APPENDIX E

Detailed Biological Cumulative Impact Analysis

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VEGETATION AND WILDLIFE (BIOLOGICAL RESOURCES) CUMULATIVE IMPACT ANALYSIS EXCERPTED FROM THE CEC RSA JUNE 2010

The section below is from the revised staff assessment by California Energy Commission staff and was used in cumulative impact discussion in sections for vegetation resources and wildlife resources of this PA/FEIS. All figure references refer to the Genesis Revised Staff Assessment or the Genesis Revised Staff Assessment Supplement.

C.2.8 CUMULATIVE IMPACT ANALYSIS

C.2.8.1 CEQA AND NEPA DEFINITIONS

A cumulative impact analysis is required under both CEQA and NEPA. "Cumulative impact" is the impact on the environment which results from the incremental impact of the proposed Project when considered with other past, present, and reasonably foreseeable future actions regardless of which agency (federal or non-federal) or person undertakes such other actions (40 CFR §1508.7).

Under CEQA Guidelines, "a cumulative impact consists of an impact which is created as a result of the combination of the project evaluated in the EIR together with other projects causing related impacts" (Title 14 Cal Code Regs §15130(a)(1)). Cumulative impacts must be addressed if the incremental effect of a project, combined with the effects of other projects is "cumulatively considerable" (Title 14 Cal Code Regs §15130(a)). Such incremental effects are to be "viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects" (Title 14 Cal Code Regs §15164(b)(1)). Together, these projects comprise the cumulative scenario which forms the basis of the cumulative impact analysis.

NEPA states that cumulative effects can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR §1508.7). Under NEPA, both context and intensity are considered. When considering intensity of an effect, we consider "whether the action is related to other actions with individually minor but cumulatively significant impacts. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts." (40 CFR §1508.27(b)(7))

Analysis of Cumulative Effects to Biological Resources

Staff used the following steps to develop the cumulative effects analysis described in this subsection:

- Identified the biological resources to consider in the analysis from a review of the impact analysis;
- Defined the geographic Study area for each resource;
- Described the current health and historical context for each resource;

- Identified direct and indirect impacts of the proposed project that might contribute to a cumulative impact;
- Identified other reasonably foreseeable projects that affect each resource;
- Assessed potential cumulative impacts;
- Reported the results; and
- Assessed the need for mitigation.

C.2.8.2 GEOGRAPHIC SCOPE

This cumulative impact analysis includes a broad, regional evaluation of the impacts of existing and reasonably foreseeable future projects that threaten plant and animal communities within the context or geographic scope of the Northern and Eastern Colorado Desert Coordinated Management Plan (NECO) (BLM-CDD 2002). The NECO planning area is located in the southeastern California Desert Conservation Area (CDCA). It occurs primarily in the Sonoran Desert region, but includes a smaller portion of the southern Mojave Desert region. For some resources, a different geographic scope was warranted, such as the use of watershed boundaries to analyze cumulative effects to desert washes, or the Chuckwalla Valley region of the I-10 corridor for populations or dune systems restricted to that geographic area.

C.2.8.3 REGIONAL OVERVIEW

This overview of regional impacts is followed by a more detailed discussion of the effects of past, present, and future projects to biological resources of the Project vicinity, with an emphasis on resources found within the Chuckwalla Valley of eastern Riverside County.

The California Desert remained a desolate area for the first few decades of the 20th century. Disturbance was more or less restricted to highways, railroad, and utility corridors, scattered mining, and sheep grazing. In the 1940s, several large military reservations were created for military training, testing, and staging areas. The deserts of eastern Riverside County comprise 40 percent of the County's land area but less than 1 percent of its population. Outside of the small urban-agricultural center of Blythe, near the Colorado River and Arizona border, there are only a few scattered, small residential and agricultural areas between Indio (to the west) and Blythe; most of the lands are in BLM ownership.

Populations of many of the desert's sensitive plants and animals were considered relatively stable until recently, as the push for renewable energy development has placed many populations at risk. Climate change is inarguably one of the biggest environmental challenges of our time and energy developers have submitted project applications that would collectively cover more than one million acres of the region (BLM 2010). However, renewable energy development has its own ecological consequences and portions of the Sonoran and Mojave deserts of California are bearing the brunt of these effects. Poorly planned development could contribute to habitat loss and fragmentation and barriers to species movement and gene flow. Although project permitting and regional planning evaluate basic environmental impacts of such projects, rarely do they consider impacts on connectivity or conduct thorough cumulative effects analyses.

Some of the many sensitive biological resources at risk in the areas identified for renewable energy development in the NECO planning area include desert washes and desert dry wash woodland, desert tortoise habitat, foraging habitat for golden eagle, Mojave fringe-toed lizard, western burrowing owl, American badger, riparian habitat for Le Conte's thrasher and other desert birds in decline, fragile dune ecosystems, burro deer range, the special-status plants Las Animas colubrina and Harwood's milk-vetch, and groundwater dependent vegetation. The Project also lies within a proposed Wildlife Habitat Management Area (Palen-Ford Wildlife Habitat Management Area). These resources will not only be affected by significant direct and indirect effects from the proposed Project, but will experience similar effects from over 20 reasonably foreseeable future projects within the NECO planning area alone.

The incremental, direct loss of habitat and individuals is more significant when considered with the significant indirect effects of fragmentation, disrupted wildlife movement and connectivity, introduction and spread of non-native plant species, and increases in predators such as ravens. These effects have contributed to population declines and range contractions for many special-status plant and animal species (Boarman 2002a). Combined with the effects of historical grazing and military training, agriculture, and highway and aqueduct construction, the proposed wind and solar energy projects have the potential to further reduce and degrade native plant and animal populations.

C.2.8.4 MAKING CONCLUSIONS ABOUT THE SEVERITY OR SIGNIFICANCE OF THE EFFECT

"No net loss" does not necessarily mean there are no cumulative impacts; the analysis of each resource also describes the indirect and cumulative effects that cannot be quantified through a Geographic Information System (GIS) analysis of habitat impacts. Similarly, even seemingly minor impacts can be important if they affect an extremely rare or limited resource, and the cumulative impact may be substantial.

For each cumulative effect the following factors were considered in making conclusions about the severity or significance of an effect:

- The health, status, or condition of the resource as a result of past, present, and reasonably foreseeable impacts;
- The contribution of the proposed Project to the overall cumulative impact to the resource;
- The Project's mitigated effect, when added to the effects of these planned future projects; and
- Impact avoidance and minimization: any project design changes that were made, or additional opportunities that could be taken, to avoid and minimize potential impacts in light of cumulative impact concerns.

The standard for a cumulative impacts analysis is defined by the use of the term "collectively significant" in the CEQA Guidelines section 15355; the analysis must assess the collective or combined effect of development. The objective is to avoid underestimating the severity of impacts which, when taken in isolation appear insignificant, but when viewed together appear significant. Cumulative impact assessments cannot conclude that contributions to cumulative impacts are not significant merely

because the contributions represent a small percentage of the overall problem. Doing so could improperly omit facts relevant to an analysis of the collective effect that the Project and other related projects would have upon biological resources. The result could be approval of projects based on an analysis that avoided evaluating the severity of impacts which, when taken in isolation appear insignificant, but when viewed together appear significant.

C.2.8.5 ANALYTICAL TOOLS AND STUDY LIMITATIONS

This cumulative effects analysis employed a combination of quantitative and qualitative analyses; a Geographic Information System (GIS)-based quantitative analysis for assessing the direct cumulative effects to habitat loss, and a qualitative analysis of the cumulatively considerable indirect effects, based on consultations with agency biologists and regional experts, as well as a literature review of the threats to species and their habitats.

GIS-Based Quantitative Analysis of Habitat Loss

The GIS-based analysis of direct habitat loss was used for this cumulative effects analysis to:

- Identify the overlap between existing and future projects and various biological data layers (e.g. landforms, soils, species occurrences, hydrographic data, vegetation mapping, wildlife habitat models, ownership and management layers);
- Compile digital map information about each resource for purposes of display and analysis; and
- Create statistical tables to summarize the direct impacts to these resources from existing and anticipated future projects, and the Project's contribution to those effects. Information on the datasets used, the sources of the data, and any limitations of the data, are provided in each biological resource section.

Qualitative Analysis of Indirect Effects

GIS is a widely used and effective tool for analyzing large amounts of spatial data, for documenting and quantifying assumptions about direct habitat loss, and the value of the habitat (where habitat models are available). However, the indirect impacts of projects are not easily captured in GIS and thus were only addressed qualitatively. This is important to note because many of these indirect effects (i.e., effects following construction) have greater significance and greater ecological consequences than the original habitat loss. Of particular concern are the effects of habitat fragmentation and its consequences for population viability and the effects of disrupted wildlife movement and connectivity and its effects on gene flow, subjecting populations of species such as bighorn sheep to isolation and inbreeding depression, and reducing their adaptability to climate change.

Other common themes that arose in this qualitative analysis of indirect cumulative effects include: increased vehicle-related mortality; disturbance from noise, lighting and increased human activity; increase in predators such as ravens; spread of invasive non-native plants; downwind effects of facilities and wind fencing on sand transport corridors; bird collisions and electrocutions; climate change and its

accompanying increased risk of drought, fire the and spread of invasive exotic plants; and the downstream effects of channel diversions on fluvial sediment transport and riparian vegetation.

Limitations of the Cumulative Project Data and Datasets

The large renewable projects proposed on BLM and private land that made up the dataset of future projects in the cumulative analysis for Biological Resources (**Biological Resources Table 9**) represent only those projects that had applications to the BLM, the Energy Commission, or eastern Riverside County as of January 2010 (the time of the analysis). **Biological Resources Figures 1** and **2** include projects for which staff had no GIS-based shapefiles at the time of the analysis; thus, they were not included in the quantitative analysis. The project list changes frequently; updates to the data used are presented below and in Section B.3.2, **Cumulative Scenario**. Further, not all of the projects shown on the table will complete the environmental review, and not all projects will be funded and constructed. Alternatively, it is possible, even likely, that new projects will be proposed in the near future that are not reflected in this analysis. See Section B.3.2 (Cumulative Scenario) for a discussion on the likelihood of development of the renewable projects on BLM and private lands listed in **Biological Resources Table 9** and illustrated in **Biological Resources Figures 1** and **2**.

This analysis does not compare the loss of individuals to the total known metapopulation; population data are incomplete for many or most species or occurrences and for some species can vary widely from year to year in response to drought.

Finally, in the GIS-based analysis, which requires the use of datasets that encompass the entire geographic scope of the analysis, the Project-specific survey data could not be compared to data for the region that was derived from different methodologies. For example, the Project survey data for waters and habitat is generally based on field surveys. Conversely, the NECO datasets for plant communities and habitats are based largely on aerial photo interpretation. Consequently, the GIS analysis of impacts to plant communities, landforms, and habitats is based on region-wide datasets for those resources (primarily NECO datasets), and not on Project survey data. Acreages listed in the analysis below, for example desert wash woodland or sand dunes may not match the Project-specific survey results. Where there are such differences, they are noted in a footnote to the table or in the summary of a specific analysis. Notwithstanding the challenges presented by comparing region-wide and Project-specific datasets, the GIS-based datasets for vegetation and landforms still provide a powerful and efficient tool for conducting large-scale, region-wide analyses.

C.2.8.6 PROJECTS CONTRIBUTING TO CUMULATIVE EFFECTS TO BIOLOGICAL RESOURCES

This analysis evaluates the impacts of the proposed Project in addition to the current baseline of past effects, present (existing) projects, and reasonably foreseeable or probable future projects in the I-10 corridor as well as the greater NECO Planning Area. **Biological Resources Figure 1**, located at the end of this section, illustrates the numerous proposed renewable projects on BLM, State and private land in the I-10 corridor between Desert Center and the Colorado River, near Blythe, in eastern Riverside County.

Biological Resources Figure 2 encompasses the entire NECO planning area, an area that is roughly equivalent to the boundaries of the Northern and Eastern Colorado Desert Recovery Unit for desert tortoise. **Biological Resources Table 9** lists the existing and foreseeable future projects (proposed) that were included in the quantitative analysis of cumulative effects. See Section B.4, **Cumulative Scenario Figures 2** and **3** and **Cumulative Scenario Tables 2** and **3** for descriptions of these existing and future proposed projects.

Biological Resources Table 9
Existing and Proposed Future Projects Considered in Cumulative Effects Analysis

Existing Projects (analyzed quantitatively)	**ROW Area* (ac)**	**Foreseeable Future Projects * [Proposed] (analyzed quantitatively)**	**ROW Area* (ac)**
Chuckwalla State Prison	**1,044**	**Genesis Solar Power Project (GSEP)**	**3,001****
Ironwood State Prison	**681**	**Blythe Solar Power Project**	**7,239****
Eagle Mountain Pumping Plant (MDWSC)	**378**	**NextEra Energy – McCoy (**Solar)	**20,560**
Kaiser Mine	**5,772**	**Palen Solar Power Project**	**2,974***
I-10 Corridor (200ft Freeway buffer from CL)	**6,494**	**Bull Frog Green Energy – Big Maria Vista** (Solar)	**22,663**
State highways (50ft Highway buffer from CL)	**2,640**	**Chuckwalla Solar 1**	**4,091**
DPV1 Transmission Line and Existing Access Roads (100ft[1] T-line Tower Buffer; 20ft road width)	**2,861**	**Rice Solar Energy Project**	**3,859**
Landfills(BLM NECO dataset)		**Desert Quartzite** (Solar)	**7,530**
Blythe Energy Project I***	**148**	**Desert Sunlight** (Solar)	**5,119**
BLM Campgrounds – Wiley's Well, Coon Hollow, Cottonwood Spring, and Midland Long-Term Visitor Area	**8,042**	**EnXco 1** (Solar)	**1,325**
BLM Off-Road Vehicle- authorized/designated routes in Meccacopia SRMS. (BLM NECO Human Use LTVAs dataset)	**3,031**	**Chuckwalla Valley Raceway**	**493**
Blythe area urban and agricultural lands (GAP Analysis vegetation dataset)	**88,317**	**Mule Mountain Solar Project**	**6,618**
Desert Center area urban and agricultural lands (2005 NAIP imagery)	**8,424**	**Eagle Mountain Pumped Storage Project**	**252**
Pipeline (NECO pipelines dataset)	**4,392**	**Red Bluff Substation –** for Genesis Solar Power Project	**90**
Projects Considered Qualitatively	**Area (ac)**	**Colorado Substation –** for Blythe Solar Power Project	**44**
Existing		**EnXco 2 Mule Mountain**	**~2,021**
BLM Grazing – Cattle and sheep allotments (Lazy Daisy, Chemehuevi, Rice Valley, and Ford Dry Lake (recently closed)	**n/a**	**Paradise Valley** (Residential "New Town" development)	**6,724**
BLM Multiple Use – Intensive multiple-use classes	**n/a**	**Blythe Airport Solar I Project**	**639**
Gen. Patton military training areas	**n/a**	**Eagle Mountain Landfill**	**1,633**
Colorado Aqueduct – open portions	**n/a**	**Blythe Energy Project II**	**153**
Chocolate Mountains Aerial Gunnery Range	**n/a**	**DPV2 Proposed Roads** (2-foot width) **and towers** (100 sq ft/tower)	**256**
Four approved commercial and 12 residential developments near Blythe	**n/a**	**Genesis Solar Project Access Road**	**29**
Solar Projects at Arizona border	**n/a**	**Blythe Energy Project Transmission Line Towers**	**148**
BLM Renewable Energy Study Areas (future, proposed)	**n/a**		

BLM Transmission Corridors	**n/a**		
		Genesis Solar Project Gas Line (100 foot width)	**85**
		Total Future Projects* 02/05/2010	**339,704 acres**
		Total Existing Disturbances*	**134,750 acres**

* Includes only renewable energy projects that had submitted a Plan of Development (POD) as of the time of the analysis (02/05/2010) and projects for which area data was available. Acreage shown for existing disturbances reflects only those projects for which area data was available.
** Acreage impacts depicted reflect the project footprint only; not the entire ROW. The unused portions of the ROW will be returned to BLM and not included in the final ROW permit
*** UFWS issued a BO for this project in 2001 and it's currently being constructed.
**** Not all of the projects depicted here will complete the environmental review, not all projects will be funded and constructed, and many will not use the entire ROW area.

Project Information Updates

Since **Biological Resources Table 9** was compiled and the GIS analysis conducted, several project changes have occurred, as follows:

- The Altera Black Hills project included in the impact calculations has been denied by the BLM.
- The LightSource Renewables – Mule Mountain II project, which is an active application in to the BLM, was not included in the impact calculations.
- The Pacific Solar Investments – Ogilby project has refined the project boundaries from those used in the impact calculations.

C.2.8.7 ANALYSIS OF CUMULATIVE EFFECTS TO BIOLOGICAL RESOURCES

Desert Washes/Waters of the State

The geographic scope for the analysis of cumulative impacts to desert washes include: the Chuckwalla-Ford Dry Lake watershed (the watershed encompassing the project) and the entire NECO planning area. The watershed area analysis (**Biological Resources Figure 3**) was based on the USGS National Hydrographic Dataset (2010) within the watershed boundary as defined by the California Interagency Watershed Map of 1999 (California Interagency Watershed Mapping Committee 1999). All figures are provided at the end of the cumulative effects analysis.

The primary hydrologic feature in the watershed is Ford Dry Lake, a depressional sink and dry playa. It is a closed basin, and the receiving basin for 1,504 miles of unnamed desert washes, including the many smaller ephemeral desert washes that pass through the Project site and drain the southeastern flank of the Palen Mountains. The "Palen Wash" is the larger feature that drains the alluvial fan between the Palen and McCoy Mountains. McCoy Spring and an old growth forest of ironwood occur on its upper reaches. The lower reaches of this feature passes through the western portion of the transmission line, natural gas line, and access road alignment.

The Chuckwalla-Ford Dry Lake watershed is relatively unaffected by existing impacts with one notable exception that was not analyzed quantitatively – the construction of I-10 and a series of wing dikes south of I-10. These permanently diverted surface flows from miles of small ephemeral desert washes and desert dry wash woodland north of 1-10, leaving miles of scattered dead ironwood trees and poor creosote bush desert scrub in their wake. Plant cover is very sparse and diversity very low in these affected areas; they are also a testament to the downstream effects that channel diversions, including small channels, can have on both upland and riparian plant communities. For the Project, these effects would be minimized somewhat by the proposed redistribution of flows below the Project into many (not all) of the delineated channels downstream of the Project, but it is unclear to what extent sediment transport in the diverted channels would be affected.

Portions of the I-10 corridor were also disturbed historically for military training exercises during World War II, and later by jojoba farming and various transmission corridors (gas and electric). There are several large infestations of Sahara mustard in this area but the watershed is otherwise little affected by existing impacts. **Biological Resources Table 10** summarizes the direct loss of desert washes that would result from anticipated future projects within the Chuckwalla-Ford Dry Lake watershed. These effects are also illustrated spatially in **Biological Resources Figure 3.** Proposed future projects would affect approximately 63 miles of desert washes (4.2 percent). Based on the USGS National Hydrographic Dataset (2010) that was used to quantify existing and future impacts throughout the watershed, the Project would affect 2.9 miles (4.6 percent of all future impacts). The ground-based and field-verified delineation of state waters (TTEC 2010l) is provided as a footnote to **Biological Resources Table 10**.

The combined loss of desert washes within the watershed is significant (**Biological Resources Table 10**) but reflects only the direct loss of washes and is only part of the bigger picture of cumulative effects to desert washes. The combined indirect effects to these features from all probable future projects that are not reflected in the quantitative analysis include: impacts to sediment transport from the numerous channel diversions; impacts to wind sand transport processes from the loss of sediment input; impacts to water quality from culverts and road crossings; fragmentation of habitat, and the corresponding loss of habitat function and values.

Biological Resources Table 10
Cumulative Effects: Desert Washes in Chuckwalla-Ford Dry Lake Watershed

Total Desert Washes* in Genesis Watershed	Impacts to Habitat from Existing Projects** (Percent of total watershed)	Impacts to Habitat from Foreseeable Future Projects*** (Percent of total watershed)	Contribution of GSEP to future cumulative impacts (Percent of total impacts from Future projects)
1,503 miles	**13 miles (0.9%)**	**63 miles (4.2%)**	**2.9 miles (4.6%)** (based on USGS dataset)

*Based on the USGS National Hydrographic Dataset (2010) and CalWater Version 2.2.1 (California Interagency Watershed Mapping Committee 1999).
** Includes only those existing projects for which GIS-based spatial data was available at the time of the analysis; see **Biological Resources Table 9**.
***The ground-based, field-verified delineation of state waters concluded that 90 acres of desert washes would be directly affected and 21 acres would be indirectly affected downstream of the Project (TTEC 2010l, TTEC 2009d).

The combined direct and indirect effects to washes adjacent to dune systems may also have unanticipated consequences to dune habitat and the special-status plants and animals that depend on them. The affected washes around Ford Dry Lake may also be an important contributor to the aeolian and fluvial sand transport systems that maintain the dunes in the Ford Dry Lake vicinity, including stabilized and partially stabilized dunes and sand sheets. The indirect effects of channel diversions and redistribution below the various solar project sites are not well understood but could include deprivation of flows and/or sediment to dependent species, or the introduction and spread of weeds. The downstream indirect impacts of the Project would be minimized, at least in part, through the modifications to the drainage plan to discharge diverted flows into existing large and small flow paths between the Project and Ford Dry Lake (See **BIO-19** (Section A) and **Soil and Water** section for a discussion of Channel Maintenance requirements).

The incremental effects of the Project to desert washes, described above, are cumulatively considerable when viewed in connection with the effects of the past, current and probable future projects included in this analysis (See **Biological Resources Table 9**). With the Project design changes described above and implementation of staff's proposed Conditions of Certification (**BIO-22, BIO-7, BIO-8**, **BIO-14** and **BIO-23**), staff has concluded that the Project's contribution to cumulative impacts to desert washes in the Project's watershed area would be less than considerable. Staff's proposed Condition of Certification **BIO-22** requires compensation through acquisition of desert washes within or adjacent to the Chuckwalla-Ford Dry Lake watershed; **BIO-7** specifies mitigation monitoring and reporting requirements; **BIO-8** requires implementing avoidance and minimization measures; **BIO-14** requires finalizing and implementing a detailed Weed Management Plan, and **BIO-23** requires implementing a closure and decommissioning plan for restoring the site topography and hydrology to a more natural condition and revegetating with the locally native species.

Biological Resources Table 11 and **Biological Resources Figure 4** illustrate the potential cumulative impacts to all desert washes within the entire NECO planning area, as depicted in the USGS National Hydrographic Dataset (USGS 2010). Cumulative impacts to desert washes from all foreseeable future projects within the larger NECO planning area are significant. Within NECO, the northern Palo Verde Mesa watershed (near Blythe) and the watersheds immediately north of Highway 62 near Cadiz Valley and Danby Lake are particularly hard-hit by proposed future projects. The cumulative projects' direct effects are compounded by the fact that they also cause impairment of hydrologic, geochemical, geomorphic, and habitat function and values of the remaining reaches downstream of the impact. With the Project design changes described above and implementation of staff's proposed Conditions of Certification (**BIO-22, BIO-7, BIO-8**, **BIO-14** and **BIO-23**) staff concludes that the effects of the Project to desert washes, described above, would be less than cumulatively considerable.

Biological Resources Table 11
Cumulative Effects: Desert Washes in the NECO Planning Area

Total Desert Washes* in NECO	Impacts to Habitat from Existing Projects** (Percent of total washes in NECO)	Impacts to Habitat from Foreseeable Future Projects*** (Percent of total washes in NECO)	Contribution of GSEP to future cumulative impacts (Percent of total impacts from Future projects)
18,596 miles	**190 miles (1.0%)**	**1,122 miles (6.0%)**	**2.9 miles (0.3%) (based on USGS dataset)**

*Based on the USGS National Hydrographic Dataset (USGS 2010).
** Includes only those existing projects for which GIS-based spatial data was available at the time of the analysis; see **Biological Resources Table 9**.
***The ground-based, field-verified delineation of state waters concluded that 90 acres of desert washes would be directly affected and 21 acres would be indirectly affected downstream of the Project (TTEC 2010l, TTEC 2009d).

Special-Status Wildlife

Desert Tortoise

This analysis addresses cumulative impacts to desert tortoise habitat as defined by the current USGS Desert Tortoise Habitat Model (Nussear et al. 2009). It is a predictive model for mapping the potential distribution of desert tortoise habitat and is useful tool for evaluating different land-use issues that tortoises face at a landscape scale. **Biological Resources Figure 5** is a spatial representation of the predicted habitat potential index values for desert tortoise, based on the 2009 model. The model is not intended to be used, or viewed, as a substitute for ground-based and site-specific field surveys. Model scores reflect a hypothesized habitat potential given the range of environmental conditions where tortoise occurrence was documented. Nussear et al. (2009, p. 15) specifically states:

> "*As such, there are likely areas of potential habitat for which habitat potential was not predicted to be high, and likewise, areas of low potential for which the model predicted higher potential. Finally, the map of desert tortoise potential habitat that we present does not account either for anthropogenic effects, such as urban development, habitat destruction, or fragmentation, or for natural disturbances, such as fire, which might have rendered potential habitat into habitat with much lower potential in recent years*".

GIS-based files for the boundaries of the Eastern and Northern Colorado Recovery Units of the 1994 Desert Tortoise Recovery Plan were not available from the USFWS and the proposed new boundaries as depicted in the USFWS 2008 Draft Revised Recovery Plan had not been adopted as of the time of this analysis. Consequently, the NECO planning area boundary was used for this analysis. The NECO boundary closely approximates the boundaries of the two USFWS recovery units; however, the USFWS boundaries extend slightly to the north and west of the NECO boundary.

The Project's unmitigated effects to desert tortoise habitat (based on the 2009 USGS habitat model) are quantified below in **Biological Resources Table 12** (and **Biological Resources Figure 5**). Most of the proposed projects in the NECO area would impact lower quality desert tortoise habitat, according to the predictive model. Across the NECO planning area, the cumulative effects to moderate quality desert

tortoise habitat from proposed future projects is particularly significant but even seemingly minor effects to higher quality habitat are significant given the species' decline and the present and future direct and indirect threats from habitat fragmentation and its associated impacts on population viability, the effects of increased predation from ravens, and other reasonably foreseeable future threats.

