOE, 2011, *Supplement to the Draft Programmatic Environmental Impact Statement for Solar Energy Development in Six Southwestern States*, DES 11-49, DOE/EIS-0403D-S, Oct.

BLM, 2012, *Assessment of the Mineral Potential of Public Lands Located within Proposed Solar Energy Zones in Nevada*, prepared by Argonne National Laboratory, Argonne, Ill., July. Available at http://solareis.anl.gov/documents/index.cfm.

SWCA and University of Arizona (SWCA Environmental Consultants and Bureau of Applied Research in Anthropology), 2011, *Ethnographic and Class I Records Searches for Proposed Solar Energy Zones in California, Nevada, and Utah for the Bureau of Land Management's Solar Programmatic Environmental Impact Statement*, prepared by SWCA Environmental Consultants, Albuquerque, N.M., and Bureau of Applied Research in Anthropology, University of Arizona, Tucson, Ariz., Dec.

ATTACHMENT A: WATER RESOURCES ACTION PLAN

As part of the Solar Energy Program, the BLM committed to collecting additional SEZ-specific data and conducting additional analysis in order to more effectively facilitate future development in SEZs. In the Supplement to the Draft Solar PEIS (BLM and DOE 2011), the BLM presented a water resources action plan applicable for each SEZ; that action plan is presented below with appropriate updates. Additional data and analyses obtained on the basis of recommendations in this water resources action plan will be publicly released through the Solar Energy Program Implementation Web Site (http://blmsolar.anl.gov) as they become available.

The main action plan items relating to water resources applicable for all SEZs were discussed in the water resources action plan presented in the Supplement to the Draft Solar PEIS. The following sections explain each action plan item, identify items that were completed as part of the Final Solar PEIS, and provide some additional consideration for consultation with other federal, state, and local agencies and feasible timelines for the additional work.

1 Planning-Level Inventory of Water Resources

The Draft Solar PEIS summarized surface water and groundwater resources for individual SEZs at the programmatic level, but a more in depth or planning-level inventory was needed to provide a common resource for developers of individual SEZs. The following planning-level inventory data was provided in the Final Solar PEIS for all of the SEZs (sources in parentheses):

- Maps of basin valley and surrounding mountain ranges
  - All canals and perennial, intermittent, ephemeral streams (U.S. Geological Survey [USGS] National Hydrography Dataset [NHD])
  - HUC8 (8-digit, 4th-level hydrologic unit code) watersheds (USGS NHD)
  - Groundwater wells (USGS National Water Information System [NWIS] and Water Science Centers, National Resources Conservation Service [NRCS])
  - Springs (USGS NWIS)
  - Groundwater basin(s) (state water agency)
  - Wetlands (USFWS National Wetlands Inventory [NWI] or state agency)
  - Playas and dry lakes (USGS NHD or state agency)
  - Meteorological station locations (USGS NWIS, Western Regional Climate Center [WRCC], state agency climate stations, e.g., California Irrigation Management Information System [CIMIS] in California)

- Tabular information
  - Canals and perennial and intermittent streams (USGS NHD)
  - Total length of ephemeral stream channels (USGS NHD)
  - Total length of stream channels by stream order (USGS NHD)
  - Annual, seasonal, peak discharge values (USGS NWIS and Water Science Centers)
  - HUC8 watershed areas (USGS NHD)

  - Groundwater basins—area, generic properties (state water agency, PEIS, USGS NWIS and Water Science Centers, NRCS)
  - Wetlands—areas, types (USFWS NWI or state agency)
  - Springs—names, elevations, flows (USGS NWIS or state agency)
  - Climate—precipitation, snowfall, evapotranspiration (USGS NWIS, WRCC, state agencies)

The following planning-level inventory data were not provided in the Final Solar PEIS, but would be useful to assemble prior to solar development in any SEZ:

- Google Earth™/geographic information system (GIS) data files, providing links to datasets (USGS NWIS)
  - Stream gages—flows and water quality
  - Groundwater wells—depth to groundwater and water quality
  - Meteorological stations—temperatures, precipitation, snowfall, etc.

2 Floodplain Determinations

In May 27, 1977, the President signed Executive Order 11988 "Floodplain Management," which states that federal agencies should avoid surface disturbance activities within identified 100-year floodplains (*Federal Register*, Volume 42, page 117, May 27, 1977). Only a few SEZs (Afton, Dry Lake, Imperial East, and Gillespie) have prior floodplain analyses available to map exclusion floodplain areas. Identifying 100-year floodplain areas must be performed in order to define non-development areas within SEZs. Given the episodic and sometimes catastrophic nature of rainfall-runoff events in the desert southwest, floodplain analyses could extend beyond the 100-year floodplain to regions susceptible to extreme flooding events (e.g. alluvial fans, high gradient areas).