Biological Resources Table 12
Cumulative Effects: Desert Tortoise Habitat*

Habitat Value*	Total Desert Tortoise habitat* in NECO	Impacts to Habitat from Existing** Projects (Percent of total in NECO)	Impacts to Habitat from Foreseeable Future*** Projects (Percent of total in NECO)	Contribution of GSEP to future cumulative impacts (Percent of total impacts from Future projects)
0	243,679 acres	67,028 acres 27.5%	21,774 acres 8.9%	0 acres
0.1	233,260 acres	9,094 acres 3.9%	25,937 acres 11.0%	523 acres 2.0%
0.2	373,170 acres	9,288 acres 2.5%	44,595 acres 12.0%	1,277 acres 2.9%
0.3	628,960 acres	11,987 acres 1.9%	38,163 acres 6.1%	52 acres 0.1%
0.4 – 0.5	787,882 acres	15,885 acres 2.0%	61,163 acres 7.8%	0 acres
0.6 – 0.7	1,381,024 acres	10,279 acres 0.7%	94,944 acres 6.9%	0 acres
0.8 – 0.9	1,868,475 acres	9,233 acres 2.8%	53,074 acres 2.8%	0 acres
1.0	30,883 acres	71 acres 0.2%	55 acres 0.2%	0 acres

*Based on the USGS Desert Tortoise Habitat Model (Nussear et al. 2009).
** Includes only those existing projects for which GIS-based spatial data was available at the time of the analysis; see **Biological Resources Table 9**.
*** Includes only BLM Renewables that had submitted a Plan of Development at the time of the analysis and those additional future projects listed in **Biological Resources Table 9**.

One of the objectives for desert tortoise recovery in the NECO is to "*mitigate effects on desert tortoise populations and habitat outside DWMAs to provide connectivity between DWMAs*." Maintaining connectivity is particularly important given the threats posed by global climate change, according to the USFWS 2008 Draft Revised Recovery Plan. Probable desert tortoise linkages between the Chuckwalla and Chemehuevi Critical Habitat Units and DWMAs are shown in **Biological Resources Figure 6.** The linkages depicted represent areas of the best habitat quality for tortoises between the DWMAs and critical habitat, and therefore represent the most probable linkages and most important areas to protect to maintain connectivity between the Chemehuevi and Chuckwalla DWMAs. The identified linkages are based on a review of information on existing vegetation and landform data (NECO datasets and Project-specific survey data) and depicted in the USGS habitat model. The location of available lands in "probable" linkages is a useful tool for identifying potential acquisition lands for desert tortoise mitigation, and for evaluating different land-use issues that tortoises face at a landscape scale.

Biological Resources Figure 6 identifies these linkages based on the areas of moderate and high quality habitat between management areas for a qualitative analysis of cumulative effects; however, the impacts to linkages are not quantified here as the areas have not been formalized or created as shape layers suitable for GIS analysis. Along with the linkages depicted in **Biological Resources Figure 6**, additional linkages through areas currently considered lower quality habitat that could be restored may also be important for long-term connectivity between the Chemehuevi and Chuckwalla DWMAs. The Project would not contribute significantly to loss of desert tortoise connectivity between the Chuckwalla and Chemehuevi Desert Wildlife Management Areas (DWMAs) and Critical Habitat Units.

While impacts to higher quality habitat are small (approximately 3 percent) relative to cumulative effects to moderate and low quality habitat, this nevertheless represents over 53,000 acres of habitat and over 150,000 acres of moderate and moderately high quality habitat that would be lost to proposed future projects. Although the Project impacts only lower quality habitats, it nevertheless contributes, at least incrementally, to a cumulatively considerable effect. In situations where the combined impact is most severe, even small incremental impacts may be cumulatively considerable.

The USFWS has expressed significant concerns about the likelihood of renewable energy development resulting in increased raven numbers even with implementation of project-specific raven management plans (USFWS 2010). To mitigate the Genesis Project's contribution to cumulative and indirect impacts on desert tortoise from raven predation, staff proposes that the applicant contribute toward implementation of the Regional Raven Management Program, and Project-specific mitigation measures as described in Condition of Certification **BIO-13** and **BIO-12**. The applicant's payment would support the regional raven management plan activities focused within the Colorado Desert Recovery Unit, which would be adversely affected by increases in raven subsidies attributable to the proposed Project. In addition, BIO-13 requires development of Project-specific raven management actions that would reduce foraging and nesting opportunities for ravens in and near the Project area. With the implementation of staff's proposed Condition of Certification **BIO-12** (acquisition of compensation lands), desert tortoise-specific avoidance and minimization measures **BIO-1** through **BIO-6**, and monitoring and reporting requirements in **BIO-7,** staff believes that the Project's contribution to cumulative impacts to desert tortoise habitat would be less than considerable. Condition of Certification **BIO-12** specifies that compensation habitat acquisitions occur within the Colorado Desert Recovery Unit in areas that have potential to contribute to desert tortoise habitat connectivity and build linkages between desert tortoise designated critical habitat, known populations of desert tortoise, and/or other preserved lands. Indirect effects to desert tortoise from ravens and the degradation of habitat quality from the spread of noxious weeds would be minimized through the detailed raven and weed management plans required under **BIO-13** and **BIO-14**.

Implementation of staff's proposed conditions of certification would reduce the Project's contribution to cumulative impacts to desert tortoise habitat, movement, and connectivity would be less than considerable. There may be cumulative impacts after mitigation is implemented by all projects, but due to the mitigation implemented by the Project, its contribution would not be cumulatively considerable. These residual cumulative effects from all future projects could be addressed through a regional and coordinated

planning effort aimed at preserving and enhancing large, intact expanses of wildlife habitat and linkages, including maintaining connections between wildlife management areas and other movement corridors.

Nelson's bighorn sheep

The distribution and extent of the NECO-designated bighorn sheep WHMAs (occupied and unoccupied range) and connectivity corridors, overlaid with past and foreseeable future projects within the NECO Planning Area, are quantified in **Biological Resources Table 13** and illustrated in **Biological Resources Figure 7-a**. The GIS analysis of the NECO bighorn sheep WHMAs and connectivity corridors indicates that occupied and unoccupied ranges and connectivity corridors are unaffected by the proposed Project. However, large-scale renewable energy development in the region north of Highway 62 could significantly impact gene flow between sheep populations through significant cumulative impacts to connectivity corridors, potentially decreasing the viability of the metapopulation of bighorn sheep. The Genesis Project itself, however, has no direct contribution to the loss of habitat within the identified connectivity corridors or the WHMAs.

Biological Resources Table 13
Cumulative Effects: Bighorn Sheep WHMAs and Connectivity Corridors

Bighorn sheep WHMAs & Connectivity Corridors*	**Total WHMA or Connectivity Corridor* in NECO**	**Impacts to WHMAs & Connectivity Corridors from Existing** Projects** (Percent of all WHMAs or Corridors in NECO)	**Impacts to WHMAs & Connectivity Corridors from Foreseeable Future*** Projects** (Percent of all WHMAs or Corridors in NECO)	**Contribution GSEP to future cumulative impacts** (Percent of total impacts from Future projects)
Total in NECO	2,552,074 acres	9,872 acres 0.4% of total NECO	93,295 acres 3.7% of total NECO	0 acres
Occupied Range	1,718,254 acres	6,008 acres 0.3% of total Occupied range	51,508 acres 2.3% of total Occupied range	0 acres
Unoccupied Range	232,506 acres	1,409 acres 0.6% of total Unoccupied range	8,134 acres 3.5% of total Unoccupied range	0 acres
Connectivity Corridors	601,313 acres	2,455 acres 0.4% of total Connectivity corridor	33,653 acres 5.6% of total Connectivity corridor	0 acres

* Based on the BLM NECO Bighorn Sheep WHMAs dataset (BLM CDD 2002).
** Includes only those existing projects for which GIS-based spatial data was available at the time of the analysis; see **Biological Resources Table 9**.
*** Includes only BLM Renewables that had submitted a Plan of Development at the time of the analysis and those additional future projects listed in **Biological Resources Table 9**.

The Genesis Project is located within the proposed Palen-Ford multi-species WHMA (BLM CDD 2002; map 2-21); but is mainly located outside the sensitive habitats for which the WHMA was primarily established (i.e., dunes and playas). The Project is not located within a bighorn sheep WHMA or corridor (BLM CDD 2002). The cumulative effects of all other proposed future projects on bighorn sheep connectivity can only be addressed through a regional and coordinated effort aimed at preserving and

enhancing large, intact expanses of wildlife habitat and linkages, including maintaining connections between wildlife management areas and other movement corridors.

Another consideration of this analysis was whether the proposed future projects would cumulatively and significantly affect bighorn sheep through the loss of spring forage on the upper bajadas adjacent to occupied range. Based on recommendations from the Society for Conservation of Bighorn Sheep, staff analyzed the impact of existing and future projects within a one-mile buffer from the base of occupied ranges (or potentially restored populations in unoccupied ranges) on plant communities to assess the potential impacts to bighorn foraging habitat. These impacts are depicted in **Biological Resources Figure 7-b** and summarized in **Biological Resources Table 14**, below. No direct or cumulatively considerable effects to bighorn sheep WHMAs or spring foraging habitat would result from the proposed Project and thus no mitigation measures relating to bighorn sheep are proposed by staff. Impacts to spring foraging habitat in other affected portions of NECO, from other projects, remain significant, however. Approximately 4.5 percent of all spring forage in Sonoran creosote bush scrub and an additional 3.3 percent of Mojave creosote bush scrub within a mile of bighorn sheep WHMAs would be affected from all other foreseeable future projects.

Biological Resources Table 14
Cumulative Effects: Bighorn Sheep Spring Foraging Habitat within 1 Mile of Bighorn Sheep WHMAs and Connectivity Corridors

Foraging Habitat* (by plant community)	**Total Plant Communities* within 1-mile buffer of Bighorn Sheep WHMAs**	**Impacts to Spring Foraging Habitat from Existing** Projects** (Percent of all Community types in 1-mile buffer)	**Impacts to Spring Foraging Habitat from Foreseeable Future*** Projects** (Percent of all Community types in 1-mile buffer)	**Contribution of GSEP to future cumulative impacts** (Percent of total impacts from Future projects)
Mojave Creosote Scrub	549,123 acres	936 acres 0.2%	18,342 acres 3.3%	0 acres
Sonoran Creosote Scrub	2,526,869 acres	8.768 acres 0.3%	113,434 acres 4.5%	0 acres
Desert Dry Wash Woodland	277,981	1,371 acres 0.5%	8,167 acres 2.9%	0 acres
Playa/Dry Lake	5,264 acres	0 acres	1,810 acres 34.4%	0 acres
Sand Dunes	6,218 acres	49 acres 0.8%	8 acres 0.1%	0 acres
Chenopod Scrub	258 acres	10 acres 3.9%	0 acres	0 acres
Agriculture, Developed	7,253 acres	N/A	576 acres 7.9%	0 acres

Foraging Habitat* (by plant community)	**Total Plant Communities* within 1-mile buffer of Bighorn Sheep WHMAs**	**Impacts to Spring Foraging Habitat from Existing** Projects** (Percent of all Community types in 1-mile buffer)	**Impacts to Spring Foraging Habitat from Foreseeable Future*** Projects** (Percent of all Community types in 1-mile buffer)	**Contribution of GSEP to future cumulative impacts** (Percent of total impacts from Future projects)
Pinyon-Juniper Woodland	1,928 acres	0 acres	0 acres	0 acres

* Based on the BLM NECO Bighorn Sheep WHMAs dataset (BLM CDD 2002).

** Includes only those existing projects for which GIS-based spatial data was available at the time of the analysis; see **Biological Resources Table 9**.

*** Includes only BLM Renewables that had submitted a Plan of Development at the time of the analysis and those additional future projects listed in **Biological Resources Table 9**.

Mojave Fringe-toed Lizard

The geographic scope for the first of two cumulative effects analyses for Mojave fringe-toed lizard is the entire NECO planning area; the second analysis looked only at the habitat for the Chuckwalla Valley population. The NECO habitat dataset for Mojave fringe-toed lizard, which included all but the highest portions of the mountain ranges, was refined to reflect the species restriction to sandier substrates. Using the NECO landforms dataset, staff created a habitat model by selecting the following landforms: crescentic dunes, longitudinal dunes, undifferentiated dunes, sandy dissected fans, sandy plains, and dry playas. Dry playas were included because they often have at least a veneer of sand. The selected landforms were overlaid with documented occurrences of Mojave fringe-toed lizard from CNDDB and the detailed field survey data from four renewable energy projects within the NECO boundary. The occurrence data was in considerable agreement with the selected landforms; no corrections were necessary and no attempt was made to rank habitat value. **Biological Resources Figure 8** and **Biological Resources Table 15** present the results of the Mojave fringe-toed lizard habitat mapping overlaid with the existing and future projects within the NECO planning area to quantify the cumulative effects of all projects on habitat loss. **Biological Resources Table 15** also summarizes the cumulative loss of habitat for six additional plant and animal species discussed later in this section (American badger and desert kit fox, burrowing owl, Le Conte's thrasher, burro deer, Couch's spadefoot toad, and Harwood's milk-vetch).

However, there are also cumulatively considerable indirect effects to Mojave fringe-toed lizard that are not reflected in this quantitative analysis of habitat loss. These include impacts to sand transport systems and the maintenance of dunes from renewable energy projects (wind fencing and the obstruction of sand-carrying winds and water-deposited sands); premature stabilization of dunes by the spread of noxious weeds, which also fuel wildfires; increased risk of fire from transmission lines and increased ignition rates and vehicle-related mortalities from the introduction of vehicles into formerly undisturbed habitats; the effects of past and future grazing and off-road vehicle use; fragmentation of the remaining habitat and the accompanying isolation and reduced population viability; and an increase in predation by ravens and other predators from an increase in perching structures. Staff considers these indirect cumulative effects significant. Of particular concern with all proposed projects within the aeolian (wind-deposited) sand

transport corridor is the indirect downwind loss of dune habitat and habitat quality from obstructions (structures and wind fencing). Studies and examples in nearby Coachella Valley suggest that such effects can be acute and occur quickly (Katra et al. 2009; Turner et al. 1984).

Future (proposed) projects alone will cumulatively cause a direct loss of over 103,000 acres (16 percent) of all Mojave fringe-toed lizard habitat. Although the Project's contribution to these NECO-wide effects is relatively minor it nevertheless contributes, at least incrementally, to a significant cumulative effect.

Within Chuckwalla Valley (**Biological Resources Table 15** and **Biological Resources Figures 9**), nearly 13,000 acres (12.9 percent) of the Mojave fringe-toed lizard habitat would be directly impacted by the construction of all proposed projects. The Project's contribution to the direct loss of habitat for the Chuckwalla Valley population of Mojave fringe-toed lizard is somewhat more substantial in the local context (1.7 percent). However since publication of the Draft SA/EIS, the applicant re-designed the facility footprint by removing a 41.4-acre "toe" area which decreased direct impacts to sand dunes from 28 acres to 1 acre (from construction of the transmission line linear facility). Removal of 27 acres of impact to sand dune habitat also substantially decreased the Project's effects to the regional sand migration corridors that occur in the Genesis Project area (TTEC 2010o).

Biological Resources Table 15
Cumulative Effects: Special-status Species Habitat

Special-status Species Habitat	**Total habitat in NECO** (or other study area)	**Impacts to Habitat from Existing+ Projects** (percent of total habitat)	**Impacts to Habitat from Foreseeable Future++ Projects** (percent of total habitat)	**Contribution GSEP to future cumulative impacts**[1] (percent of total future impacts)
Mojave fringe-toed lizard habitat* (all NECO)	630,121 acres	14,541 acres 2.3%	103,604 acres 16.4%	224 acres 0.2%
Mojave fringe-toed lizard habitat* (Chuckwalla Population)	99,657 acres	8,290 acres 8.3%	12,845 acres 12.9%	224 acres 1.7%
American badger and desert kit fox habitat*	4,795,631 acres	134,750 acres 2.8%	339,704 acres 7.1%	1,811 acres 0.5%
Burrowing owl habitat***	4,795,631 acres	134,750 acres 2.8%	339,704 acres 7.1%	1,811 acres 0.5%
LeConte's thrasher habitat****	3,718,357 acres	47,078 acres 1.3%	300,139 acres 8.1%	1,811 acres 0.6%
Burro deer range*****	637,453 acres	10,236 acres 1.6%	47,640 acres 7.5%	151 acres 0.3%
Couch's spadefoot toad range******	1,548,597 acres	88,992 acres 5.7%	115,218 acres 7.4%	1,811 acres 1.6%
Harwood's milk-vetch habitat*******	3,134,303 acres	54,788 acres 1.8%	274,727 acres 8.8%	1,811 acres 0.7%

1 = Acreages adjusted to reflect removal of the 41.4 acre "toe" (TTEC 2010o).
*Total habitat based on the BLM NECO Landforms dataset (BLM CDD 2002), selecting following values: undifferentiated dunes; crescentic dunes, longitudinal dunes; sandy plains; playas, and sandy dissected fans.
**Total habitat based on the BLM NECO Landforms dataset (BLM CDD 2002), excluding mountains playas, badlands, and lava flows

***Total habitat based on the BLM NECO Landforms dataset (BLM CDD 2002), excluding dunes, playas, mountains, badlands, and lava flows
****Total habitat based on the NECO habitat model for LeConte's thrasher
*****Total habitat based on the NECO habitat model for burro deer (mule deer)
******Total habitat based on the NECO range map for Couch's spadefoot toad
*******Total habitat based on Staff's habitat model for Harwood milk-vetch. Using the NECO landforms model and selecting landforms on which occurrences of Harwood's milk-vetch have been documented; landforms do not imply presence of Harwood's milk-vetch
+ Includes only those existing projects between Desert Center and the Colorado River for which GIS-based spatial data was available at the time of the analysis; see Biological Resources Table 9
++ Includes only BLM Renewables that had submitted a Plan of Development (POD) at the time of the analysis and those additional future projects listed in Biological Resources Table 9.

In addition to the minimization of effects created by the re-desgin, the Project's contribution to cumulative effects would also be reduced by proposed compensatory mitigation identified in Condition of Certification **BIO-20**, which requires implementation of impact avoidance and minimization measures and acquisition of habitat to mitigate for the Project-related loss of sand dune and other sandy habitats that support Mojave fringe-toed lizards. Condition of Certification **BIO-20** specifies that the acquisitions would need to be targeted for sand dune or partially stabilized sand dune habitat within the Chuckwalla Valley. Impacts to desert washes in Chuckwalla Valley, some of which contribute sand to the aeolian transport corridor, would be offset through Condition of Certification **BIO-22** by acquiring and preserving private lands in the valley containing desert washes that are not currently protected under a conservation easement and could be developed in the future. Indirect effects from ravens and the spread of Sahara mustard and other noxious weeds would be minimized through **BIO-13** and **BIO-14.** Implementation of all mitigation measures would be assured through Condition of Certification **BIO-7**. Therefore, with the implementation of the aforementioned conditions of certifications, the Project's contribution to the cumulative effects to Mojave fringe-toed lizard would be less than considerable.

Golden Eagle

Staff conducted four different analyses of cumulative effects on golden eagle foraging habitat: 1) the entire NECO planning area (**Biological Resources Figures 10**); 2) foraging habitat within 10 miles of the base of all mountain landforms within NECO (**Biological Resources Figures 11-a**); 3) a 10-mile radius around the Project (**Biological Resources Figures 11-b**), and 4) a 140-mile radius around the Project (**Biological Resources Figures 11-c**).

The model of foraging habitat adjacent to mountain landforms was based on an assumption that the mountainous areas were the most likely sites for golden eagle nests. The 140-mile analysis (**Biological Figure 11-c**) used the California GAP vegetation mapping dataset (Davis et al. 1998), a project of the Biogeography lab at UC Santa Barbara. The vegetation mapping depicted in Arizona and Nevada is based on the National GAP vegetation mapping project. The original GAP mapping of desert dry wash woodlands and dunes was improved for the NECO plant communities dataset used in **Biological Figures 11-a and 11-b** (BLM CDD 2002; Appendix H); however, all datasets are based largely on aerial photo interpretation and would not be considered as accurate as a ground-based and field-verified delineation of habitats. The basis for a 140-mile analysis (which was limited by a lack of compatible vegetation mapping data for Mexico) was based on an analysis of band recovery data provided by the

U.S. Bird Banding Laboratory which showed that 90 percent of mature golden eagles re-encountered during the breeding season were within 140 miles of their natal site (USFWS 2009). Currently, only two nests have been documented within 10 miles of the Project; these two nests were 9.8 miles away and were inactive in 2010. Golden eagle nest surveys were completed in spring 2010 but the results were not available at the time of publication of the RSA. **Biological Resources Table 16** summarizes the impacts to foraging habitat for **Biological Resources Figures 11-a** through **11-c**. Please see **Biological Resources Table 18** and **Figure 19-a** for a summary and map of impacts to plant communities within entire NECO planning area.

All of the golden eagle foraging habitat figures depict the locations of currently known and documented golden eagle nest locations. The source of this information include the "nest card" database, desert-wide helicopter surveys conducted in 1978 and 1979, and locations depicted in a 1984 BLM California Desert Conservation Area (CDCA) map of “Sensitive, Rare, Threatened and Endangered Fish and Wildlife” that were digitized for this analysis (BLM 1999). It is unknown whether these nests are still active and/or present; this analysis assumes that they could be active and, at a minimum, that the site is suitable for nesting. The nest locations depicted are approximate (with a margin of error +/- 1-2 miles) and the map should not be viewed as a substitute for site-specific nest surveys to assess project impacts.

The loss of foraging habitat quantified in the GIS analysis is but one picture of the range-wide cumulative effects that have contributed to a sharp decline in golden eagle populations in recent years. The USFWS and others (USFWS 2009b; Kochert et al. 2002) estimate there are approximately 30,000 golden eagles in the western U.S., down from an estimated 100,000 in the late 1970s. Survey data from 2003 and 2006-2008 indicate a decline of 26 percent since 2003. Climate change is also expected to impact golden eagle by increasing drought severity, and the CO_2 concentrations are expected to exacerbate the spread of invasive weeds, which displace native species and habitats, fuel wild fires, and alter fire regimes. Wind energy development may also be particularly harmful to golden eagles; however, the proposed transmission lines for this and other proposed future projects are also expected to increase raptor collisions and electrocutions. Lead poisoning and the loss of prey species are also important contributors to golden eagle mortality and the overall decline in habitat function and value from human activities.

Proposed future projects within 10 miles of all mountains (**Biological Resources Figure 11-a** and **Biological Resources Table 16**) would cumulatively affect over 325,000 acres of foraging habitat (not including agriculture). The combined effect of all existing and probable future impacts to the loss of foraging habitat within 10 miles of the Project is also significant. Proposed future projects within 10 miles of the Project site (**Biological Resources Figures 11-b**) would cumulatively affect over 31,780 acres of foraging habitat (not including agriculture)—nearly 10 percent of all potential foraging habitat. The Project contributes, at least incrementally, to a significant cumulative loss of foraging habitat, and habitat quality for a species in sharp decline. In situations where the cumulative impact is most severe, even small incremental impacts may be cumulatively considerable.

Biological Resources Table 16
Cumulative Effects: Golden Eagle Foraging Habitat

Cumulative Effects: Golden Eagle Foraging Habitat Within 10 miles of Mountains				
Foraging Habitat* (by plant community)	**Total Plant Communities* within 10-mile buffer of mountains in NECO**	**Impacts to Foraging Habitat from Existing** Projects** (Percent of all Community types in 10-mile buffer)	**Impacts to Foraging Habitat from Foreseeable Future*** Projects** (Percent of all Community types in 10-mile buffer)	**Contribution of GSEP to future cumulative impacts** (Percent of total impacts from Future projects)[1]
Mojave Creosote Scrub	728,536 acres	1,691 acres 0.2%	33,920 acres 4.7%	0 acres
Sonoran Creosote Scrub	3,571,797acres	22,019 acres 0.6%	228,363 acres 6.4%	1,773 acres 0.8%
Desert Dry Wash Woodland	654,735	8,128 acres 1.2%	48,086 acres 7.3%	16 acres**** 0.03%
Playa/Dry Lake	54,433 acres	961 acres 1.8%	15,713 acres 29%	37 acres 0.2%
Sand Dunes	60,807 acres	1,465 acres 2.4%	175 acres 0.3%	1 acre 0.6%
Chenopod Scrub	982 acres	72 acres 7.3%	0 acres	0 acres
Agriculture, Developed	79,894 acres	N/A	1,011 acres 1.3%	0 acres
Pinyon-Juniper Woodland	1,928 acres	0 acres	0 acres	0 acres

Cumulative Effects: Golden Eagle Foraging Habitat Within 10 miles of Project				
Foraging Habitat* (by plant community)	**Total Plant Communities* within 10-mile buffer of Project**	**Impacts to Foraging Habitat from Existing** Projects** (Percent of all Community types in 10-mile buffer)	**Impacts to Foraging Habitat from Foreseeable Future*** Projects** (Percent of all Community types in 10-mile buffer)	**Contribution of GSEP to future cumulative impacts** (Percent of total impacts from Future projects)[1]
Mojave Creosote Scrub	0 acres	0 acres	0 acres	0 acres
Sonoran Creosote Scrub	257,135 acres	1,559 acres 0.6%	23,935 acres 9.3%	1,773 acres**** 7.4%
Desert Dry Wash Woodland	62,575 acres	1,255 acres 2.0%	7,677 acres 12.3%	16 acres**** 0.2%
Playa/Dry Lake	5,269 acres	950 acres 18.0%	0 acres	37 acres**** 100%
Sand Dunes	5,613 acres	0 acres	168 acres 3.0%	1 acre**** 0.6%

Chenopod Scrub	216 acres	62 acres 28.7%	0 acres	0 acres
Agriculture, Developed	2,205 acres	N/A	140 acres 6.3%	0 acres
Pinyon-Juniper Woodland	0 acres	0 acres	0 acres	0 acres

*Based on the BLM NECO Plant Communities dataset (BLM CDD 2002) conducted by the Biogeography Lab at the University of California, Santa Barbara and coordinated through the USGS Biological Resources Division UC Santa Barbara GAP Analysis (1996), updated during the NECO planning effort (see Appendix H of the NECO Management Plan (BLM CDD 2002)
** Includes only those existing projects for which GIS-based spatial data was available at the time of the analysis; see Biological Resources Table 9
*** Includes only BLM Renewables that had submitted a Plan of Development (POD) at the time of the analysis and those additional future projects listed in Biological Resources Table 9
**** Numbers reflect actual ground-based and field verified delineation of habitats (TTEC 2010-l; GSEP 2009a). Dune acreage (1ac.) reflects adjustment for removal of the 41.4 acre "toe" (TTEC 2010o).

Cumulative Effects: Golden Eagle Foraging Habitat+ 140-mile Radius Area + Different vegetation mapping dataset than NECO area analyses; used California GAP Analysis dataset and National GAP program data for Arizona				
Foraging Habitat+ (by plant community)	**Total Plant Communities+ in 140-mile Radius of Project**	**Impacts to Foraging Habitat from Existing ++Projects** (Percent of all community type in 140-mile radius)	**Impacts to Foraging Habitat from Foreseeable Future+++ Projects** (Percent of all community type in 140-mile radius)	**Contribution of GSEP to future cumulative impacts** (Percent of total impacts from future projects) [1]
Mojavean & Sonoran Desert Scrubs	19,813,486 acres	n/a	1,106,998 acres 5.6%	1,773 acres++++ 0.2%
Great Basin Desert Scrubs	263,209 acres	n/a	7,419 acres 2.8%	0 acres
Alkali Desert Sink Scrub	374,785 acres	n/a	33,728 acres 9.0%	0 acres+++++
Desert Succulent Scrubs++++ (desert scrubs with cacti/succulents)	3,497,649 acres	n/a	68,671 acres 2.0%	0 acres
Chaparral	2,497,868 acres	n/a	21,940 acres 0.9%	0 acres
Riversidean Sage Scrub	368,827 acres	n/a	0 acres	0 acres
Desert Riparian (woodlands)	234,632 acres	n/a	0 acres	16 acres++++ 100%
Desert Wash (unvegetated and wash scrubs)	858,560 acres	n/a	57,723 acres 6.7%	74 acres++++ 0.1%

Playa/Lacustrine	282,667acres	n/a	0 acres	37 acres 100%
Agriculture	1,604,793 acres	n/a	1,387 acres 0.1%	0 acres
Pinyon-Juniper Woodland	859,050 acres	n/a	164 acres 0.02%	0 acres
Montane Conifer	719,915 acres	n/a	9,663 acres 1.3%	0 acres
Montane Riparian Woodland	8,106 acres	n/a	0 acres	0 acres
Oak Woodland	114,388 acres	n/a	148 acres 0.1%	0 acres
Urban	1,307,902 acres	n/a	48 acres 0.004%	0 acres
Riverine and Lacustrine (open water)	105,806 acres	n/a	561 acres 0.5%	0 acres
Grassland and Mixed Shrub-Grass	584,229 acres	n/a	1,368 acres 0.2%	0 acres
Wet Meadow	26,568 acres	n/a	0 acres	0 acres
Emergent Marsh (Saline and Freshwater)	9,579 acres	n/a	9.8 acres 0.1%	0 acres
Palm Oasis	3,029 acres	n/a	0 acres	0 acres
Barren (Rock outcrop)	219,155 acres	n/a	337 acres 0.1%	0 acres

*Based on the BLM NECO Plant Communities dataset (BLM CDD 2002) conducted by the Biogeography Lab at the University of California, Santa Barbara and coordinated through the USGS Biological Resources Division UC Santa Barbara GAP Analysis (1996), updated during the NECO planning effort (see Appendix H of the NECO Management Plan (BLM CDD 2002)

** Includes only those existing projects between Desert Center and the Colorado River for which GIS-based spatial data was available at the time of the analysis; see **Biological Resources Table 9**

*** Includes only BLM Renewables that had submitted a Plan of Development (POD) at the time of the analysis and those additional future projects listed in **Biological Resources Table 9** (February 2010)

**** Includes the indirect effects to dune habitat (33 ac.) from the proposed SCE Colorado Substation, and 4 acres direct impacts from the linear facilities of the Project. Substation impacts will be mitigated under the authority of the CPUC.

+Based on the California GAP Analysis conducted by the Biogeography Lab at the University of California, Santa Barbara and coordinated through the USGS Biological Resources Division UC Santa Barbara GAP Analysis (1996). Arizona vegetation data based on National GAP Program data. Nevada GAP data not included in Table 15

++Existing impacts dataset not compiled for this analysis

+++Based only on future (proposed) renewable energy projects in California and Arizona; ROW obtained from BLM California and BLM Arizona; includes only projects with a Plan of Development (POD) at the time of the analysis (May 2010). BLM Nevada GIS-based data not available at time of analysis (May 2010)

++++Includes Joshua Tree Woodland, Mojave Yucca Woodland, and various mixed shrub and cacti communities

+++++Numbers reflect the ground-based delineation of habitats and state waters; dune acreage (1ac.) reflects adjustment for removal of the 41.4 acre “toe” (TTEC 2010o).

The Project's contribution to the cumulative loss of foraging habitat would be less than cumulatively considerable with the implementation of staff's proposed conditions of certification to address both habitat loss and the indirect effects described above. As specified in staff's proposed Condition of Certification **BIO-12**, the Applicant shall acquire and protect 1,864 acres of Sonoran creosote bush scrub within the Colorado Desert Recovery Unit (for desert tortoise), 190 acres of Mojave fringe-toed lizard habitat (**BIO-20**), and 132 acres of ephemeral desert washes within or adjacent to the Chuckwalla- Ford Dry Lake watershed (**BIO-22**). While acquisition does not address the net loss of foraging habitat in the immediate future, it is expected to prevent future losses of habitat by placing a permanent conservation easement and deed restrictions on private lands that could otherwise be converted for urban or agricultural uses, or energy development. The Project's contribution to the indirect cumulative effects to foraging habitat from the spread of invasive non-native plants would be less than considerable after implementation of Condition of Certification **BIO-14** (Weed Management Plan.

There may be cumulative impacts after mitigation is implemented by this Project, but the mitigation implemented by the proposed Project reduces its contribution to cumulative impacts to a level that is is not cumulatively considerable. These residual cumulative effects from all future projects—after mitigation to less than significant—could be addressed through a regional and coordinated planning effort aimed at preserving and enhancing large, intact expanses of foraging habitat, limiting development near nest sites, developing guidelines for minimizing collisions and electrocutions, and other programmatic efforts.

American Badger and Desert Kit Fox

The geographic scope for the cumulative analysis for these two species encompasses the entire NECO planning area. Using the NECO landforms dataset, the extent of suitable habitat depicted in the NECO plan was refined somewhat by excluding the following landforms: playas, badlands (steep erosional features), lava flows, and mountains. The remaining habitat was then overlaid by existing and foreseeable future projects to quantify cumulative impacts to badger and kit fox habitat (**Biological Resources Table 15** and **Biological Resources Figure 12**).

This quantitative analysis of habitat loss does not address use of the Project site and adjacent habitat for both foraging and movement pathways. Other reasonably anticipated cumulative effects not quantified here include habitat fragmentation and the diminished habitat values of remaining habitat from increased noise; disruption from night lighting; exotic plant invasion (which fuels wildfires and alters fire regimes); dust and air pollution; an increase in predators; agriculture and urban development, and; the consequences of human intrusion into previously undisturbed habitats (such as hunting, use of rodenticides and other poisons, road kills, trapping, and human disturbance).

An estimated 339,704 acres of American badger and desert kit fox habitat would be displaced by the proposed future projects within the NECO planning area, representing approximately 7 percent of the total habitat mapped in NECO (based on the simple habitat model described above). Staff considers this a cumulatively considerable contribution to a significant cumulative effect, particularly when viewed in combination with the anticipated indirect effects of habitat fragmentation and degradation to remaining

habitat and other threats described above. The Project contributes—at least incrementally—to a significant cumulative effect. Staff's proposed Condition of Certification **BIO-12** requiring acquisition of 1,864 acres of Sonoran creosote bush scrub within the Colorado Desert Recovery Unit (for desert tortoise), 190 acres of Mojave fringe-toed lizard habitat **(BIO-20)** within Chuckwalla Valley, and 132 acres of desert washes **(BIO-22)** within the immediate or adjacent watershed, would also benefit American badger and desert kit fox. With the implementation of habitat acquisition (**BIO-12, 20, and 22**), and the avoidance and minimization measures for American badger and desert kit fox contained in **BIO-17**, the Project's contribution to the combined effects of the Project and the past, present, and probable future impacts would be less than cumulatively considerable. While acquisition does not replace the habitat, it prevents future losses of habitat through conservation easements and deed restrictions on private lands that could otherwise be converted for urban or agricultural uses, or energy development. A programmatic and multi-agency approach to address the cumulative effects of all projects, after implementation of the Project-specific mitigation measures, is currently in progress.

Western Burrowing Owl

Using the NECO landforms dataset, the extent of suitable habitat for burrowing owl in the NECO planning area was refined by excluding the following landforms: dunes, mountains, playas, badlands (steep erosional features) and lava flows. The results were then overlaid by existing and foreseeable future projects to quantify cumulative impacts to burrowing owl habitat **(Biological Resources Table 15** and **Biological Resources Figure 13)**.

The GIS-based analysis of habitat loss does not reflect the significant cumulative effects of habitat fragmentation and its impacts on population viability, increased road kills, increased risk of fire from weed invasion and ignition sources, and the degradation of remaining habitat function and values. Staff considers the combined effect of all proposed future projects on habitat loss (339,704 acres or 7.1 percent loss of all habitat in the NECO planning area), and the indirect effects described above, to be a significant cumulative effect to which the Project contributes incrementally. However, the Project's contribution to cumulative effects would be reduced to a level less than considerable through implementation of the following conditions of certification: acquisition of 1,864 acres of Sonoran creosote bush scrub within the Colorado Desert Recovery Unit for desert tortoise (**BIO-12)**, 190 acres of Mojave fringe-toed lizard habitat **(BIO-20)** within Chuckwalla Valley, and 132 acres of desert washes **(BIO-22)** within the immediate or adjacent watershed. This proposed habitat replacement would also be expected to benefit burrowing owl by preventing future losses of habitat that is currently zoned for energy or other development. The Raven Management Plan **(BIO-13)** and Weed Management Plan **(BIO-14)** are also expected to minimize the Project's contribution to the indirect effects of increased avian predators and the spread of invasive plants, and **BIO-18** contains measures specifically for avoiding and minimizing impacts to burrowing owl.

Le Conte's Thrasher

The scope of this analysis includes the entire NECO planning area and utilized the NECO Le Conte's thrasher habitat dataset to quantify cumulative effects of habitat loss from existing and foreseeable

future projects (**Biological Resources Table 15** and **Biological Resources Figure 14)**. The NECO habitat model for this species is applicable to several other special-status bird species that inhabit desert dry wash woodland and adjacent upland habitat, including loggerhead shrike, phainopepla, ash-throated flycatcher, and northern mockingbird. The cumulative impacts to migratory birds not addressed in the quantitative analysis of habitat loss include habitat fragmentation, and degradation, and impacts to riparian and groundwater-dependent vegetation and riparian vegetation from water overdrafts and diversions.

The combined effect of the Project and the existing and probable future impacts are substantial; 300,139 acres of desert scrubs and desert wash woodland would be lost to future renewable energy development within the NECO planning area alone; this represents 8.1 percent of all potential habitat in NECO. Staff believes that the Project's contribution to the cumulative loss of habitat would be less than cumulatively considerable through implementation of proposed Condition of Certification **BIO-22**, which requires acquisition and enhancement of desert dry wash woodland and unvegetated ephemeral washes within the same watershed as the Genesis Project. Condition of Certification **BIO-12** requires compensatory habitat acquisition for desert tortoise habitat, which is also expected to benefit Le Conte's thrasher, and **BIO-15** requires pre-construction nesting bird surveys. Proposed Conditions of Certification **BIO-25** and **BIO-26** would require monitoring for impacts to groundwater-dependent vegetation within 10 miles of the Project pumping well and require remedial action if adverse effects are detected. The Project's contributions to the cumulative effects to Le Conte's thrasher from the indirect effects described above would be less than cumulatively considerable with the implementation of these additional mitigation measures.

Burro Deer

Burro deer is a subspecies of mule deer found in the Colorado Desert of Southern California, primarily along the Colorado River and in desert dry wash woodland communities away from the river. During the hot summers, water is critical, and deer concentrate along the Colorado River where water developments have been installed and where the microphyll woodland is dense and provides good forage and cover. Impacts are most important within 1/4 mile of natural or artificial watering sites; these sites are depicted in the bighorn sheep Wildlife Habitat Management Area map, **Biological Resources Figure 7a,** and are based on the NECO dataset for natural and artificial water sources.

Biological Resources Table 15 summarizes the anticipated cumulative effects to burro deer range; these effects are also illustrated in **Biological Resources Figure 15.** Using the NECO dataset for burro deer range, approximately 151 acres of the total 47,640 acres (0.3 percent) of burro deer range in the NECPO plan area would be displaced by the Genesis Project. Proposed future projects would cumulatively affect 7.5 percent of the burro deer range, as the range is documented in NECO (BLM CDD 2002). Staff's proposed Condition of Certification **BIO-22** for acquisition of 132 acres of desert washes within or adjacent to the Chuckwalla-Ford Dry Lake watershed, and Condition of Certification **BIO-12** for acquisition of 1,864 acres of Sonoran creosote bush scrub would reduce the Project's contributions to the cumulative loss of burro deer range to a level less than cumulatively considerable. The Project's

contribution to indirect cumulative effects would be minimized through **BIO-14** (detailed Weed Management Plan), **BIO-24** (revegetation of temporarily disturbed areas), and **BIO-25** and **26** (monitoring for impacts to groundwater-dependent vegetation within 10 miles of the Project pumping well and remedial action if adverse effects are detected).

Burro deer movement between the eastern portion of Ford Dry Lake and the Palen Wash ironwood forest, which is depicted in **Biological Resources Figure 15** as burro deer range, would be impacted by the proposed Project. This is not expected to be a significant impact because the importance of this linkage is already compromised by OHV and other human disturbance from the Wiley Well Rest Stop, and because the western portion of the ROW will be returned to BLM, thus allowing continued movement upslope into the Palen Wash and Palen Mountain Range from the west.

The cumulative effects of all future projects on wildlife movement and connectivity are discussed below and addressed in part through a proposed coordinated, multi-agency approach to preserving important linkages in the Chuckwalla Valley outlined in **Biological Resources Appendix B**.

Couch's Spadefoot Toad

The NECO Couch's spadefoot toad range dataset was used in this analysis to quantify cumulative impacts to potential habitat (**Biological Resources Table 15** and **Biological Resources Figure 16**). Based on the dataset's depiction of the range the GIS analysis indicates that the cumulative effects of all proposed future projects would affect 115,218 acres of Couch's spadefoot toad range in California, or 7.4 percent of its total range in California. Staff considers this a significant cumulative effect to which the Project would contribute to at least incrementally. The Project's contribution to this significant cumulative effect would be minimized to a level less than cumulatively considerable through implementation of staff's proposed Condition of Certification **BIO-27**, which specifies avoidance and minimizations measures for the known breeding pond south of I-10 along the interconnecting transmission line. The Project's contribution to an increase in invasive non-native plants and avian predators would be minimized through staff's proposed conditions of certification **BIO-13** (Raven Management Plan) and **BIO-14** (Weed Management Plan).

Wildlife Movement and Connectivity

Connectivity refers to the degree to which organisms can move among habitat patches and populations. Individuals must be able to move between patches to meet their resource needs, and in the long term populations must be connected to allow for dispersion, gene flow, and re-colonization. This discussion includes a qualitative discussion of cumulative effects to wildlife movement and connectivity. The probable desert tortoise linkages between the Chuckwalla DWMA and Chemehuevi DWMA are depicted spatially in **Biological Resources Figure 6** "Desert Tortoise DWMAs & Connectivity Corridors", displayed on a base map of USGS desert tortoise habitat modeling (Nussear et al. 2009).

Biological Resources Table 13 and **Figures 7-a** and **7-b** summarize cumulative effects to bighorn sheep WHMAs and connectivity corridors as depicted in the NECO Plan (BLM CDD 2002). **Biological Resources Table 17** and **Biological Resources Figure 17** and **18** look at the cumulative effects to plant communities and landforms within three Multi-Species WHMAs in the Project vicinity: Big Maria Mountains WHMA, Palen-Ford WHMA, and the DWMA Continuity WHMA, which provides connectivity between the Chuckwalla DWMA/ACEC south of I-10 and the Palen-Ford WHMA north of I-10. This analysis utilized the NECO Plant Communities and Landforms datasets to describe the type of habitat affected within each separate WHMA.

Two other solar projects are currently proposed within the Palen-Ford WHMA: Palen Solar Power Project and Chuckwalla Solar One. **Biological Resources Table 17** and **Figures 17** and **18** indicates the Genesis Project is an important contributor to the loss of Sonoran creosote bush scrub (29 percent) and playa (37 acres, including sand drifts at the playa margins) within the Palen-Ford WHMA. The actual ground-delineated and field-verified impact for desert dry wash woodland is 16 acres (see also **Biological Resources Table 5**); the NECO GIS datasets are based on aerial photo interpretation and as such are considered less reliable than verified ground survey results.

The Palen-Ford WHMA, and all other WHMAs within the NECO planning area, was specifically designated to form the NECO Multi-species Conservation Zone, along with the wilderness areas, DWMAs, ACECs, Joshua Tree National Park, and the military bases, to protect the species considered in NECO. The Palen-Ford WHMA was specifically established to protect the dunes and playas (NECO sensitive habitat types) and the Mojave fringe-toed lizard. The Project is responsible for 100% of the future impacts to playa and sand drifts over playa in the Palen-Ford WHMA.

The Genesis solar fields are located largely out of the dune system (after removal of the 41.4 acre “toe” (TTEC 2010o), and the linears moved slightly to avoid dune habitat occupied by Mojave fringe-toed lizard. The Project will not substantially impair the connectivity for those species for which the Palen-Ford WHMA was designated. The contribution of the Project to dune habitat loss does not reflect the indirect downwind effect of the solar field’s obstruction of the wind sand transport corridor. However, re-routing washes from the Palen Mountains around the Genesis site would not represent a significant disruption to wildlife movement as the washes lead only to Ford Dry Lake and I-10; an area that is also disturbed by human and unauthorized vehicle use around the Wiley Well Rest Area.

The combined effect of the Project and all existing and probable future projects in NECO on connectivity within Chuckwalla Valley and the Palen-Ford WHMA is significant and thus the Project will contribute, at least incrementally, to a cumulatively considerable effect. The requirement in **BIO-20** and **BIO-22** to acquire habitat within Chuckwalla Valley and within within the identified connectivity linkages would reduce the Project’s contribution to cumulative effects to connectivity in Chuckwalla Valley and the Palen-Ford WHMA to a level less than cumulatively considerable.

Biological Resources Table 17
Cumulative Effects: Wildlife Habitat Management Areas and Plant Communities

Palen-Ford WHMA				
Plant Community* within WHMA	**Total Plant Communities* in WHMA**	**Impacts to Habitat from Existing** Projects** (Percent of all Community type in WHMA)	**Impacts to Habitat from Foreseeable Future*** Projects** (Percent of all Community type in WHMA)	**Contribution of GSEP to future cumulative impacts** (Percent of total impacts to WHMA from Future projects)[1]
Sonoran Creosote Scrub	39,366 acres	2,087 acres 5.3%	5,488 acres 14%	1,587 acres 29%
Desert Dry Wash Woodland****	13,104 acres	932 acres 7.1%	202 acres 1.5%	123 acres****** 61% (16 acres/7.9%)
Sand Dunes	17,690 acres	0 acres	44 acres 0.25%	17 acres****** 39% (1 acres/63.6%)
Chenopod Scrub	381 acres	62 acres 16.3%	0 acres	0 acres****** (38 acres/100%)
Playas	13,696 acres	950 acres 6.9%	0 acres	0 acres****** (37 acres)
Agriculture, Urban	152 acres	146 acres N/A	0 acres	0 acres

Big Maria Mountains WHMA				
Plant Community* within WHMA	**Total Plant Communities* in WHMA**	**Impacts to Habitat from Existing** Projects** (Percent of all Community type in WHMA)	**Impacts to Habitat from Foreseeable Future*** Projects** (Percent of all Community type in WHMA)	**Contribution of GSEP to future cumulative impacts** (Percent of total impacts to WHMA from Future projects)
Sonoran Creosote Scrub	24,436 acres	317 acres 1.3%	3,105 acres 12.7%	0 acres
Desert Dry Wash Woodland****	9,308 acres	507 acres 5.4%	1,008 acres 10.8%	0 acres
Agriculture, Urban	50 acres	n/a	0 acres	0 acres

DWMA Continuity WHMA				
Plant Community* within WHMA	**Total Plant Communities* in WHMA**	**Impacts to Habitat from Existing** Projects** (Percent of all Community type in WHMA)	**Impacts to Habitat from Foreseeable Future*** Projects** (Percent of all Community type in WHMA)	**Contribution of GSEP to future cumulative impacts** (Percent of total impacts to WHMA from Future projects)
Sonoran Creosote Scrub	12,804 acres	856 acres 6.7%	988 acres 7.7%	0 acres
Desert Dry Wash Woodland	275 acres	2.9 acres 1.1%	1.4 acres 0.5%	0 acres

*Based on the BLM NECO Plant Communities dataset (BLM CDD 2002), updated from the California Gap Analysis Project, conducted by the Biogeography Lab at the University of California, Santa Barbara and coordinated through the USGS Biological Resources Division UC Santa Barbara GAP Analysis (1996).
** Includes only those existing projects for which GIS-based spatial data was available at the time of the analysis; see Biological Resources Table 9

*** Includes only BLM Renewables that had submitted a Plan of Development (POD) at the time of the analysis and those additional future projects listed in Biological Resources Table 9
**** Acreages shown reflect the ground-based and field-verified delineation of habitats (TTEC 2010-l); dune acreage (1 ac) adjusted to reflect removal of the 41.4 acre "toe" (TTEC 2010o).

Staff believes that the Project's contribution to desert tortoise connectivity is not cumulatively considerable; staff has identified the area west of Desert Center and HWY 177 as being the most valuable area for tortoise connectivity based on existing habitat conditions, tortoise densities, and the USGS habitat modeling for the Project vicinity (see **Biological Resources Figure 6**). Additionally, the dunes and playas form a north-to-south barrier to tortoise movement. The Project is also located outside the DWMA Connectivity WHMA. Although the WHMA was not established to specifically serve desert tortoise, the Project does contribute to the loss of habitat (Sonoran creosote bush scrub) within the WHMA. Proposed Condition of Certification **BIO-12** would require acquisition and protection of 1,864 acres of Sonoran creosote bush scrub within the Chuckwalla Desert Tortoise Critical Habitat Unit. Mitigation for cumulative effects to connectivity could be enhanced if desert tortoise acquisitions were targeted for areas that would enhance wildlife connectivity within the same WHMA and corridor, as described in **Biological Resources Appendix B**. Kit foxes, coyotes, and badgers are not NECO species and were not the reason for the establishment of the WHMAs; however, the acquisition of lands within the connectivity linkages described in **Appendix B** would also benefit kit fox, coyote, badger, and burro deer.

Natural Communities

Two cumulative effects analyses of different geographic scope were conducted for natural communities: 1) the entire NECO planning area (**Biological Resources Figure 19-a),** and 2) Chuckwalla Valley (**Biological Resources Figure 19-b)**. The NECO plant communities dataset was used for both analyses; it is based on the California Gap Analysis Project (Davis et al. 1998) but the accuracy and resolution of the GAP mapping was improved for the NECO plant communities dataset (BLM CDD; Appendix H) using aerial photos and helicopter surveys. However, such analyses are inferior (in accuracy) to ground-based and field-verified delineation of habitats; consequently, the Project's contribution to cumulative effects reflects the actual ground-based results. **Biological Resources Table 18** quantifies the cumulative effects to plant communities stratified by community type. "Mojave creosote scrub" refers to the creosote bush-dominant desert scrubs that occur within the Mojave Desert region of the California Desert geographic subdivision (Hickman 1993). The transition to Sonoran Desert is mapped at the Bristol Mountains near the Twenty-Nine Palms Marine Corps Base and extends east and south through the NECO planning area, and encompasses the Project area.