Except for the SEZs listed above, floodplain determinations had not been completed at the time of publication of the Final Solar PEIS and are still needed. Floodplain determinations require field surveys, consultations with the Federal Emergency Management Agency (FEMA) and state/local flood control agencies, and hydrologic analyses. The primary steps to identifying floodplain areas include the following:

- Identifying of main surface drainage pathways within and adjacent to SEZs
- Consulting with FEMA and state/local flood control agencies regarding floodplain mapping protocols

- Conducting field surveys
  - Channel geometries
  - High-water-mark indicator maps
  - Ground-truthing NHD channel networks

- Performing hydrologic analyses
  - Analysis of flood frequency
  - Hydraulic modeling of runoff routing

  - Determination of inundation areas

- Obtaining approvals (BLM-coordinated)
  - FEMA/agency for floodplains

3 Jurisdictional Waters Determinations

Section 404 of the Clean Water Act (CWA) requires a permitting process for dredging and filling activities affecting "jurisdictional waters" of the United States. The U.S. Army Corps of Engineers (USACE) and EPA oversee the permitting process and make determinations on what constitutes jurisdictional water on a case-by-case basis. Jurisdictional water determinations can be made by using a variety of techniques, including topographic maps and aerial photographs, field surveys, and hydrologic analyses. The appropriate method for jurisdictional water determinations must be coordinated with the appropriate offices of the USACE and EPA. If field surveys are required, coordination with field surveys for floodplain determinations should be made. Jurisdictional water determinations for the SEZs had not been completed at the time of publication of the Final Solar PEIS and are still needed. Jurisdictional water determinations will not define non-development areas within SEZs but will determine where CWA Section 404 permitting will be required.

4 Significant Ephemeral Waters Determinations

In addition to floodplains and jurisdictional waters, several commenters and cooperators on the Draft Solar PEIS had concerns regarding the loss of ephemeral stream networks because of their importance to hydrology, geomorphology, and habitat. The Draft Solar PEIS identified significant washes to be excluded from development that showed physical evidence of conveying substantial flood flows (these areas will likely overlap with 100-year floodplain mapping). The Final Solar PEIS identified sensitive stream reaches for each SEZ on the basis of available geospatial datasets and professional judgment. Further analyses should be performed to identify dense ephemeral stream networks that overlap with critical habitat, provide significant groundwater connectivity, or constitute critical geomorphic features necessary for maintaining connected features (e.g., dunes, eolian transport corridors, and active alluvial fans). These additional analyses should use high-resolution imagery to identify stream reaches not accounted for in FPEIS analysis, as well as include consultation with local BLM offices, cooperating federal agencies, and state agencies regarding critical ephemeral stream networks for habitat, hydrologic, and geomorphic value.

5 Monitoring and Adaptive Management Programs

Careful siting and planning of solar facilities can reduce adverse impacts on surface water and groundwater resources, but there are many unknowns regarding both surface water and groundwater processes. Establishing a robust monitoring program and analysis tools for SEZs would gain important information on whether surface water or groundwater resources are being affected by solar facilities. Monitoring programs would need to incorporate stakeholder involvement including appropriate federal/state/local agencies (e.g., local BLM offices, USGS Water Science Centers, USFWS, National Park Service [NPS], state water resources agencies)

that conduct water resources monitoring. The Final Solar PEIS recommended a process and methods and tools for developing SEZ monitoring programs for water resources. The process should include identifying a stakeholder monitoring committee including agencies involved with water rights and resources. The committee should oversee the development and implementation of a monitoring program. The basic components of surface water and groundwater monitoring programs should include recommended monitoring parameters, measuring frequency, a plan for stakeholder involvement. The monitoring program could also include new or modified design features for the SEZ, such as a requirement to have water flow meters on groundwater pumps to accurately measure extractions (to be used in groundwater models and analyses to support long, term monitoring programs).

6 Groundwater Analyses

Utility-scale solar energy facilities have the potential to affect groundwater. For the Final Solar PEIS, an analysis of potential groundwater impacts for each SEZ was done quantitatively using a simple one-dimensional groundwater modeling approach (BLM and DOE 2012, Appendix O) and qualitatively by summarizing available information relative to groundwater processes and comparing that information to estimates of potential groundwater extractions for the four main solar energy technologies evaluated. The level of groundwater analysis needed for each SEZ will vary depending on the proposed level of water use (e.g., less detailed analyses may be needed for photovoltaic [PV] facilities than for higher water use facilities such as parabolic trough).

Seven SEZs were identified in the Final PEIS that would benefit from a more quantitative analysis: Afton, Amargosa Valley, Brenda, Dry Lake, Dry Lake Valley North, Imperial East, and Riverside East. At these seven SEZs, numerical groundwater models are being used to better address two major concerns: potential drawdown impacts on surface water features (e.g., loss of springs, change in river discharge) and drawdown impacts on other groundwater users and groundwater processes. Where there are existing groundwater models, the following will be added:

- Groundwater model refinements for SEZ analysis, and
- Analyses of full build-out pumping scenarios.

Where there are not existing groundwater models, the following will be provided:

- Simplified, superposition-based, groundwater modeling; and
- Analyses of full build-out pumping scenarios.

The groundwater models and reports for these SEZ will be released through the SEZ pages of the Solar Energy Program Implementation Web Site (http://blmsolar.anl.gov/sez) as they become available.