Significant cumulative effects to plant communities from probable future projects (before mitigation) across the NECO planning area are seen in many community types: 228,363 acres of Sonoran creosote scrub (5.9 percent of the total habitat type in NECO), 43,320 acres of Mojave creosote bush scrub (5.4 percent), 48,167 acres of desert dry wash woodland (7.1 percent), and 18,634 acres of playa (21.1 percent). Project-specific compensatory mitigation measures—similar to those recommended in this Revised Staff assessment—are likely to be imposed for the future renewable energy projects; however, the combined impacts to habitat reflected in **Biological Resources Table 18** do not address the

Biological Resources Table 18
Cumulative Effects: Natural Communities

Natural Communities – NECO				
Plant Community*	**Total Plant Communities* in NECO**	**Impacts to Habitat from Existing** Projects** (Percent of all Community type in NECO)	**Impacts to Habitat from Foreseeable Future*** Projects** (Percent of all Community type in NECO**)**	**Contribution of GSEP to future cumulative impacts** (Percent of total impacts from Future projects)[1]
Mojave Creosote Scrub	805,832 acres	6,233 acres 0.8%	43,320 acres 5.4%	0 acres
Sonoran Creosote Scrub	3,829,999 acres	22,815 acres 0.6%	228,363 acres 5.9%	1,773 acres**** 0.8%
Desert Dry Wash Woodland/Microphyll Woodland****	682,027 acres	8,457 acres 1.2%	48,167 acres 7.1%	16 acres**** 0.03%
Playa/Dry Lake****** (including sand drifts over playa margins)	88,110 acres	961 acres 1.1%	18,634 acres 21.1%	37 acres**** 0.2%
Sand Dunes******	62,140 acres	14 acres 0.02%	175 acres 0.3%	1 acre**** 0.6%
Chenopod Scrub	2,113 acres	480 acres 22.7%	0 acres	0 acres
Agriculture, Developed	94,187 acres	N/A	1,017 acres 1.1%	0 acres
Pinyon-Juniper Woodland	1,928 acres	0 acres	0 acres	0 acres
Natural Communities – Chuckwalla Valley				
Plant Community*	**Total Plant Communities* in NECO**	**Impacts to Habitat from Existing** Projects** (Percent of all Community type in NECO)	**Impacts to Habitat from Foreseeable Future*** Projects** (Percent of all Community type in NECO**)**	**Contribution of GSEP to future cumulative impacts** (Percent of total impacts from Future projects)[1]
Sonoran Creosote Scrub	403,760 acres	6,657 acres 1.6%	17,306 acres 4.3%	1,773acres**** 10.2%
Desert Dry Wash Woodland/Microphyll Woodland****	148,856	4,645 acres 3.1%	10,950 acres 7.4%	16 acres**** 0.03%
Playa/Dry Lake******	13,696 acres	950 acres 6.9%	0 acres	37 acres**** 100%
Sand Dunes******	18,705 acres	0 acres	168 acres 0.9%	1 acre**** 0.6%
Chenopod Scrub	474 acres	72 acres 15.2%	0 acres	0 acres
Agriculture, Developed	9,345 acres	N/A	568 acres 6.1%	0 acres

*Based on the BLM NECO Plant Communities dataset (BLM CDD 2002) conducted by the Biogeography Lab at the University of California, Santa Barbara and coordinated through the USGS Biological Resources Division UC Santa Barbara GAP Analysis (1996), updated during the NECO planning effort (see Appendix H of the NECO (BLM and CDD 2002)
** Includes only those existing projects between Desert Center and the Colorado River for which GIS-based spatial data was available at the time of the analysis; see Biological Resources Table 9
*** Includes only BLM Renewables that had submitted a Plan of Development (POD) at the time of the analysis and those additional future projects listed in Biological Resources Table 9
****Acreages reflect the ground-based and field-verified delineation of habitats, including the 1acre adjustment for removal of the 41.4 acre "toe" (TTEC 2010o).

significant cumulative indirect effects to remaining habitat that can be expected from the past, present, and future projects: fragmentation and edge effects; alteration of the surface drainage patterns and fluvial and aeolian sand transport systems that maintain dune and dry playa habitats (which in turn support many special-status plant species); groundwater pumping impacts to mesquite groves and other phreatophytes; an increase in the risk of fire, and the introduction and spread of noxious weeds. The potential for spread of Sahara mustard is major concern because it is already infesting many areas on and adjacent to the Project and it has the potential to spread explosively if not carefully managed. Sahara mustard has been reported to be toxic to desert tortoise and other herbivores, and is an immediate threat to several special-status plant occurrences. Climate change is expected to exacerbate the effects of drought and noxious weed spread.

The combined effect of the Project and existing and future probable impacts in NECO and Chuckwalla Valley is cumulatively considerable. The Project contributes substantially to the combined effect from all probable future projects in Chuckwalla Valley to Sonoran creosote bush scrub (10.2%), and 100% of the cumulative impacts to playa and sand drifts over playa (a NECO-sensitive natural community). Sonoran creosote bush scrub is a common and widespread community in the southeastern deserts of California; however, this broad designation does not reflect the uncommon and even rare plant assemblages within the alliance of creosote bush that have been documented by the CDFG Vegetation Committee (CDFG 2003); nor does it reflect the reasonably anticipated indirect effects described above. The Project's contribution to these impacts would be minimized to a level less than cumulatively considerable with implementation of the following conditions of certification: **BIO-12** for acquisition of 1,864 acres of Sonoran creosote bush scrub; **BIO-21** for acquisition and protection of 132 acres of desert washes and desert dry wash woodland within or adjacent to the Chuckwalla-Ford Dry Lake watershed; **BIO-20** for the acquisition and protection of 190 acres of dunes or other sandy landforms within Chuckwalla Valley; **BIO-14** for weed management; **BIO-24** for revegetation of temporarily disturbed areas using locally native seed; and **BIO-25** and **BIO-26** for monitoring of groundwater-dependent vegetation and remedial action in the event of adverse effects.

Landforms

Biological Resources Table 19 reflects the cumulative impacts to landforms within the NECO planning area, stratified by landform and based on the NECO landforms dataset. Like the NECO plant communities mapping dataset, the landforms dataset was also based on aerial photo interpretation with some ground-truthing, but is less accurate than ground-based and field-verified delineations of habitat. However, the landforms dataset was in considerable alignment with the ground-based and verified habitat mapping.

Biological Resources Table 19
Cumulative Effects: Landforms/Wildlife Habitat

NECO Landform*	Total Landform* in NECO	Impacts to Habitat from Existing** Projects (Percent of all landform type in NECO)	Impacts to Habitat from Foreseeable Future*** Projects (Percent of all landform type in NECO)	Contribution of GSEP to future cumulative impacts (Percent of total impacts from Future projects) [1]
Alluvial Fans/Bajadas	2,997,468 acres	42,619 acres 1.4%	217,761 acres 7.3%	1,809 acres 0.8%
Sand Dunes	150,136 acres	3,755 acres 2.5% of total	17,027 acres 11.3% of total	1 acre**** 0.2%
Pediments	139,282 acres	1,715 acres 1.2% of total	1,263 acres 0.9% of total	0 acres
Plains	408,453 acres	75,687 acres 18.5% of total	48,117 acres 11.8% of total	0 acres
Badlands	79,141 acres	40 acres 0.05% of total	1,203 acres 1.5% of total	0 acres
Lava Flows	180 acres	0 acres	0 acres	0 acres
Riverwashes	137,265 acres	1,475 acres 0.1% of total	6,896 acres 5.0% of total	74 acres**** 1.1%
Dry Playas	62,106 acres	1,348 acres 2.2% of total	9,423 acres 15.2% of total	37 acres**** 0.4%
Mesas	6,843 acres	2 acres 0.03%	0 acres	0 acres
Tilted Plateaus	8,979 acres	0.1 acres 0.001%	3,762 acres 42.0% of total	0 acres
Mountains	609,023 acres	1,468 acres 0.2% of total	8,682 acres 1.4% of total	0 acres

*Based on the NECO Landforms dataset (BLM CDD 2002); acreages for dunes and playa from this dataset differ from the acreages based on an analysis using the NECO plant communities dataset, due to differences in methodology, minimum mapping polygons, etc. Actual project-specific field survey data concluded that the project would directly affect 1 acres of stabilized and partially stabilized dunes.
** Includes only those existing projects between Desert Center and the Colorado River for which GIS-based spatial data was available at the time of the analysis; see T Biological Resources Table 9
*** Includes only BLM Renewables that had submitted a Plan of Development (POD) at the time of the analysis and those additional future projects listed in T Biological Resources Table 9
****Acreages reflect the ground-based and field-verified delineation of habitats, including the 1acre adjustment for removal of the 41.4 acre "toe" (TTEC 2010o).

As illustrated below, and illustrated spatially in **Biological Resources Figure 20,** the cumulative effects of all future (proposed) projects to dunes, playas, and plains are significant. Dunes and sandy plains also provide habitat for several rare plants and animals in the Chuckwalla region, most notably Mojave fringe-toed lizards, Harwood's milk-vetch, Harwood's eriastrum, Abram's spurge, jack-ass clover, and a potentially new species of saltbush recently discovered on the margins of Palen Dry Lake (Andre pers.

comm.). The Project contributes—at least incrementally—to these significant cumulative effects. The Project also contributes to cumulatively considerable indirect effects to these NECO- and CNDDB-sensitive habitats, including interrupted aeolian (wind-deposited) and fluvial (water-deposited) sand transport systems, both of which contribute to the maintenance and sustainability of dune habitats; groundwater pumping (lowering groundwater tables has also been demonstrated to influence dune morphology [Langford et al 2009]); habitat fragmentation and degradation from roads and increased vehicle and human disturbance; an increase in avian predators of dune species from the increase in perching sites; and the spread of invasive non-native plants such as Sahara mustard, which is believed to be toxic to desert tortoise and other herbivores and can spread explosively in response to disturbance.

The Project's contribution to significant cumulative effects to sandy plains, sand drifts over playa, and dunes would be minimized to a level less than cumulatively considerable through implementation of staff's proposed Condition of Certification **BIO-20.** This requires acquisition of 190 combined acres of dunes, playa and sandy plains within Chuckwalla Valley. The Project's contribution to the cumulative loss of alluvial fans and bajadas is minimized through **BIO-12**, which requires protection of 1,864 acres of Sonoran creosote bush scrub, which inhabits these landforms that occur between the valley floor and the base of the adjacent mountains. The Project's contribution to the cumulative loss of desert washes will be addressed through **BIO-22**; 132 acres of desert washes and desert dry wash woodland would be protected within the Ford watershed or adjoining watersheds.

The Project's contribution to cumulatively significant indirect effects would be minimized to a level less than cumulatively considerable through implementation of Conditions of Certification **BIO-13** (Raven Management Plan), **BIO-14** (Weed Management Plan), **BIO-24** (revegetation of temporarily disturbed areas using locally native seed), and **BIO-25** and **BIO-26** (monitoring of groundwater-dependent vegetation and remedial action in the event of adverse effects).

Desert Dry Wash Woodland

Biological Resources Table 20 highlights the cumulative effects of existing and future projects to desert dry wash woodland within the immediate watershed encompassing the Project (**Biological Resources Figure 21**). The NECO plant communities dataset was used for this analysis, which is based largely on aerial photo interpretation. The Project's field-verified, ground-based delineation (TTEC 2010l) documented 16 acres of desert dry wash woodland (a microphyll woodland) along jurisdictional state waters features in the project footprint that would be directly impacted and reflects the field-verified, ground-based delineation of waters of the state. The NECO dataset and GIS-based analysis showed a 165-acre area of desert dry wash woodland. The differences are presumably based on different methodologies (remote versus ground-based delineation) and different criteria for 'membership' in the microphyll woodland category; however, a large polygon of desert dry wash woodland that occurs just outside of the Project footprint along the Palen Wash may also account for the difference in acreage between the field-based delineation and the mapping of woodland in the NECO plant communities dataset, assuming the aerial photos were taken at different times and at different angles. Staff relies on the field-verified and ground-based delineation of habitats. The terms 'desert dry wash woodland' and 'microphyll woodland' are used interchangeably by Holland (1986) Barbour & Keeler-Wolf (2007) and in practice by BLM.

Biological Resources Table 20
Cumulative Effects: Desert Dry Wash Woodland

Desert Dry Wash Woodland – Chuckwalla Valley				
Plant Community*	**Total Plant Communities* in Chuckwalla Valley**	**Impacts to Habitat from Existing** Projects** (Percent of all Community type in **Chuckwalla Valley**)	**Impacts to Habitat from Foreseeable Future*** Projects** (Percent of all Community type in **Chuckwalla Valley**)	**Contribution of GSEP to future cumulative impacts** (Percent of total impacts from Future projects)
Desert Dry Wash Woodland/Microphyll Woodland	148,856 acres	4,645 acres 3.1%	10,950 acres 7.4%	16 acres**** 0.15%
Desert Dry Wash Woodland – NECO				
Plant Community*	**Total Plant Communities* in NECO**	**Impacts to Habitat from Existing** Projects** (Percent of all Community type in **NECO)**	**Impacts to Habitat from Foreseeable Future*** Projects** (Percent of all Community type in **NECO**)	**Contribution of GSEP to future cumulative impacts** (Percent of total impacts from Future projects)
Desert Dry Wash Woodland/Microphyll Woodland	682,027 acres	8,457 acres 1.2%	48,167 acres 7.1%	16 acres**** 0.03%

*Based on the BLM NECO Plant Communities dataset (BLM CDD 2002) conducted by the Biogeography Lab at the University of California, Santa Barbara and coordinated through the USGS Biological Resources Division UC Santa Barbara GAP Analysis (Davis et al. 1998), updated during the NECO planning effort (see Appendix H of the NECO (BLM- CDD 2002).
** Includes only those existing projects for which GIS-based spatial data was available at the time of the analysis; see Biological Resources Table 9.
*** Includes only BLM Renewables that had submitted a Plan of Development at the time of the analysis.
****Acreages reflect the ground-based and field-verified delineation of habitats, including the 1acre adjustment for removal of the 41.4 acre "toe" (TTEC 2010o).

According to CEQA guidelines, seemingly minor impacts can be significant if they affect an extremely rare or limited resource, and the cumulative impact may be substantial. Desert dry wash woodland is a sensitive natural community recognized under many LORS and area plans. Because it has a limited distribution (relative to common and widespread communities such as Sonoran creosote bush scrub) and carries an ecological importance that is disproportionate to its limited extent, staff considers the combined loss of approximately 7 percent of desert dry wash woodland from future impacts to be a significant cumulative effect—an effect to which the Project contributes at least incrementally. Desert dry wash woodland and other wash-dependent habitat that occurs within the stream environment is regulated under Section 1600 of the California Fish and Game Code. These habitats are also recognized as sensitive communities in the NECO plan (BLM CDD 2002) and CNDDB (CDFG 2003).

This GIS analysis of direct habitat loss does not reflect the equally significant indirect effects that could be reasonably expected to result from all or most of the proposed future projects, including the Genesis Project: interrupted geomorphic processes downstream of the stream diversions and the loss of sediments critical to many rare plants; diverted stream flows and deprived stream reaches; fragmentation of the remaining habitat and diminished habitat function and value for wildlife; and

invasion by tamarisk (a highly invasive noxious weed that displaces native riparian vegetation and depletes shallow groundwater). Miles of standing dead ironwood trees north of I-10 in the Corn Springs Area are a testament to the effects of channel diversions—even small channels—on desert riparian trees.

The Project's contribution to cumulatively significant desert dry wash woodland impacts would be minimized to a level less than cumulatively considerable through a variety of measures. Condition of Certification **BIO-22** specifies acquisition and enhancement of 48 acres of desert dry wash woodland (16 acres mitigated at a 3:1 ratio) within or adjacent to the Chuckwalla-Ford Dry Lake watershed. The Weed Management Plan (**BIO-14**) would include tamarisk as a target for management, and **BIO-19**, Section A (special-status plant mitigation) specifies the modification of the engineered channel design to ensure that the discharge of the diverted flows is revised to align with the existing natural drainages delineated between the Project and Ford Dry Lake.

Active Dune Habitat in Chuckwalla Valley

This analysis highlights the cumulative effects of existing and proposed future projects on the most active portions of the dune ecosystem in Chuckwalla Valley: landforms mapped in the NECO landforms dataset as crescentic dunes, longitudinal dunes, and undifferentiated dunces. The Chuckwalla Valley dunes is a system that is isolated and distinct from other dune systems in NECO, and, like the Palo Verde mesa and Cadiz Valley areas, it is an area that would be disproportionately affected by proposed renewable energy projects.

Dunes provide essential habitat for a disproportionate number of special-status animals and plants. Locally these species include: Mojave fring-toed lizard; Harwood's eriastrum; Harwood's milk-vetch; jack-ass clover; Abram's spurge; several rare cryptantha species, and a potentially new species of saltbush (*Atriplex* sp. nov. J. Andre) recently discovered around the margins of Palen Dry Lake (documented) and Ford Dry Lake (reported). In nearby Coachella Valley, the dune ecosystems are home to a wide variety of rare and endemic, threatened and endangered plants and animals, including several rare dune endemic invertebrates. Dunes are also BLM NECO sensitive communities and recognized as rare natural communities in the CNDDB (CDFG 2003). As noted above, even seemingly minor impacts may be considered significant if they affect an extremely rare or limited resource.

Biological Resources Table 21 and **Biological Resources Figure 20** quantifies the cumulative effects of the existing and future projects on "active" dune formations in the NECO planning area; the extent of other less active aeolian-deposited and stream-deposited sands within the aeolian sand transport corridor are better reflected in the habitat model for Mojave fringe-toed lizard (**Biological Resources Figure 8** and **9**, and **Biological Resources Table 14**). The habitat model for Mojave fringe-toed lizard includes also sandy plains, and sand-covered alluvial fans; all or portions of these landforms appear to be located within the wind-sand transport corridor but occur in the less active outer portions beyond the more active dunes (Worley-Parsons 2010c, 2010d; Collison 2010).

Biological Resources Table 21
Cumulative Effects: Active Dune Habitat

Total Dune habitat* in Chuckwalla Valley	Impacts to Dune Habitat from Existing** Projects (Percent of all dune habitat in Chuckwalla Valley)	Impacts to Dune Habitat from Foreseeable Future*** Projects (Percent of all dune habitat in Chuckwalla Valley)	Contribution of GSEP to future cumulative impacts (Percent of total impacts from Future projects)[1]
25,463 acres	1,049 acres 4.1% of total	1,607 acres 6.3% of total	0 acres**** (1 acres/1.7%)

1 = Acreages adjusted to reflect removal of the 41.4 acre "toe" (TTEC 2010o).
*Based on the BLM NECO Landforms dataset (BLM CDD 2002) for the following values: crescentic dunes, longitudinal dunes, and undifferentiated dunes. Actual project-specific field survey data concluded that the project would directly affect 28 acres of stabilized and partially stabilized dunes. Additionally, approximately 453 acres of habitat downwind of the solar fields would be indirectly affected (**Soil & Water Appendix A**).
** Includes only those existing projects between Desert Center and the Colorado River for which GIS-based spatial data was available at the time of the analysis; see Biological Resources Table 9
*** Includes only BLM Renewables that had submitted a Plan of Development (POD) at the time of the analysis and those additional future projects listed in Biological Resources Table 9
**** Acreage shown based on NECO landforms dataset (BLM CDD 2002); Applicant's ground-based delineation of habitat shown in parentheses () below (GSEP 2009a).

The direct loss of habitat quantified in **Biological Resources Table 21** is only part of the picture of cumulative effects; staff also considers the Project's likely indirect effects, which, when combined with similar effects from other probable future projects, are severe. These include: the degradation and eventual loss of habitat from obstructions in the wind transport corridor; depriving the dunes downwind of the fine windblown sands that build and maintain the habitat and ensure its suitability for Mojave fringe-toed lizard. In the absence of regular fresh input of fine, windblown sands, the deprived dunes quickly become stabilized, vegetate, compact, and develop a surface lag of coarse sand or gravel that combine to render the habitat unsuitable for the many plants and animals that have evolved to the unique, always shifting, natural disturbance regime of the dunes. The Project contributes at least incrementally to this cumulatively significant effect. Other reasonably foreseeable indirect effects of existing and future impacts to dune habitat not reflected in this quantitative analysis include: fragmentation and degradation of remaining habitat by roads and the resulting loss of gene flow between isolated populations; unauthorized off-road vehicles increased by the construction of new roads into previously inaccessible areas, altered drainage patterns, and the spread of noxious weeds such as Russian thistle and Sahara mustard, which prematurely stabilize the dunes and make the habitat less suitable for dune-dependent rare plants and fringe-toed lizard (Barrows pers. comm; Barrows et al. 2009; Griffiths et al. 2002). Habitat values for dependent wildlife are also affected by increased predation from avian predators, which benefit from the new perching structures that the solar facilities provide. Recent research in New Mexico has confirmed that groundwater is a key feature that contributes to dune morphology; dune fields are shaped by a feedback between aeolian dynamics and groundwater chemistry (Langford et al. 2009). The combined effects of groundwater pumping may also cause a significant cumulative effect on dune habitat, an effect to which the Project contributes at least incrementally.

Biological Resources Table 21 illustrates the significant cumulative effects to active dunes expected to occur in the Chuckwalla Valley; over 1,600 acres of active dunes would be directly affected by habitat

loss alone. Please also see **Biological Resources Figure 8** and **9**, and **Biological Resources Table 15** for a summary of the Mojave fringe-toed lizard habitat model, which includes sandy plains and sand-covered alluvial fans (in addition to more active dune landforms). All or portions of these landforms are located within the wind-sand transport corridor but occur in the less active outer portions beyond the more active dunes (barchan dunes, etc.).

The combined loss of dune habitat from the Project and other probable future projects is a significant. Although the Project's contribution to the loss of habitat is less than cumulatively considerable, it also contributes to a significant-to-severe cumulative effect from all the anticipated indirect effects described above. According to CEQA guidance, in situations where the cumulative impact is severe, even small incremental impacts may be cumulatively considerable. The Project's contribution to these effects would be minimized to a level less than cumulatively considerable through implementation of the following conditions of certification: **BIO-20** for acquisition and protection of 190 acres of dunes and sand drifts over playa in Chuckwalla Valley; **BIO-13** (Raven Management Plan); **BIO-14** (Weed Management Plan); **BIO-24** (revegetation plan for temporary disturbance), and **BIO-25** and **BIO-26** for monitoring groundwater-dependent vegetation and remedial action in the event that adverse effects are detected.

SPECIAL-STATUS PLANTS

Staff's analysis of cumulative impacts to special-status plants relied on three types of analyses: 1) a quantitative GIS-based analysis of impacts to essential habitat using NECO landforms and/or natural community datasets, and the USGS National Hydrographic Dataset; 2) a careful review of the Consortium of California Herbaria (CCH 2010) to determine if there were additional documented occurrences that were not already included in CNDDB (2010) and 3) the occurrence data was loaded into an ESRI GIS-based web application that allowed staff to view all CNDDB and CCH occurrences overlain on various jurisdictional, biological, landform, utility, USGS topographic maps and aerial imagery. This allowed staff to better understand a species' threats and management vulnerabilities relative to probable future renewable energy projects throughout their range, their distance and proximity to projects or features, their peripheral status, their eco-geographic variation or diversity, potential for fragmentation and other indirect effects from nearby development, and ownership and management threats to remaining occurrences. A complete list of datasets that were utilized in this web-application is included in staff's analysis of direct impacts to plants (see Section C.2.4.2).

Many new occurrences of Harwood's milk-vetch have been found at three of the proposed solar projects in the I-10 corridor; in a good rainfall year, it appears to be fairly well distributed in the dune habitats in the Chuckwalla Valley. Of the 46 total occurrences (CNDDB and CCH); 11 are historical occurrences and of the remaining 35, no more than 10 appear to be protected in federal wilderness or state park ownership. Of the 25 occurrences not protected, 10 of these would be affected by renewable energy projects alone. It is important to note, however, that survey data from the proposed projects has not yet been incorporated into CNDDB, and the preliminary data. Staff also expects that many of these new occurrences would also be directly or indirectly affected by the Projects whose surveys resulted in their discovery.

Significant cumulative indirect effects that are likely to occur include: altered drainage patterns, disrupted wind- or fluvial-sand transport processes, fragmentation of the habitat and reduced gene flow between isolated populations, the spread of non-native plants, and an increased risk of fire. Climate change is expected to exacerbate the effects of drought, and CO_2 concentration has already been demonstrated to promote the spread of invasive plants. Global warming is expected to disproportionately affect annual species in the Sonoran Desert region, according to a recent study by the University of Arizona.

Biological Resources Table 15 and **Biological Resources Figure 23** quantifies the cumulative effects of the BLM renewable energy projects and other existing and future projects to the sandy substrates associated with this special-status plant. The NECO landforms dataset was used; landforms selected to create the simple model of potential habitat include sandy dissected fans, sandy plains, fans, dissected fans, undifferentiated plains, and undifferentiated dunes. This was based on a careful review of the landforms dataset overlaid with known occurrences of Harwood's milk-vetch from CNDDB occurrences and the Project-specific survey data. Staff expects that this model somewhat over-represents actual suitable habitat for Harwood's milk-vetch but it cannot be refined until the more detailed soil mapping for the region is available (currently in development by the Natural Resources Conservation Service). However, the mapping of habitat should not be misconstrued to conclude that all the habitat is potentially occupied; rare plants have very specific microhabitat requirements that are often poorly understood. Actual distribution within mapped habitat is often confined to small or scattered and infrequent occurrences within an already restricted range. Rare plants can also sometimes be locally abundant but highly restricted in their range. Harwood's milk-vetch habitat would be disproportionately affected (almost 9 percent of its habitat in NECO) by the push for renewable development in NECO, and the species' range in California is nearly restricted to the NECO planning area. In the Chuckwalla Valley, 12.9% of its habitat is affected by probable future projects and 8.3% has already been lost (see **Biological Resources Table 15** for Mojave fringe-toed lizard, which occupies similar sandy habitat). The loss of habitat quantified in the GIS analysis does not reflect the combined indirect effects of spread of noxious weeds, fragmentation and reduced gene flow among isolated populations from existing and future projects.

The combined loss of Harwood's milk-vetch habitat, the cumulative indirect impacts to documented occurrences, and the ownership and management threats to remaining occurrences are cumulatively significant. Although the Project's contribution to these effects may be small, it contributes, at least incrementally to a significant cumulative effect. According to CEQA guidance, in situations where the cumulative impact is substantial, even small incremental impacts may be cumulatively considerable.

Other species restricted to dune and playa habitats, washes and other sandy habitats have occurrences outside of federal wilderness or state park lands and are threatened by renewable energy development, but the cumulative effects to Harwood's milk-vetch are of particular concern due to the position of many occurrences in the immediate vicinity of probable future projects and the likelihood of significant indirect effects. These include: lobed ground cherry, Las Animas colubrina, Abram's spurge, jack-ass clover, California and glandular ditaxis. Harwood's eriastrum is somewhat more affected than these

aforementioned plant species, and dwarf germander and flat-seeded spurged have very few documented occurrences in California. They also have occurrences that are not protected in federal wilderness designation or in national or state park ownership.

Populations of most special-status plants in this region of California were considered relatively stable until recently, as the push for renewable energy development has placed many plants and occurrences at risk. The Project's contribution to these effects, and to cumulative effects to other special-status plants found in the Project area, would be less than cumulatively considerable through implementation of the following conditions of certification: **BIO-19**, which includes detailed specifications for avoidance and minimization measures, and criteria and performance standards for off-site mitigation through acquisition of rehabilitation of degraded populations; **BIO-20** for acquisition and protection of 190 acres of dunes and sand drifts over playa in the Chuckwalla Valley; **BIO-14** (Weed Management Plan), and **BIO-22** for acquisition of desert washes (at a 3:1 ratio) in the Chuckwalla-Ford Dry lake watershed.

It is likely that implementation of **BIO-19** will require compensatory mitigation, and avoidance and minimization measures for impacts to special-status plants, and the dunes, playas, sand drifts, and desert washes that support the majority of rare plants in the valleys and low-lying areas affected by renewable energy development. There may be cumulative impacts after mitigation is implemented by all projects, but due to the mitigation implemented by the Project, its contribution would be less than cumulatively considerable. The residual cumulative effects from all future projects, after mitigation could be addressed through a regional and coordinated planning effort aimed at preserving and enhancing remaining populations and their essential habitat, and restoring degraded populations.

Groundwater-Dependent Vegetation

The groundwater cumulative impact analysis (see **Soil and Water Resources**, Section C.7.4.2) indicates that groundwater extraction during construction and operation of this and other foreseeable projects would place the basin into an overdraft condition. This impact may be exacerbated by other unidentified renewable energy projects in the I-10 corridor, which has been targeted as a potential area for further renewable energy development. However, staff concluded that the amount of water that is stored in the basin greatly exceeds the amount of cumulative overdraft, even taking into account other reasonably foreseeable future projects, rendering the project's contribution to this cumulative impact less than cumulatively considerable.

Nevertheless, the proposed Project would have an impact on the deep aquifer groundwater levels within the area immediately surrounding the proposed Project pumping well. The area of potential affect surrounding the well is estimated to extend approximately 10 miles out from the Project pumping well by the end of Project operation. The Applicant has stated that pumping from the deeper aquifer would not affect the shallow alluvial-fill aquifer that supports groundwater-dependent vegetation within this zone of potential effect based on the presence of low permeability clay layers between the shallow and deep aquifers observed at the test well onsite, and that characteristically occur around lakebeds. However, the calculations and assumptions used to evaluate potential groundwater level impacts are

imprecise and have limitations and uncertainties associated with them such that the magnitude of potential impacts that could occur cannot be determined precisely.

Although the Project's contribution to the cumulative effects of probable future projects to drawdown of the spring baseline water tables is minor—due in part to its position at the far east end of the valley—it contributes, at least incrementally to a significant, and potentially severe, cumulative effect. According to CEQA guidance, in situations where the cumulative impact is substantial, even small incremental impacts may be cumulatively considerable. Implementation of Conditions of Certification **BIO-25, BIO-26**, and **SOIL& WATER-3**, **-4**, and **-5** would ensure that the Project's proposed use of groundwater and effect on groundwater dependent vegetation would be less than cumulatively considerable, **BIO-25** provides detailed specifications, minimum standards, and reporting requirements for monitoring the groundwater-dependent vegetation and spring groundwater levels within the 10-mile area of effect around the Project pumping well. **BIO-26** outlines the thresholds for remedial action and performance standards for the mitigation in the event that adverse effects are detected.

Overview: Cumulative Impacts to Biological Resources of the Chuckwalla Valley

The indirect effects of past, present, and foreseeable future development of the Chuckwalla Valley will contribute cumulatively to the overall loss of dune habitat, desert washes, and the fragmentation and degradation of the remaining habitat for Mojave fringe-toed lizard and several dune-dependent rare plant species. The indirect cumulative effects of development on dune ecosystems are not represented in the GIS analysis of direct habitat loss, but such effects are well documented in Coachella Valley--a comparable and suitable reference site from which conclusions may be reasonably drawn about the environmental stressors and their effects. The Chuckwalla Valley system, although not nearly as fragmented as Coachella Valley, has already been adversely affected in many ways. Proposed renewable energy development in Chuckwalla Valley could threaten what remains of the habitat and places several populations at risk—most notably, the local Chuckwalla Valley population of the Mojave fringe-toed lizard. Past and present impacts in Chuckwalla Valley that have already contributed to a decline in the quality and extent of aeolian dune habitat, habitat for Mojave fringe-toed lizard and dune-dependent rare plant species, desert washes and wash-dependent vegetation, include:

- Compaction and habitat degradation from historic military training operations during World War II;
- Past off-road vehicle use and present/future unauthorized use around Ford Dry Lake;
- Past sheep grazing around Ford Dry Lake;
- Electric and Natural Gas Transmission line construction;
- Road construction associated with the transmission construction;
- Construction and operation of the Wiley Wells Rest Stop;
- Construction of Interstate 10 and the network of diversion dikes south of I-10;
- State Highway 177 and a network of both paved roads and unimproved roads;
- Urban and agricultural conversion around Desert Center (8,424 acres);

- Blythe Energy and DPV 1 transmission lines and access roads; and
- Construction of the Colorado Aqueduct; and
- Chuckwalla Valley State Prison

Dikes associated with I-10 limit the depositional area of the Chuckwalla Mountains bajada to the south (upstream) of I-10 and concentrate the flows into three discrete channels, where historically numerous small channels fanned out over large areas contributing to fluvial sediment to the aeolian system. The downstream effects of these diversions are striking, severe, and very apparent throughout the I-10 corridor to the north, and in comparisons of current and historical photos. The perimeter stormwater conveyance channels proposed with nearly every solar project would closely mimic these downstream effects to fluvial transport systems. Russian thistle, a noxious weed, has replaced native plant diversity in some dune habitats. More recently, Sahara mustard has invaded the valley and spread explosively since it was introduced some decades ago. Invasive plants increase fire frequency and are correlated with population declines of milk-vetch and fringe-toed lizard in Coachella Valley (Barrows and Allen 2007).

A list of the existing and probable future projects considered in the NECO-wide analysis of cumulative effects is provided in **Biological Resources Table 9**. A subset of probable future renewable energy projects that occur in Chuckwalla Valley are listed below, including those that occur in the portion of the valley and dune system south of I-10.

Reasonably foreseeable future actions that will further contribute to the loss of habitat, desert washes and wash-dependent vegetation, and to the fragmentation and degradation of dunes and adjacent habitat for fringe-toed lizard and dune-dependent rare plant species in Chuckwalla Valley include:

- Palen Solar Power Project (3,001 acres)
- Genesis Solar Energy Project (1,797 acres)
- Chuckwalla Solar 1 (4,091 acres)
- EnXco 2 (Solar Energy Project, 1,325 acres)
- First Solar – Desert Sunlight (5,119 acres)

On the dunes south of I-10:

- Colorado Substation (approximately 80 acres)
- DPV 2 and Desert Southwest transmission lines and access roads
- LightSource Renewables – Mule Mountain II
- Altera - Mule Mountain (6,618 acres).

In the Coachella Valley, blocked sand/wind corridors have been shown to lead to sand compaction and premature stabilization of the dunes, increased mean grain size (which reduces habitat suitability for fringe-toed lizards), and aeolian habitat loss. Stabilization of the dunes is also aggravated by an increase in invasive exotic plants, introduced through soil disturbance and an increase in vectors (vehicles).

Invasive plants are correlated with decreases in the rare dune-endemic species of milk-vetch, fringe-toed lizard, and endemic sand-treader crickets in Coachella Valley.

Road construction associated with new solar projects and their related transmission corridors further degrade and fragment the habitat, and lead to an increase in vehicle traffic and encroachment in previously undisturbed areas. Unpaved roads into the valley interior and historical grazing have led to a dramatic increase in noxious weed invasion over large areas of dunes and surrounding habitat. New roads into otherwise undisturbed portions of the valley also lead to an increase in vehicle-related mortality, and habitat destruction from unauthorized off-road vehicle use. Human encroachment, agriculture, and development around Desert Center are also accompanied by an increase in predators, such as ravens. These indirect cumulative effects on dune-dependent species are particularly acute in isolated, fragmented habitats that lack the buffering effects of connectivity to larger populations. All of these stressor and effects are documented to have led to the decline of dune ecosystems in Coachella Valley and can reasonably be expected to occur in Chuckwalla Valley with future development.

C.2.8.8 CONCLUSION

Construction and operation of the Genesis Project will contribute, at least incrementally, to a significant cumulative effect in nearly every resource area analyzed. Cumulative impacts in some areas—impacts to dunes and playa habitat, desert washes, Harwood's milk-vetch—are substantial. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects. Cumulative impact assessments cannot conclude that contributions to cumulative impacts are not significant merely because the contributions represent a small percentage of the overall problem.

The biological resources cumulative effects analysis employed a quantitative, GIS-based analysis of direct impacts to habitat and a qualitative analysis of indirect effects (e.g., increases in predators, noxious weeds, etc.). In many cases, the anticipated indirect impacts are more significant, or adverse, than the direct loss of habitat, but are more difficult to quantify. In preparing the qualitative assessment of indirect cumulative effects, staff relied on consultations with regional experts and agency biologists, a literature review of the threats to species and their habitats, and documented observations and studies from Coachella Valley, a dune system west of Chuckwalla Valley that supports many related species and similar habitats (Barrows 1996; Barrows & Allen 2007; CVAG 2007; Griffiths et al. 2002; Katra et al. 2009; Turner et al. 1984; Weaver 1981; Barrows pers. comm.).

The geographic scope of the cumulative effects analysis varied between the biological resources. Many of the analyses used the Northern and Eastern Colorado Desert Coordinated Management Plan (NECO) boundaries (BLM-CDD 2002). The NECO boundary closely approximates the boundaries of the Eastern and Northern Colorado Desert Tortoise Recovery Units; however, the recovery unit boundaries extend slightly to the north and west of the NECO boundary. For some resources, a different geographic scope was warranted, such as the use of watershed boundaries to analyze cumulative effects to desert

washes, or the Chuckwalla Valley region of the I-10 corridor for populations or dune systems restricted to that geographic area.

Significant cumulative effects (including indirect effects) were identified in a number of biological resource areas where the Project contributes—at least incrementally—to the cumulative effect. These include:

- Desert washes – Chuckwalla - Ford Dry Lake Watershed and the broader NECO planning area;
- Desert tortoise habitat;
- Golden eagle foraging habitat;
- Mojave fringe-toed lizard and their habitat;
- Habitat for American badger, desert kit fox, and burrowing owl;
- LeConte's thrasher habitat;
- Couch's spadefoot toad range;
- Habitat for Harwood's milk-vetch and other dune/playa-dependent special-status plants;
- Wildlife habitat and connectivity within the Palen-Ford WHMA (for Mojave fringe toed lizard, dunes, and playa);
- Mojave and Sonoran creosote bush scrub; desert dry wash woodland (microphyll woodland); playa and sand drifts over playa, and dunes (active and stabilized)

Of particular concern are the cumulative effects of renewable energy projects within the geographic scope of the Chuckwalla Valley, which contains an isolated system of dunes and population of Mojave fringe-toed lizard. The direct loss of dune habitat and Mojave fringe-toed lizard is minor relative to the indirect downwind effects from obstructions within the active aeolian sand transport corridor, and the disruption of the fluvial processes that contribute sand to the system from the diversion of washes – approximately 63 miles of washes within the Chuckwalla-Ford Dry Lake watershed alone. Lessons learned from decades of study at nearby Coachella Valley (a comparable and suitable reference site from which conclusions may be reasonably drawn about Chuckwalla Valley) suggest that these indirect effects are significant and adverse. In addition to the disruption of geomorphic processes, significant indirect effects that can be reasonably expected to occur in the Chuckwalla system from future projects include fragmentation and its effects on connectivity and gene flow; spread of invasive non-native plants; increase in avian predators, and; an increase in vehicle-related wildlife mortality.

In a recent study "Climate Change and the Future of California's Endemic Flora" (Loarie et al 2009), anticipated climate change is projected to cause greater than 80 percent reductions in range size for up to 66% of California's endemic species within a century. These results are comparable to other studies, but projected reductions depend on the magnitude of future emissions and on the ability of species to disperse from their current locations. California's varied terrain could cause species to move in very different directions, breaking up present-day floras. However, these projections also identify regions where species undergoing severe range reductions may persist. Protecting these potential future refugia

and facilitating species dispersal will be essential to maintain biodiversity in the face of climate change (Loarie et al 2009). These include the cooler, more mesic microclimates of the mountainous areas, which may protect significant components of biodiversity into the next century. Many of these areas are already in some degree of federal wilderness protection. However, the value of these refugia depends critically on the ability to of species to disperse, underscoring the importance of landscape connectivity and potential restoration in the face of increasing urbanization, land use change, and disturbance.

The proposed Project is expected to contribute to a cumulative reduction in greenhouse gases. However, the benefits gained by the Project's reduction in greenhouse gases must also be weighed against the potential loss of carbon sequestration benefits from the desert vegetation and biological soil crusts.

A recent study conducted in the Mojave Desert found that the desert soil ecosystems could represent a significant carbon sink (Campbell et al. 2009). Whether a result of biotic crusts, vegetation, alkaline soils, or an increase in average precipitation, the rate of carbon absorption in the soil has scientists considering whether desert ecosystems play a more critical role in the carbon cycle than previously believed (Stone 2008; Campbell et al. 2009). Some scientists, however, dispute these findings and attribute them to an anomaly caused by increased rain for the study period reported (Campbell et al. 2009). A study is currently underway by the University of Oregon "to determine whether the installation and operation of solar thermal plants will impact carbon sequestration capabilities of the Mojave Desert ecosystem and ecosystem services (assessment endpoint) to the extent that more carbon is released or inhibited from being stored than saved while utilizing solar technology." (Campbell et al. 2009). Until the dispute is resolved, staff expects that the answer may vary somewhat on a case-by-case basis. For example, project sites that are very sparsely vegetated with only a minor component of soil crusts may confer less sequestration capabilities than sites with a rich cover of biological soils crusts and succulent desert scrubs.

Nevertheless, there is little dispute that the loss of desert vegetation and biological soil crusts on a solar thermal plant site permanently eliminates the carbon sequestration benefits, and the soil disturbance during grading and construction releases the stored carbon back into the atmosphere. Staff believes that the cumulative loss of sequestration benefits and release of stored carbon from all past, present, and probable future projects is likely to be significant. With implementation of the avoidance and minimization measures (**BIO-8**), revegetion plan for temporarily disturbed area (**BIO-24**), compensating for habitat loss by preventing the future development of desert lands through acquisition and permanent protection under conservation easements (**BIO-12, BIO-19, BIO-20** and **BIO-22**), restoring degraded portions of acquired lands (**BIO-12** and **BIO-19**), minimizing the size of the disturbance area along the linears (**BIO-8 and BIO-19**), and revegetating after closure and decommissioning (**BIO-23**), the Project's contribution to the cumulative effects described above would be less than cumulatively considerable.

Compliance with the mitigation measures identified by staff would reduce the Project's contribution to cumulative effects to a level that is less than cumulatively considerable. There may be cumulative effects

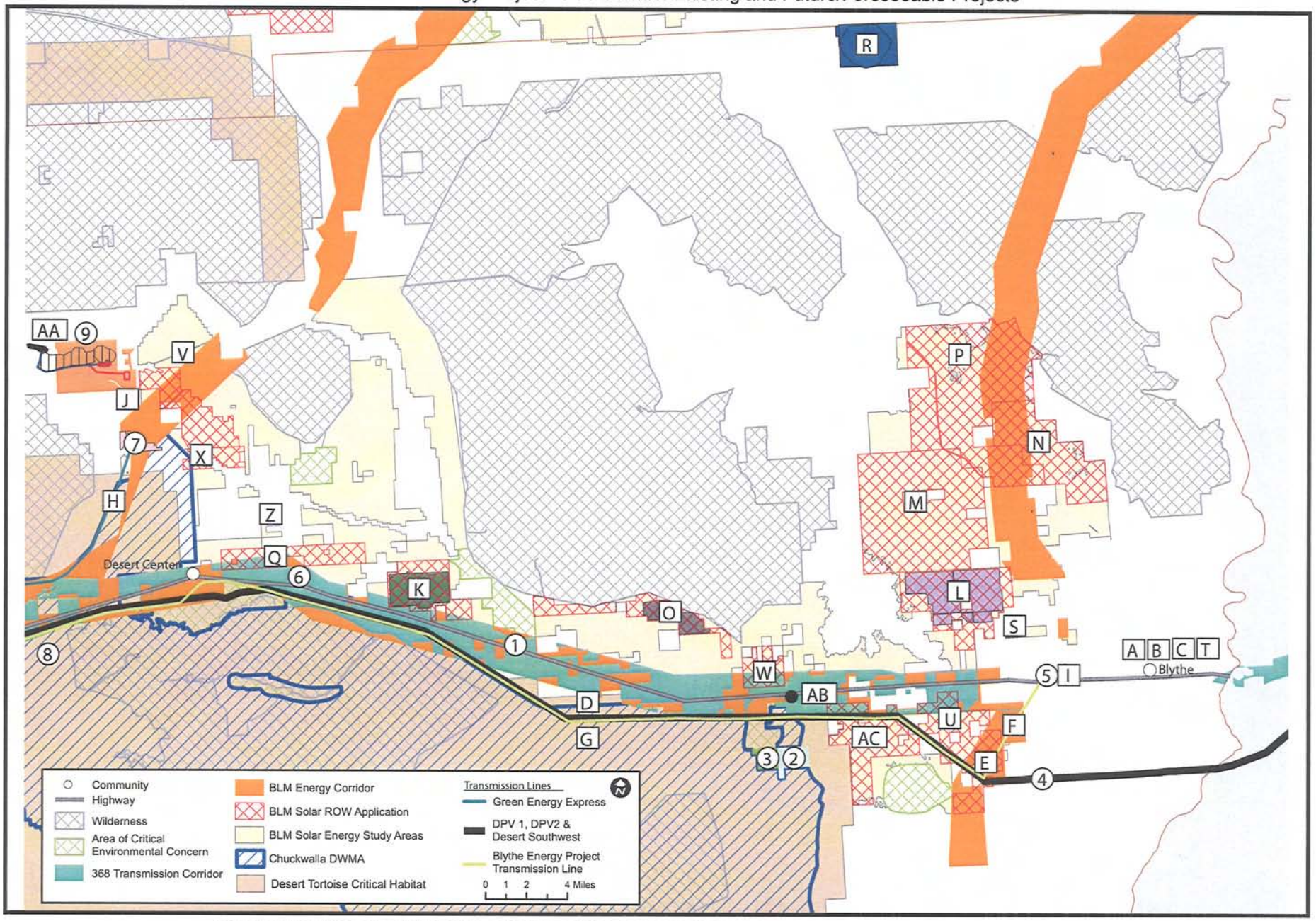
after mitigation is implemented by this project, but mitigation would reduce this project's contribution to a level that is not cumulatively considerable. These residual cumulative effects from all past, current, and future projects could be addressed through a regional and coordinated planning effort aimed at: preserving and enhancing large, intact expanses of wildlife habitat and linkages, including maintaining connections between wildlife management areas and other movement corridors, and identifying and preserving important refugia to facilitate species dispersal and maintain biodiversity in the face of climate change.

In addition to addressing the residual ecological impacts, after mitigation to less than significant levels, these coordinated planning efforts by state and federal agencies must also address the cumulative loss of carbon sequestration benefits from the loss of desert vegetation and biological soil crusts, and the concurrent release of stored carbon back into the atmosphere during grading and construction is significant. These could be addressed through coordinated planning efforts aimed at: creating incentive programs for energy efficiency and conservation; funding research that analyzes alternative energy options that are less land intensive; reducing the number of permitted projects and creating solar exclusion zones in areas of high ecological values and carbon sequestration potential; restoring or better utilizing degraded desert lands; and restoring the carbon sequestration benefits of damaged desert (and especially) forest ecosystems elsewhere (Campbell et al. 2009).

Ongoing collaborative efforts by federal and state agencies to develop a Desert Renewable Energy Conservation Plan and BLM's Solar Energy Development Programmatic EIS offer an appropriate forum for such planning. **Appendix B** describes the Desert Wildlife Management Area management strategies that could achieve the goals of preservation and enhancement of wildlife connectivity in the NECO planning area. Staff supports these programmatic efforts and believes they represent an excellent means of integrating the State's and BLM's renewable resources goals and environmental protection goals.

BIOLOGICAL RESOURCES - FIGURE 1

Genesis Solar Energy Project - I-10 Corridor Existing and Future/Foreseeable Projects



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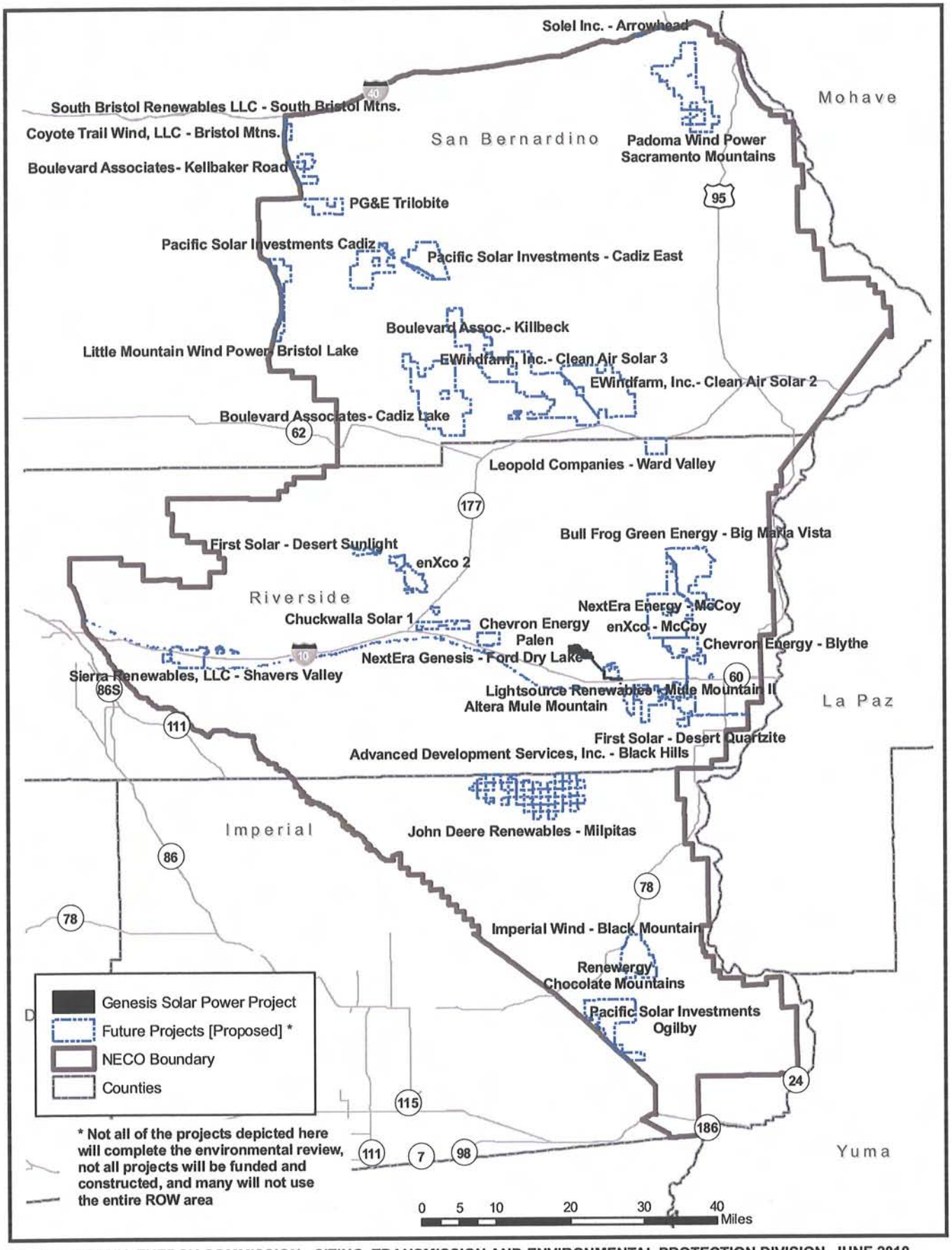
SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 2

Genesis Solar Energy Project - Foreseeable Future Projects (Proposed)

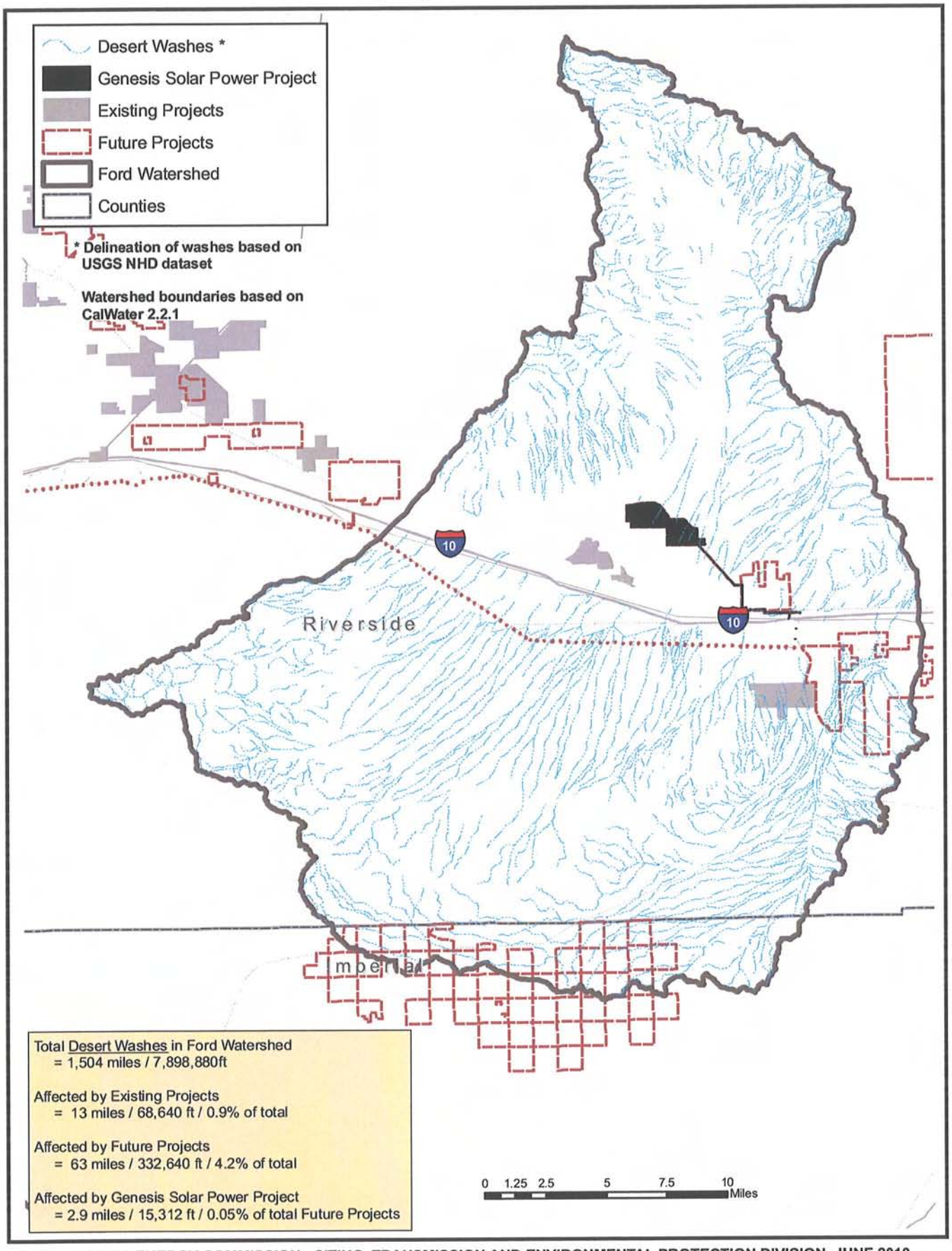


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 3

Genesis Solar Energy Project - Desert Washes - Ford Watershed

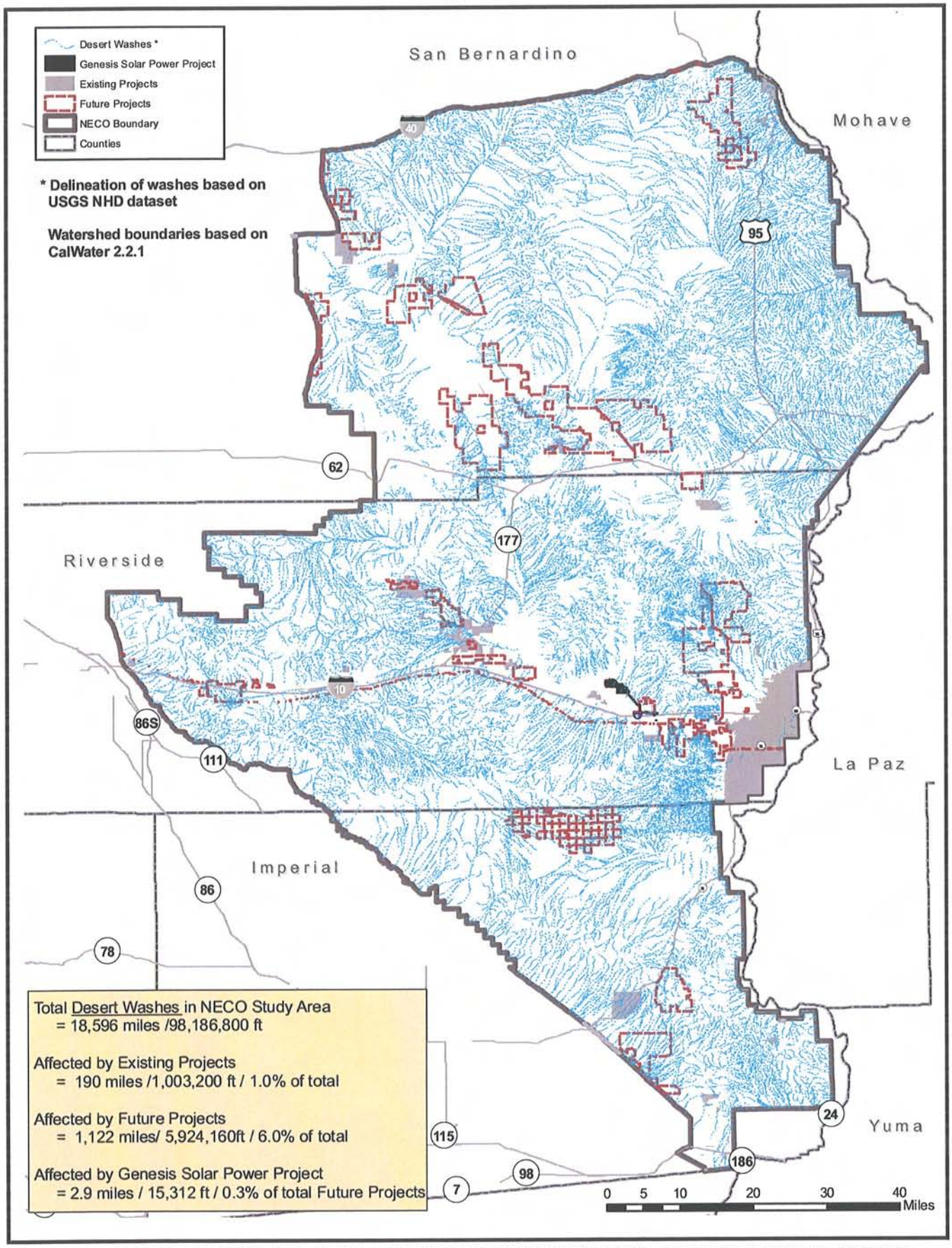


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 4

Genesis Solar Energy Project - Desert Washes

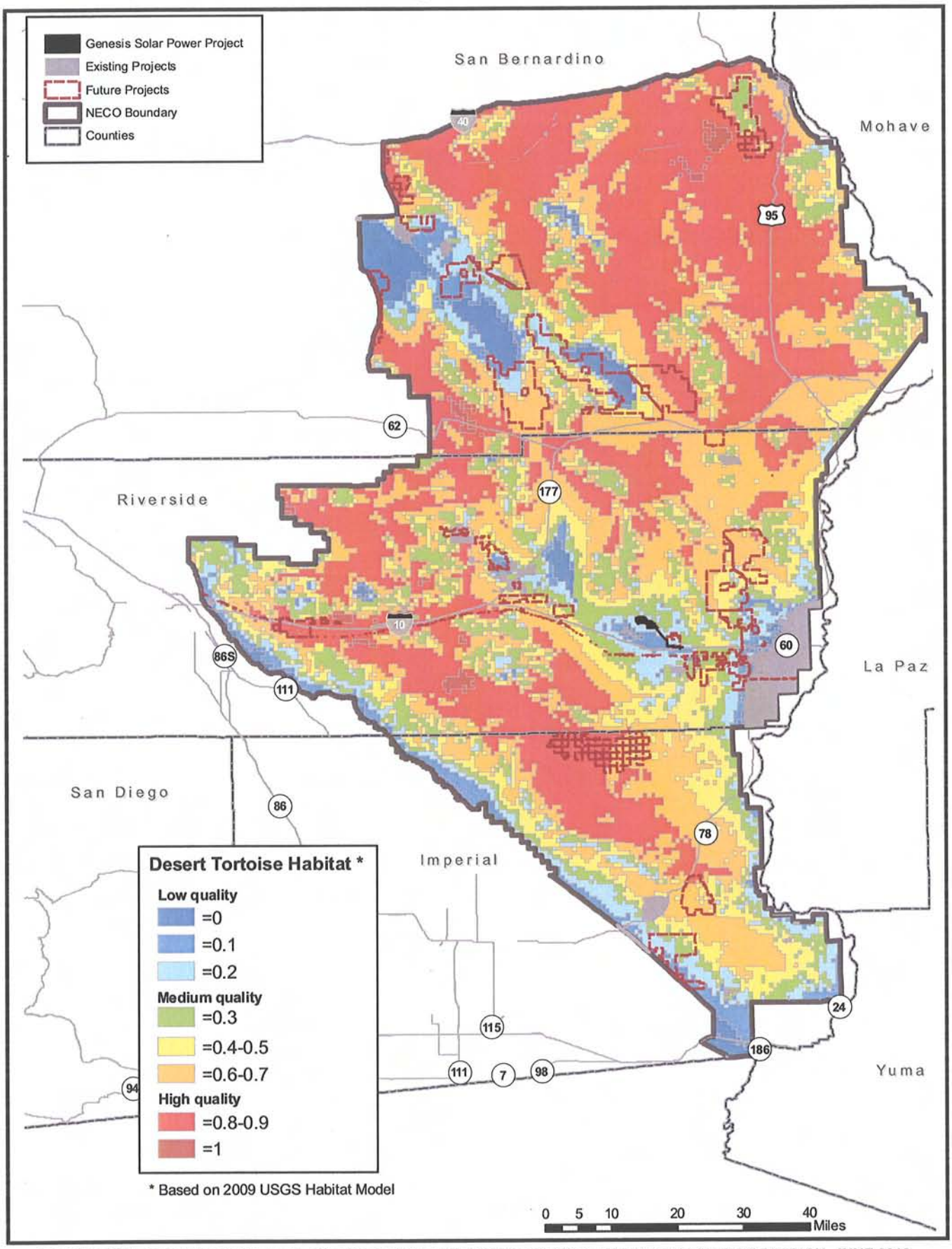


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 5

Genesis Solar Energy Project - Desert Tortoise Habitat

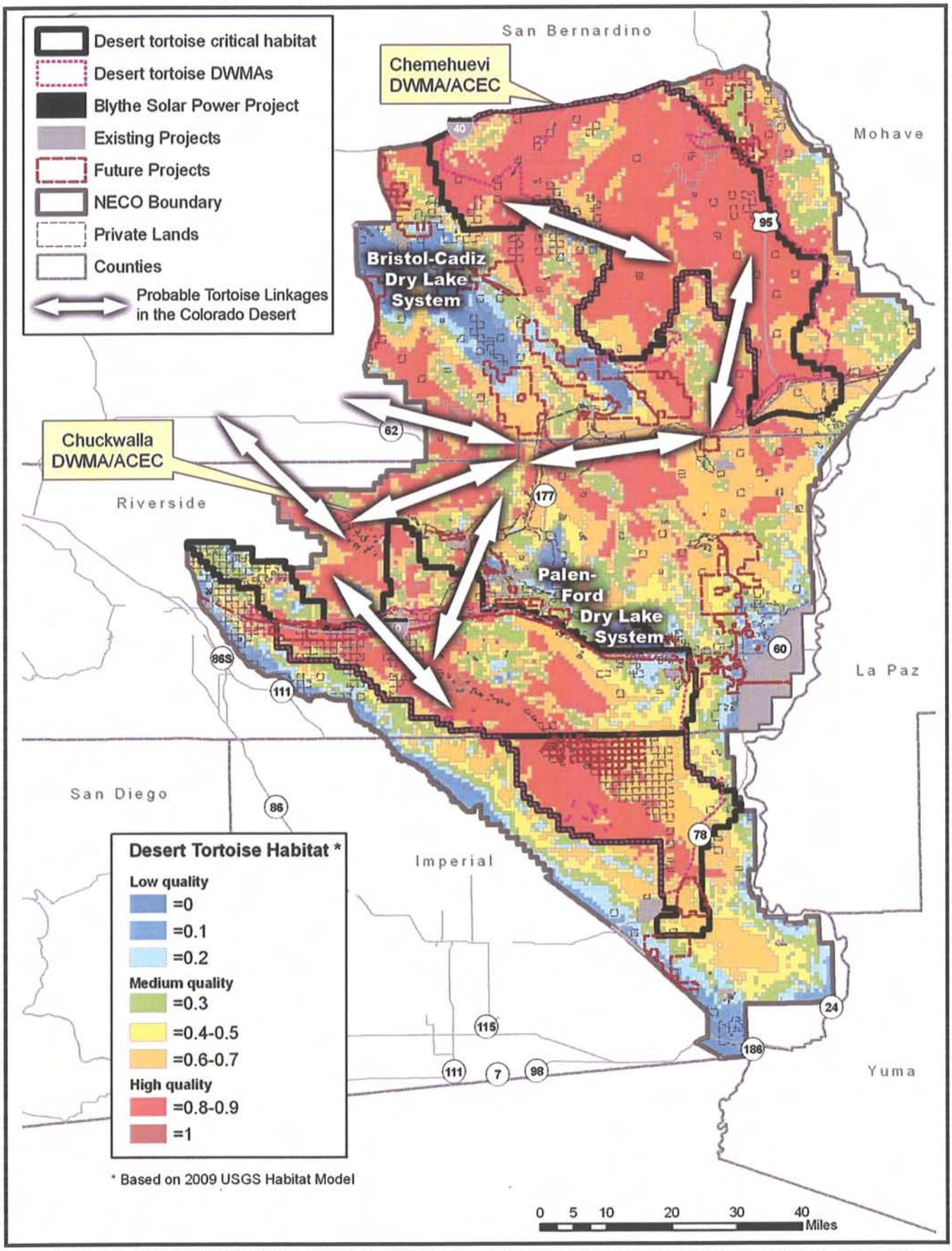


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 6

Genesis Solar Energy Project - Desert Tortoise - Chuckwalla to Chemehuevi DWMAs and Critical Habitat

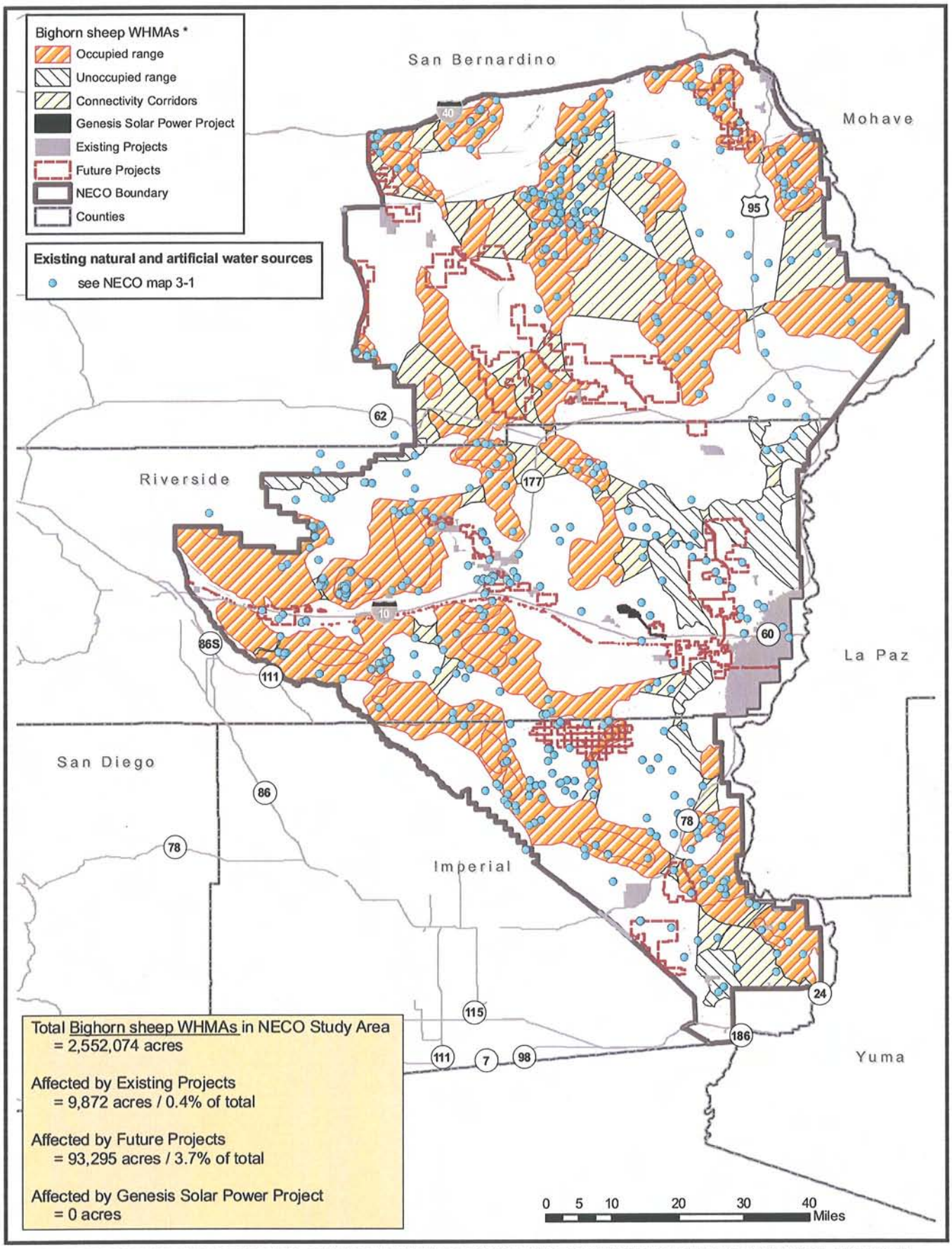


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 7A

Genesis Solar Energy Project - Bighorn Sheep WHMAs

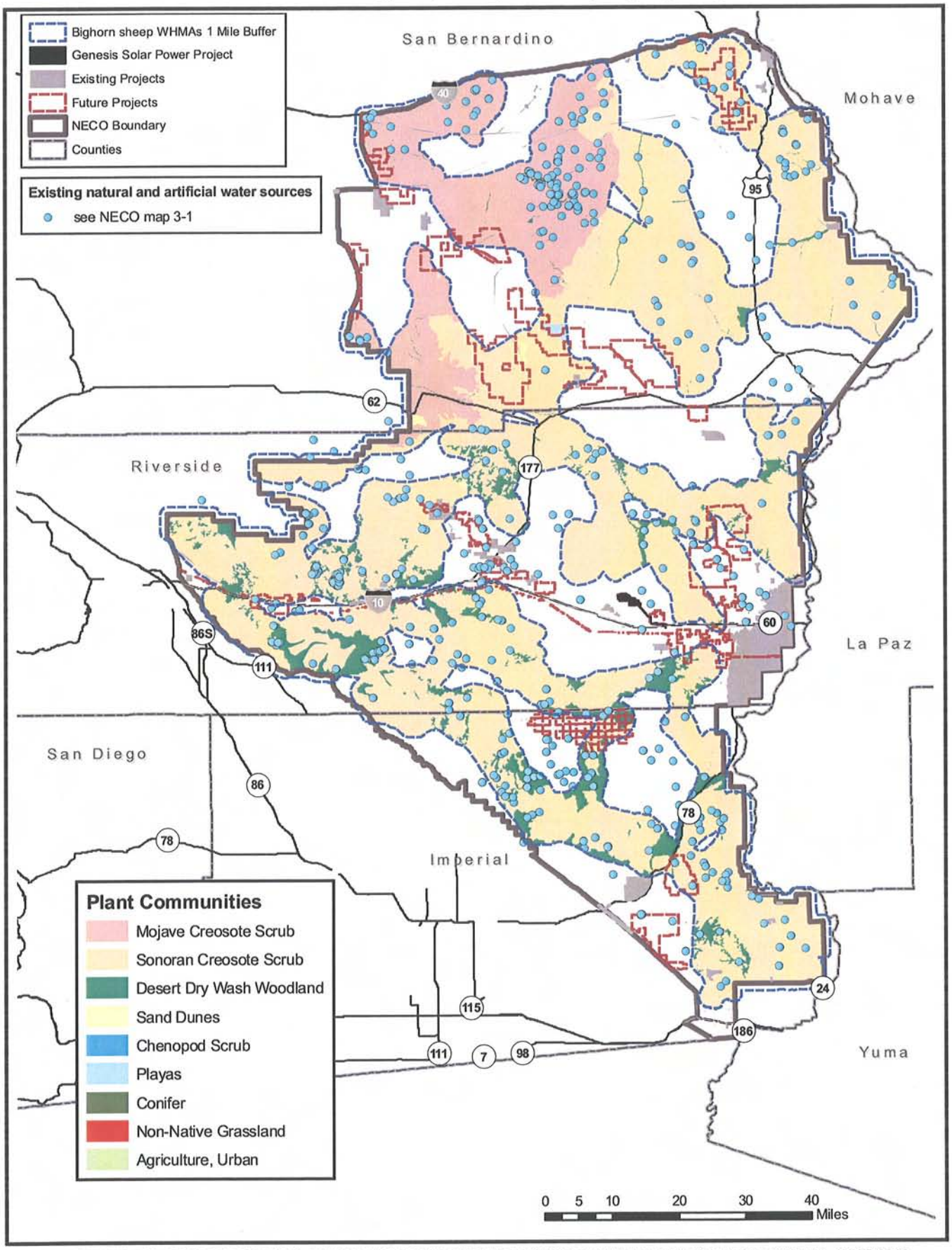


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 7B

Genesis Solar Energy Project - Bighorn Sheep - Spring Forage

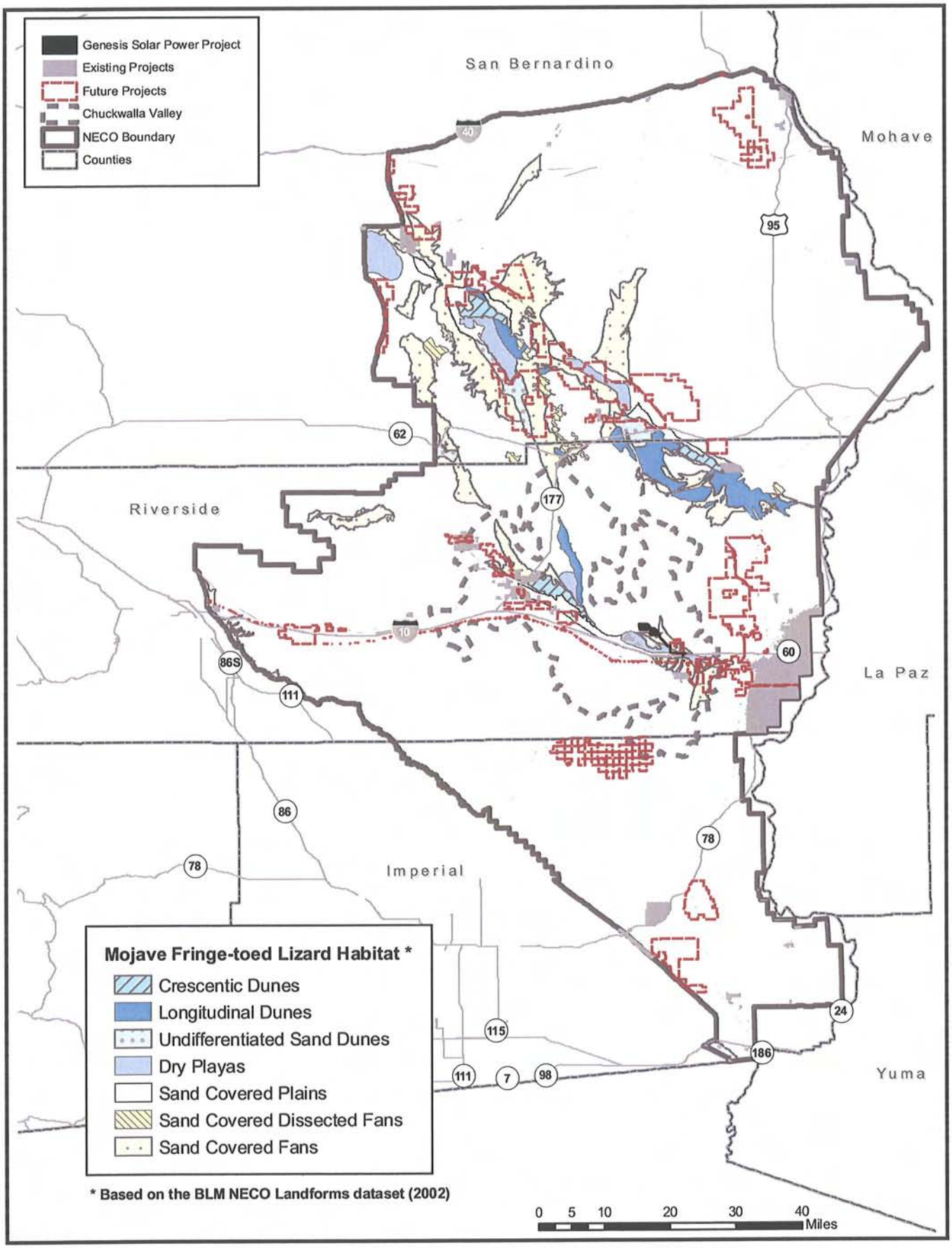


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 8

Genesis Solar Energy Project - Mojave Fringe-Toed Lizard Habitat

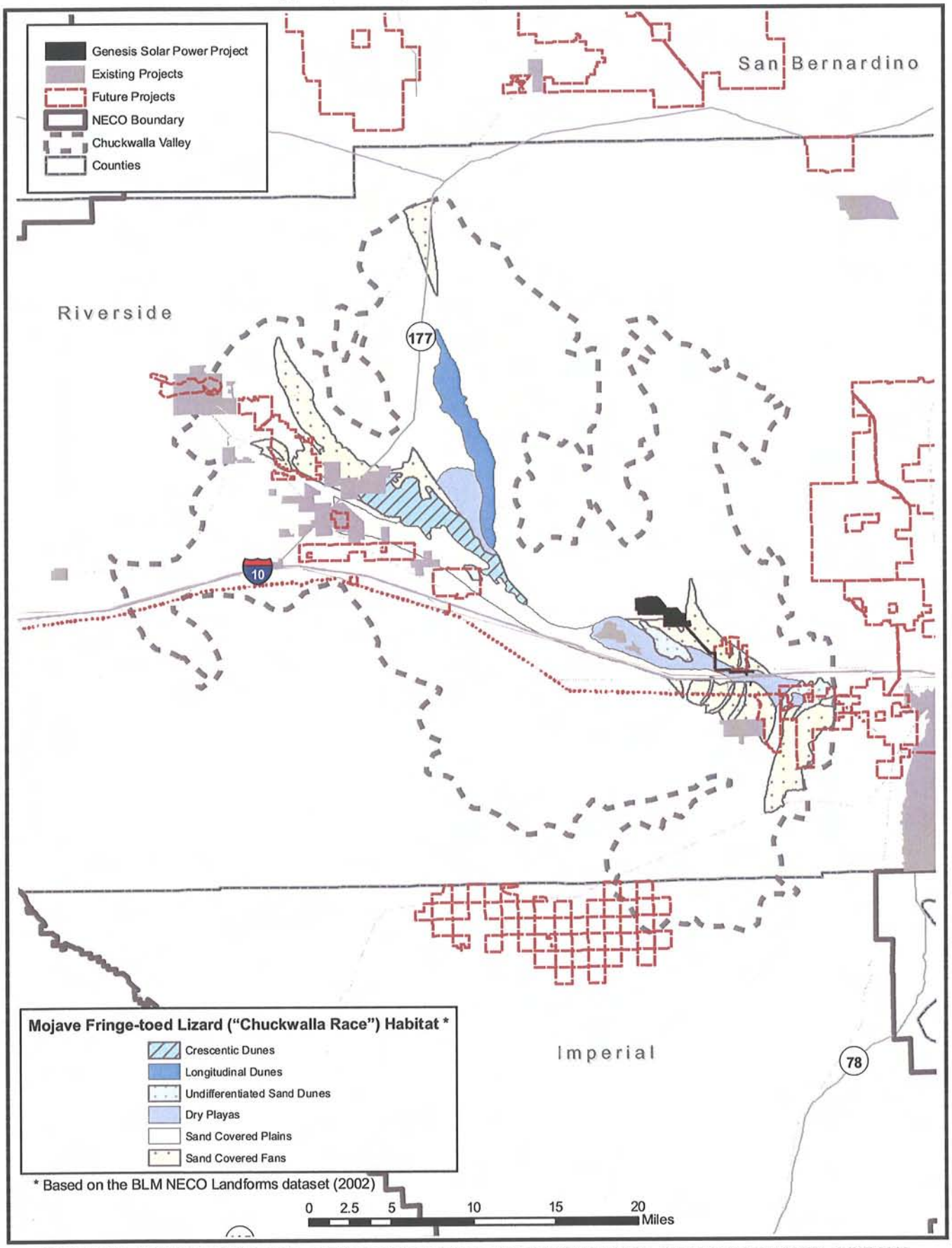


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 9

Genesis Solar Energy Project - Mojave Fringe-Toed Lizard ("Chuckwalla Race") Habitat

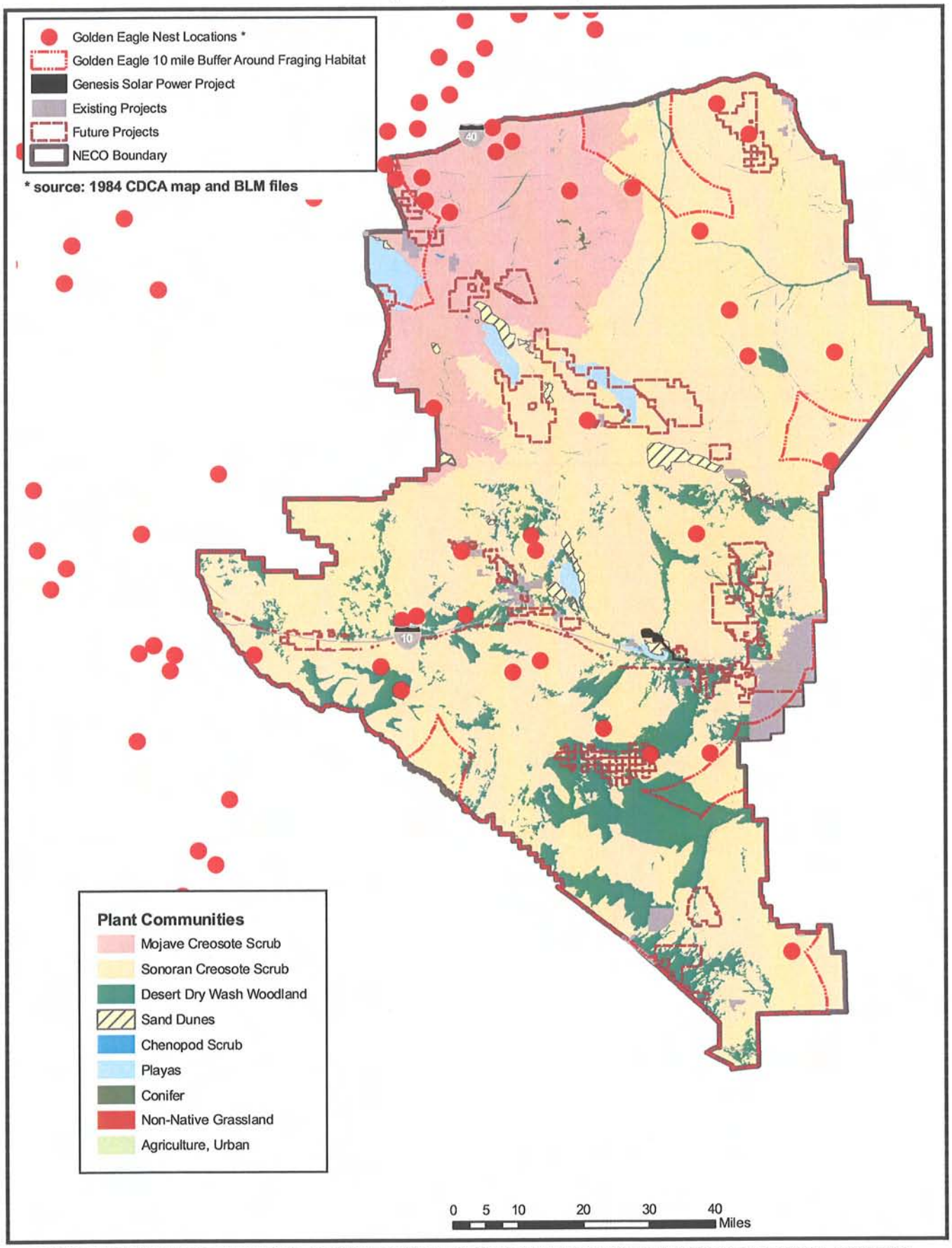


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 10

Genesis Solar Energy Project - Golden Eagle Nest Locations

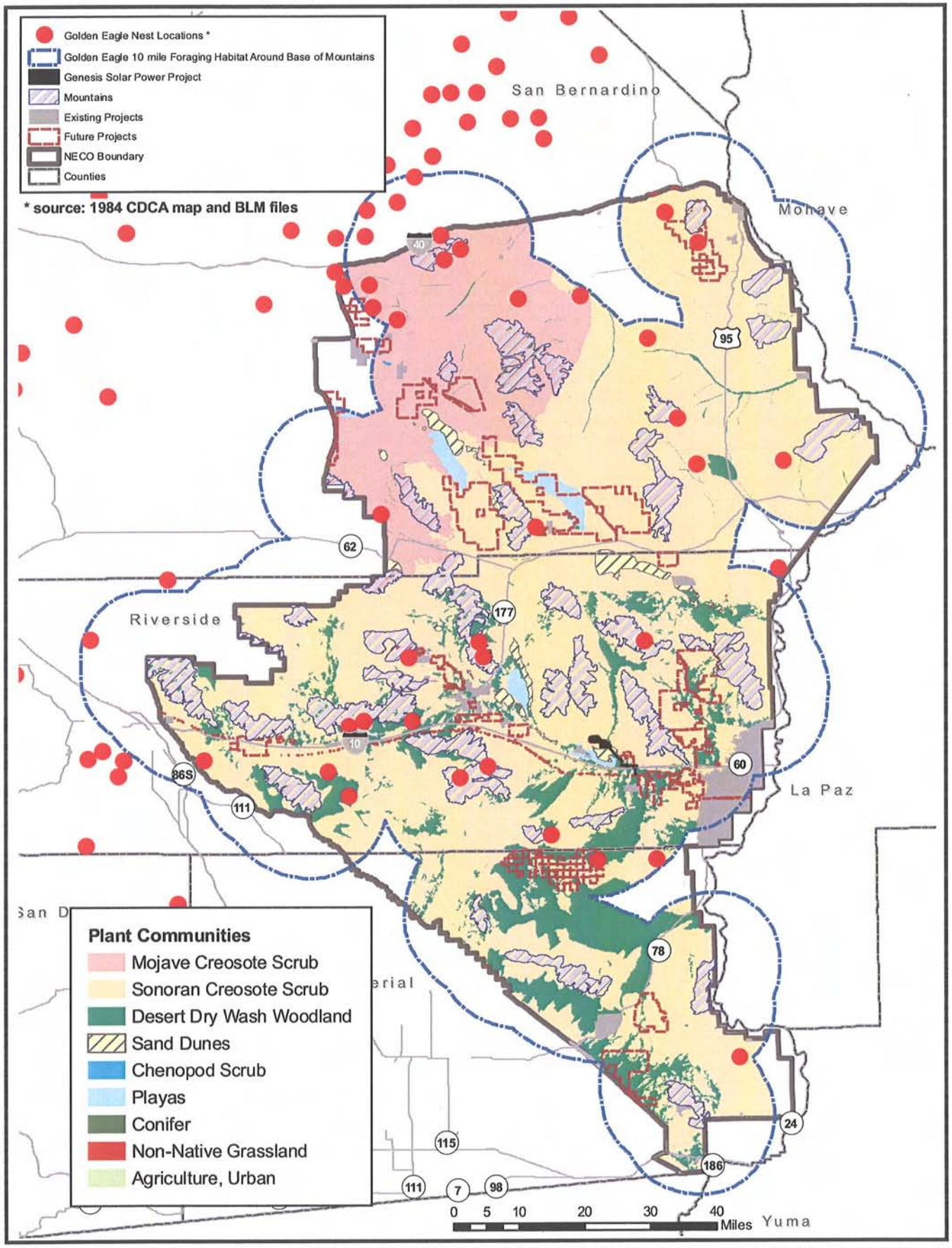


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 11A

Genesis Solar Energy Project - Golden Eagle Foraging Habitat Within 10 Miles Of Mountains

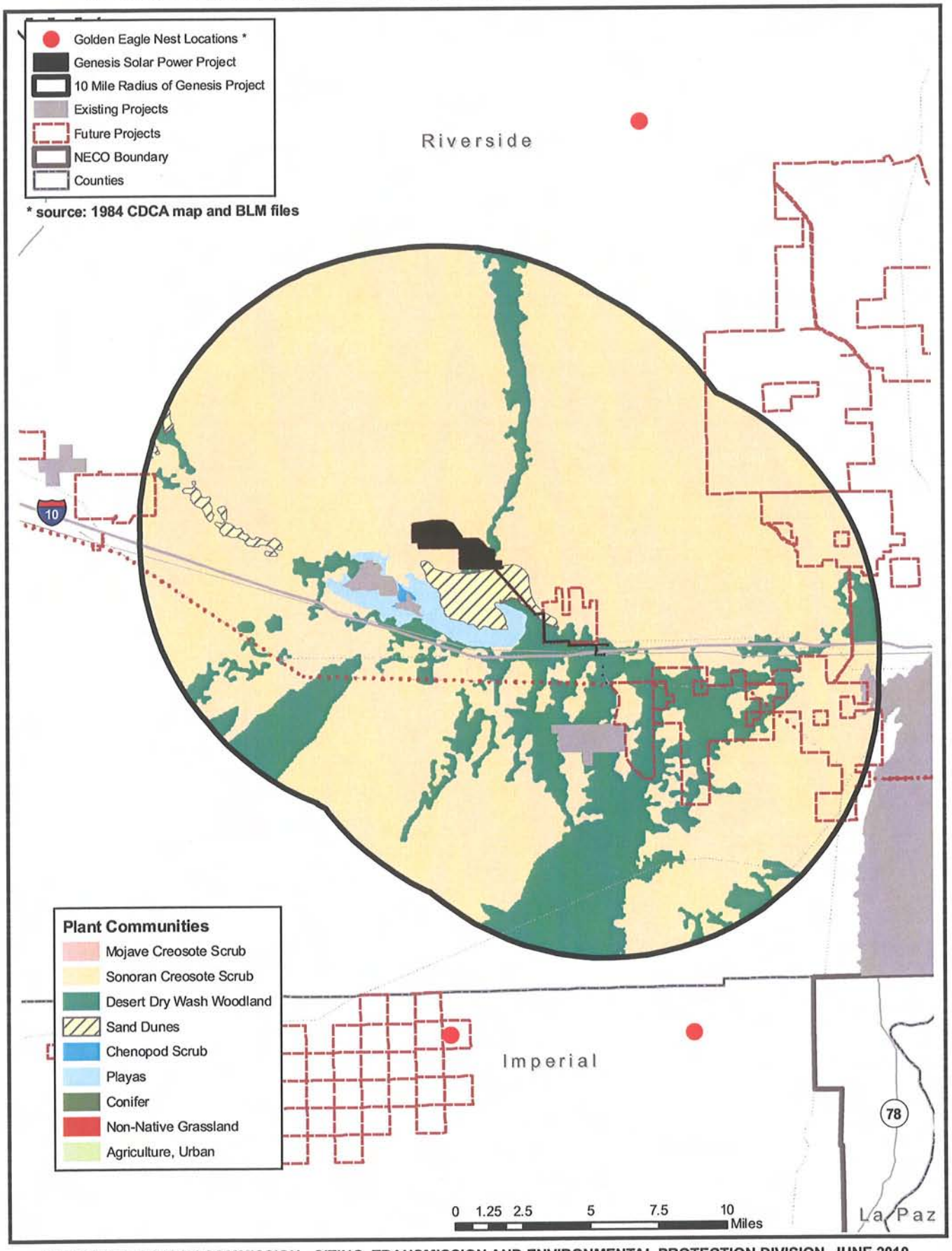


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 11B

Genesis Solar Energy Project - Golden Eagle Foraging Habitat Within 10 Mile Radius of Project

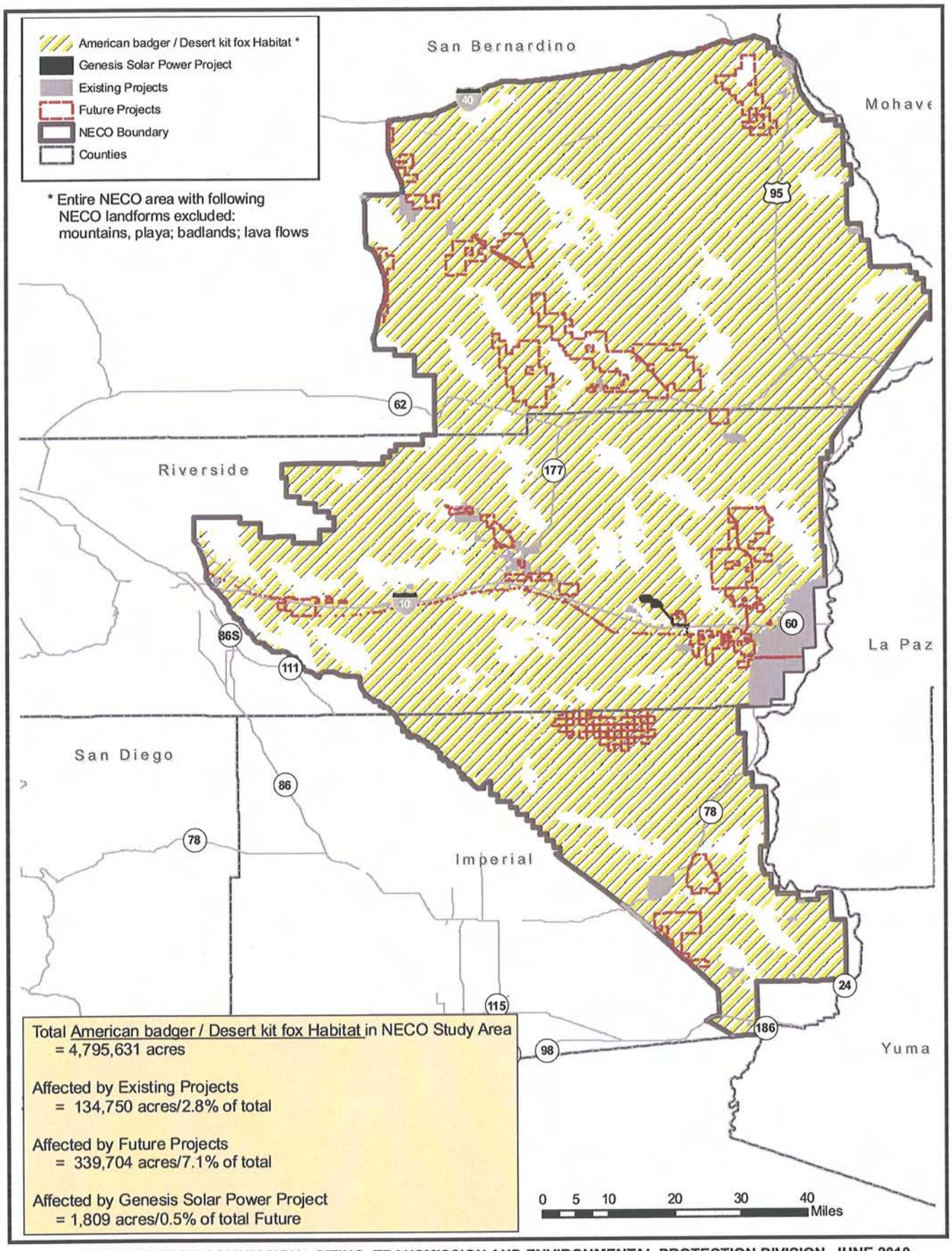


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 12

Genesis Solar Energy Project - American Badger / Desert Kit Fox Habitat

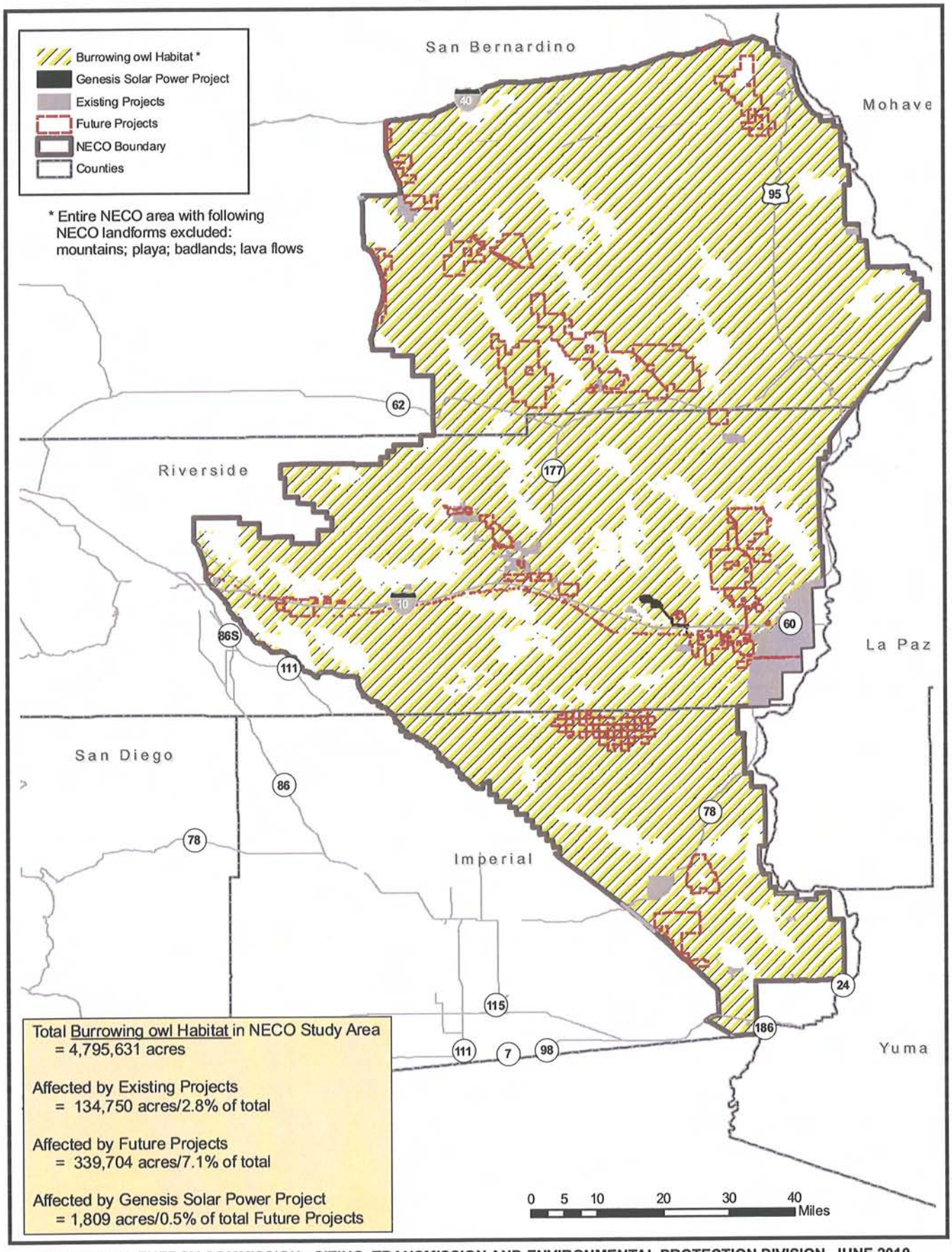


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 13

Genesis Solar Energy Project - Burrowing Owl Habitat

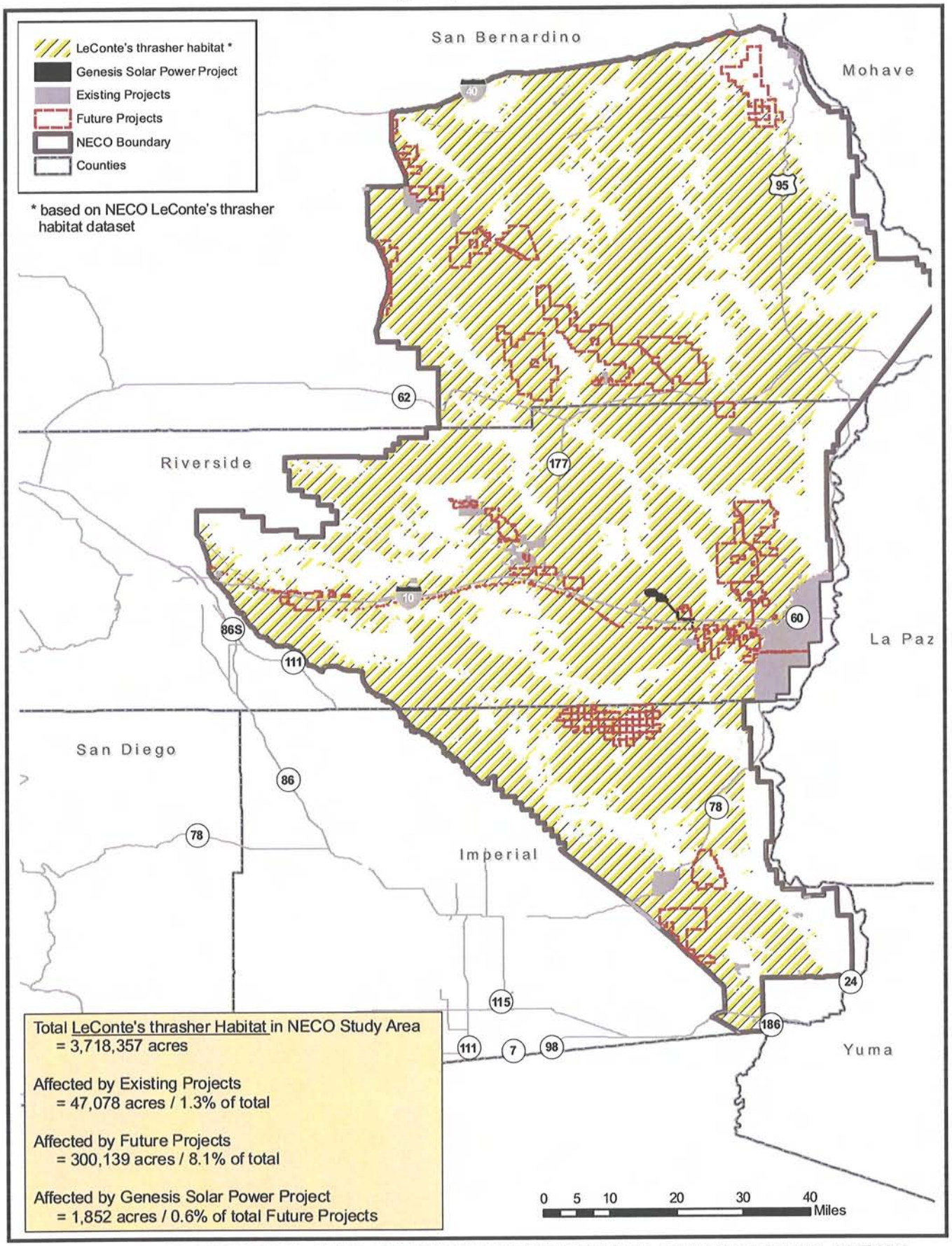


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 14

Genesis Solar Energy Project - Leconte's Thrasher Habitat

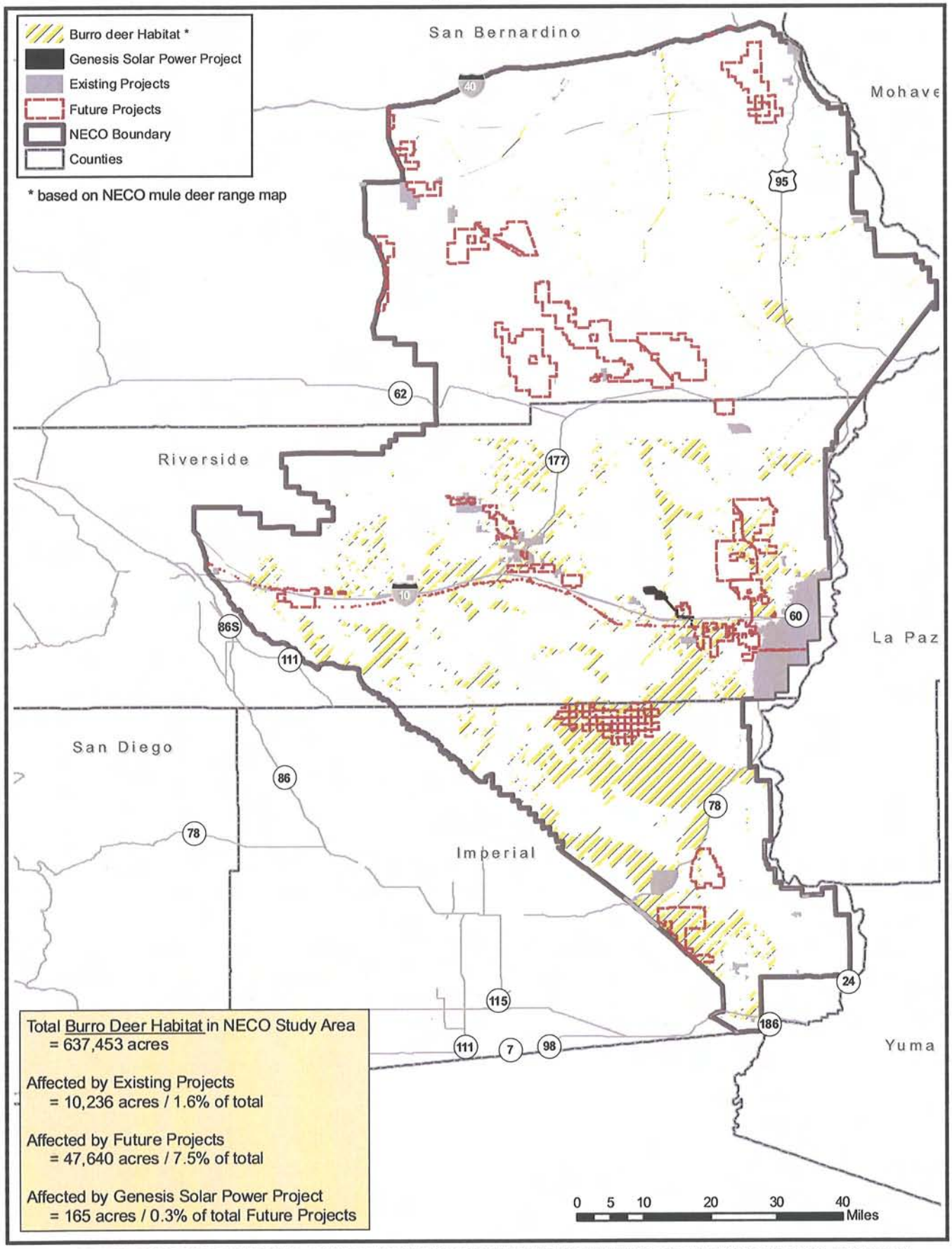


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 15

Genesis Solar Energy Project - Burro Deer Habitat

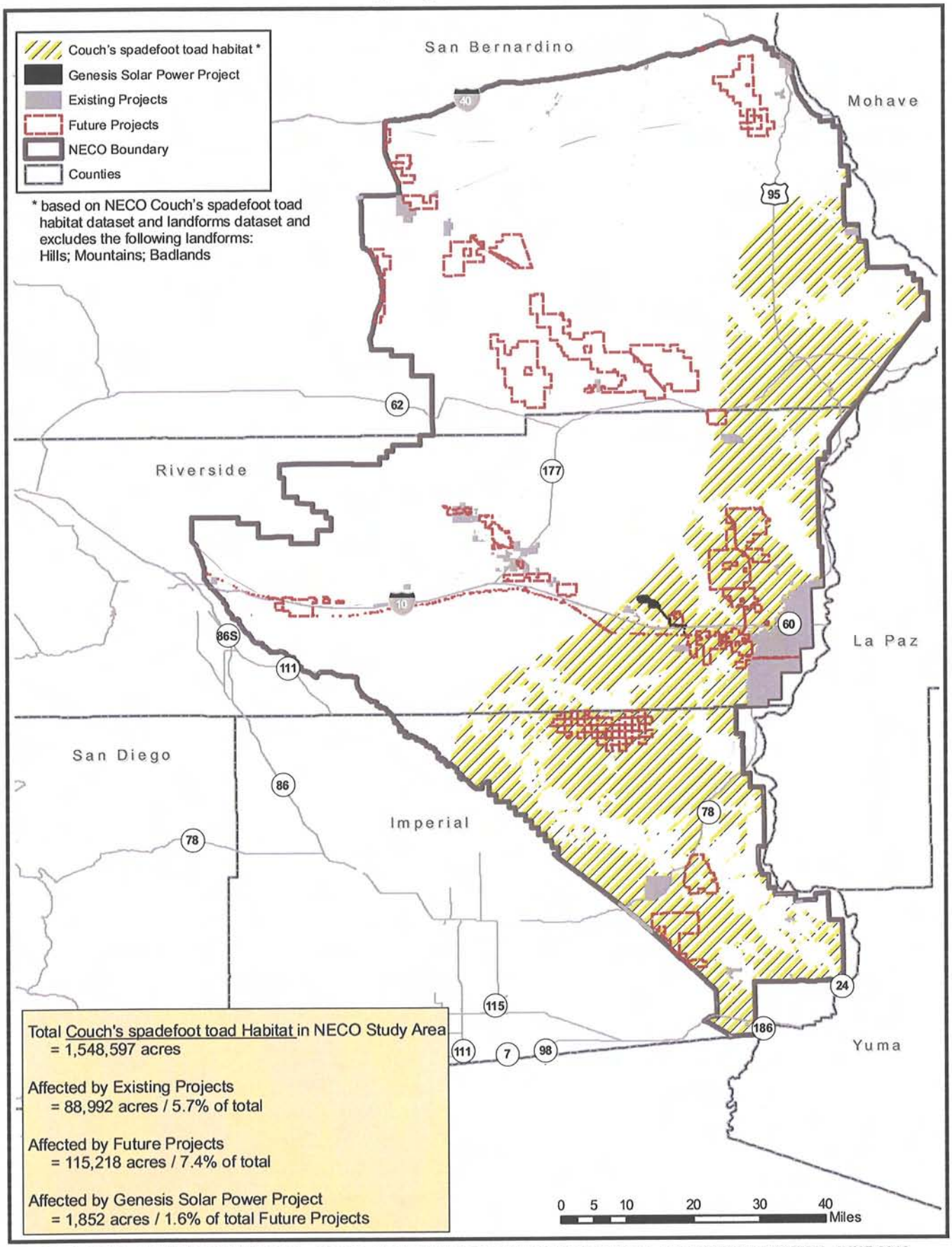


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 16

Genesis Solar Energy Project - Couch's Spadefoot Toad Habitat

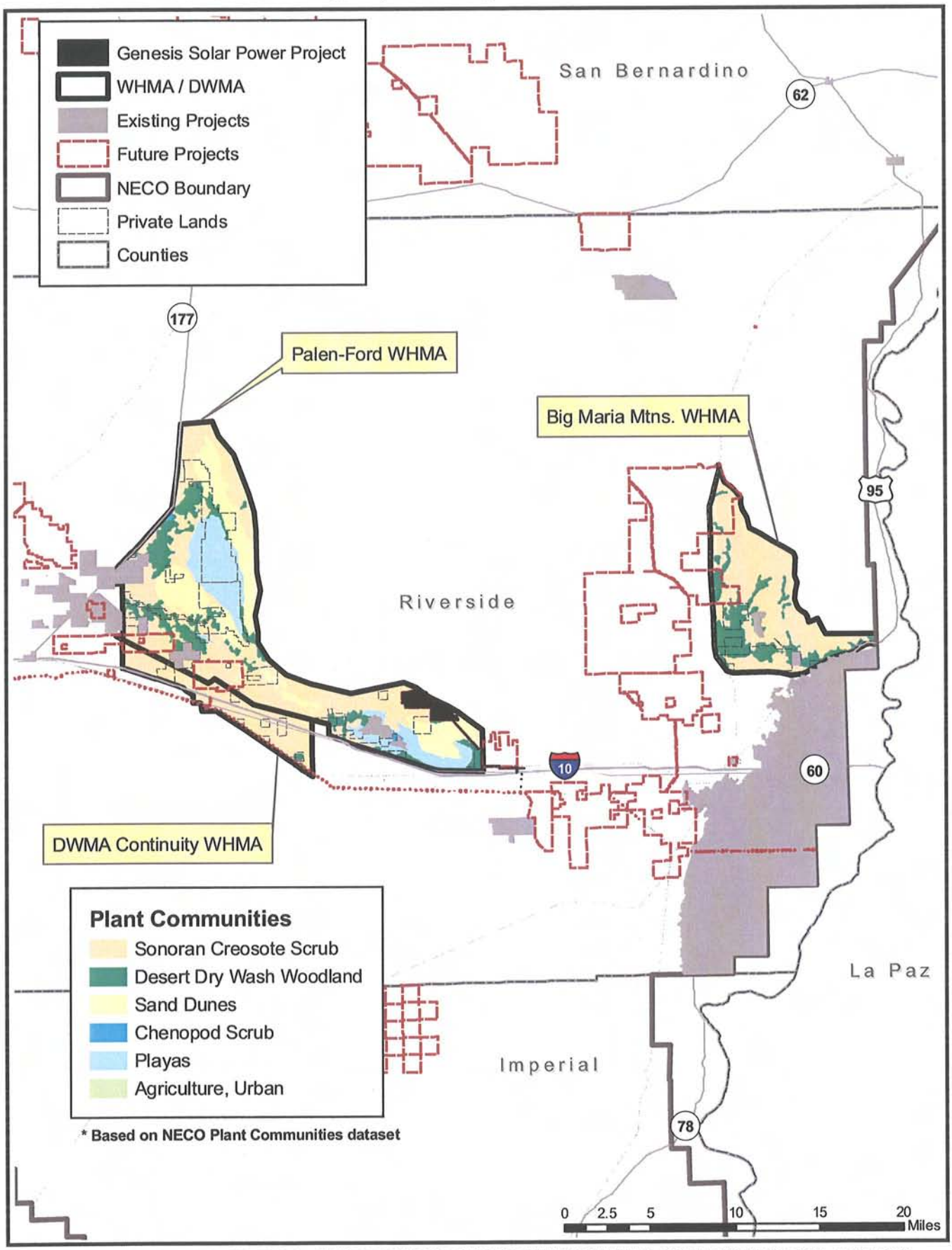


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 17

Genesis Solar Energy Project - Multi-Species WHMAs - Plant Communities

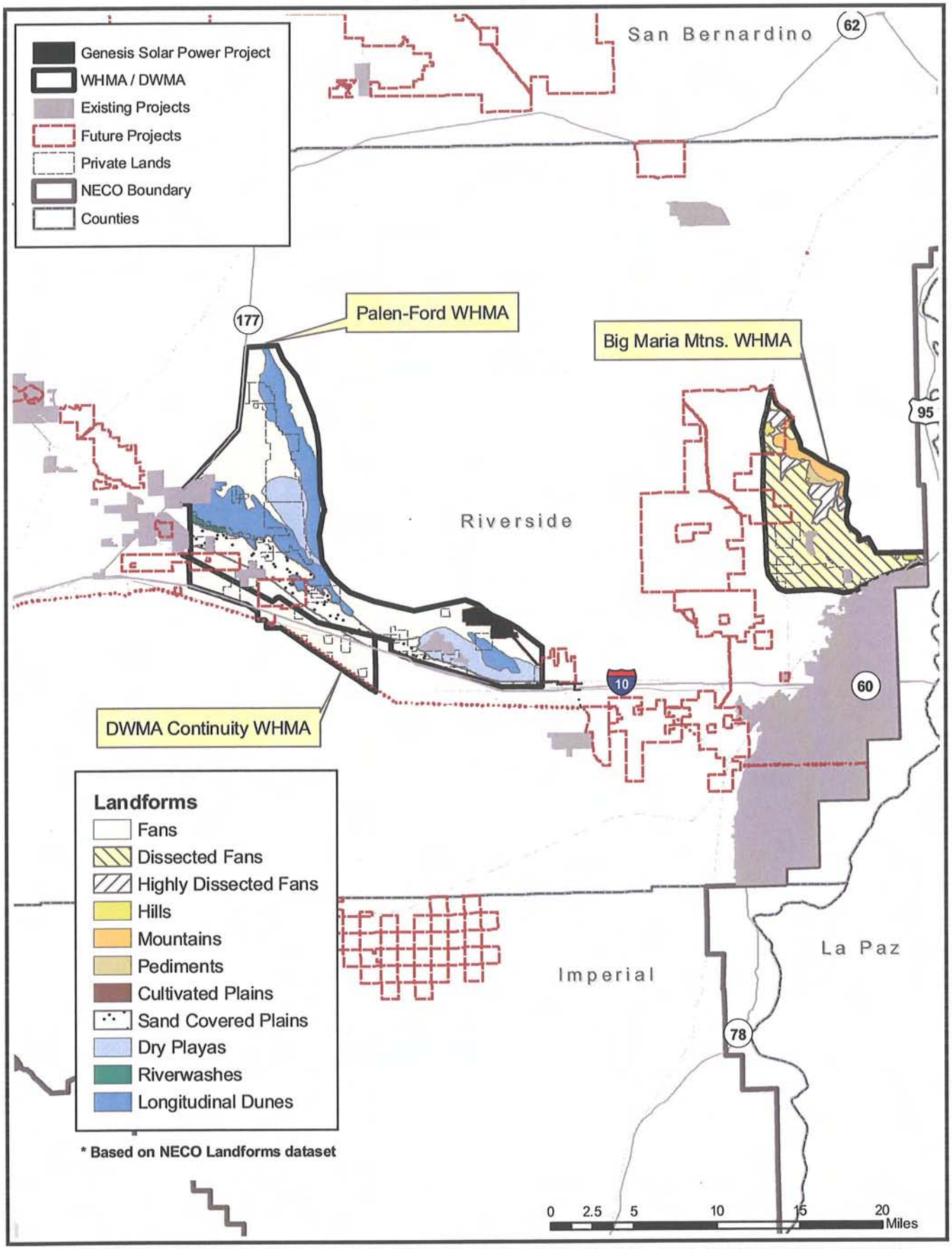


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 18

Genesis Solar Energy Project - Multi-Species WHMAs - Landforms

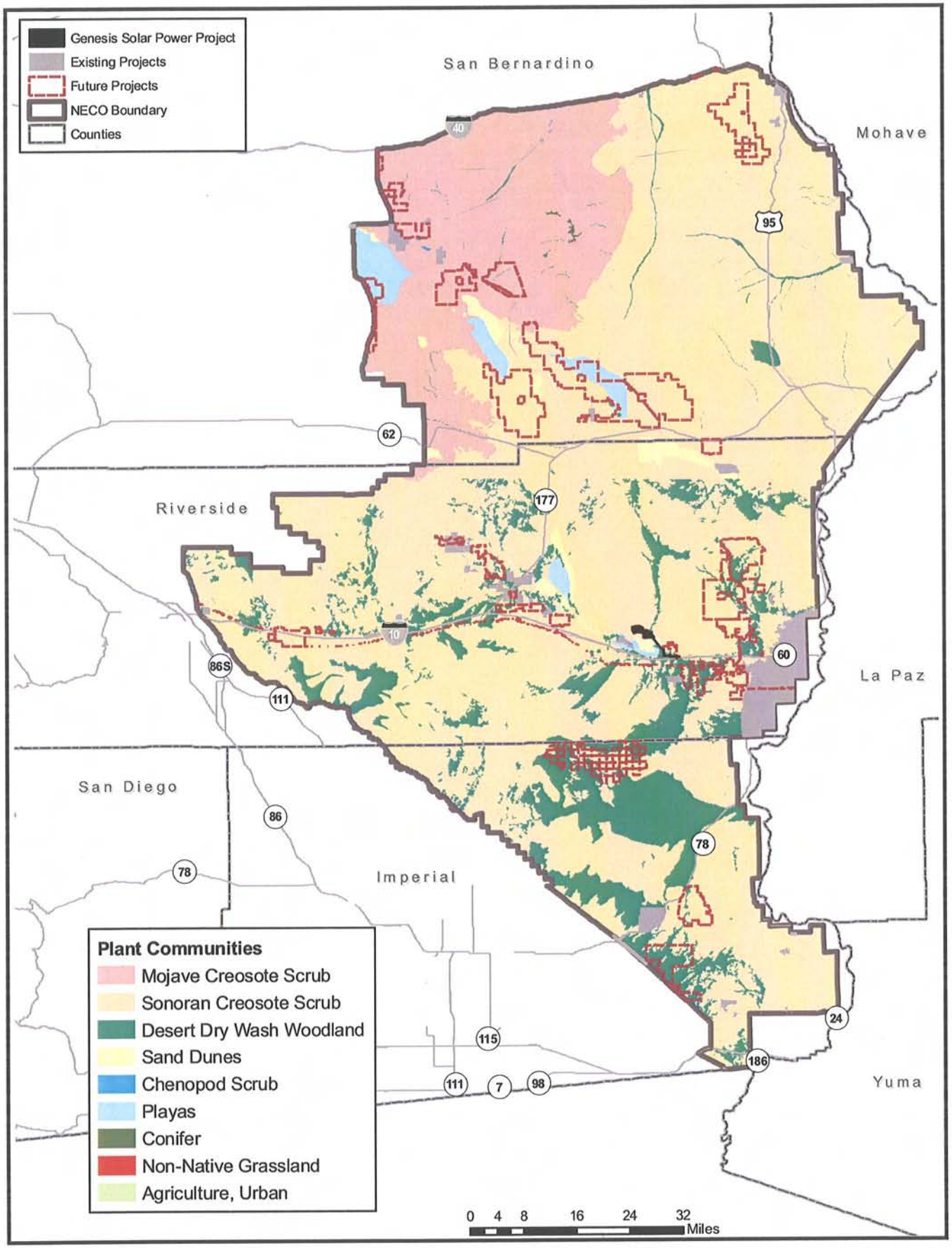


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 19A

Genesis Solar Energy Project - Plant Communities

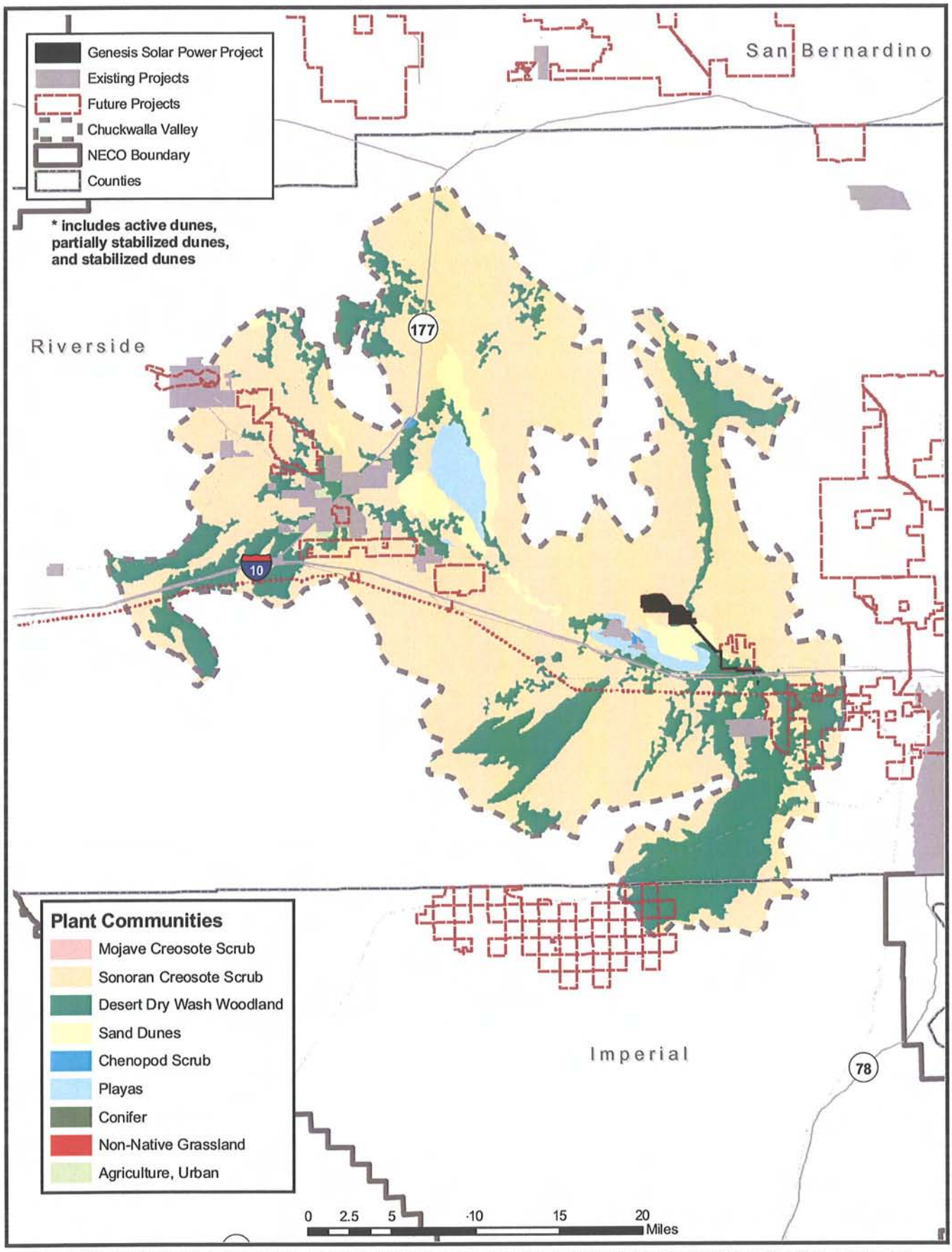


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 19B

Genesis Solar Energy Project - Plant Communities - Chuckwalla Valley

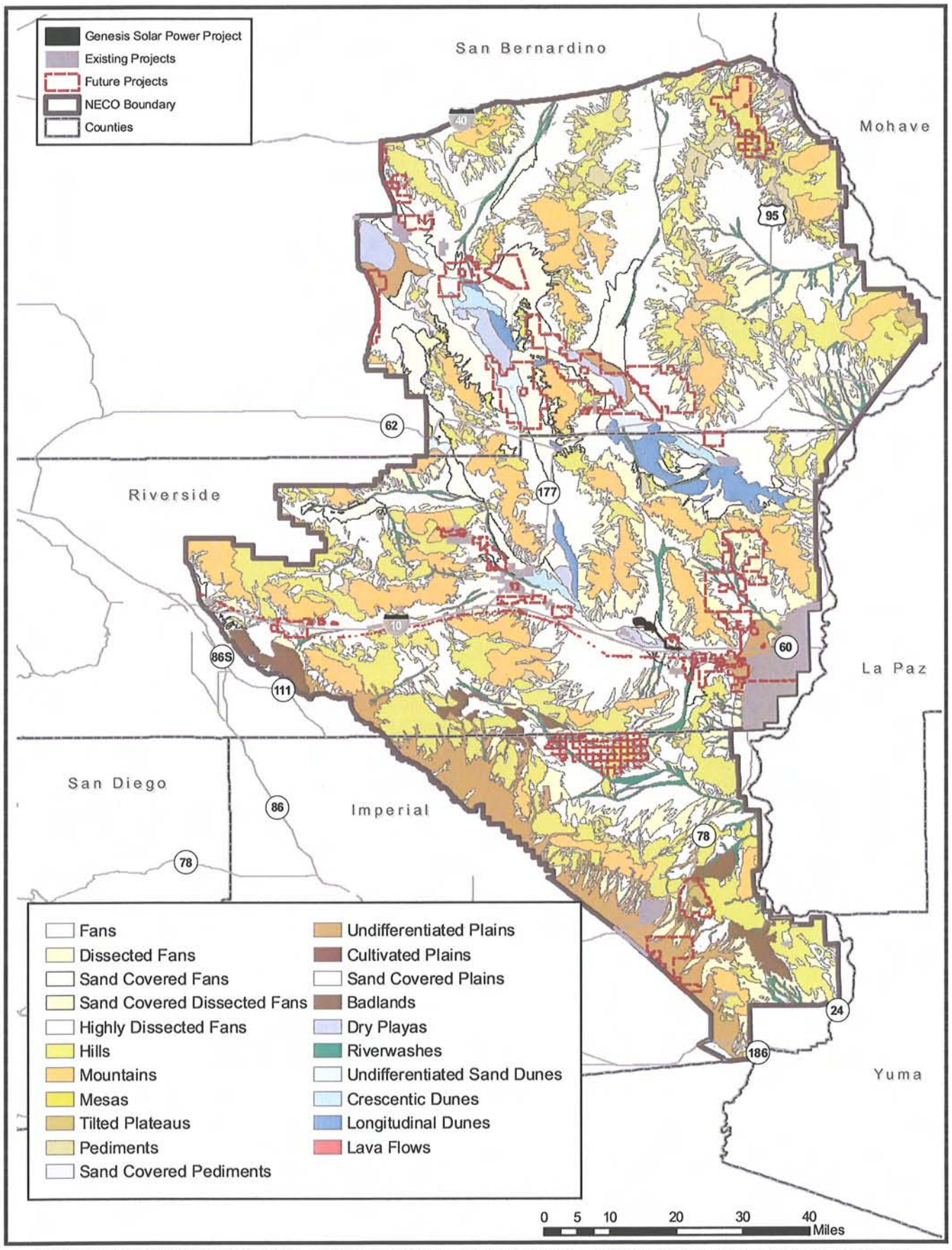


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 20

Genesis Solar Energy Project - Landforms

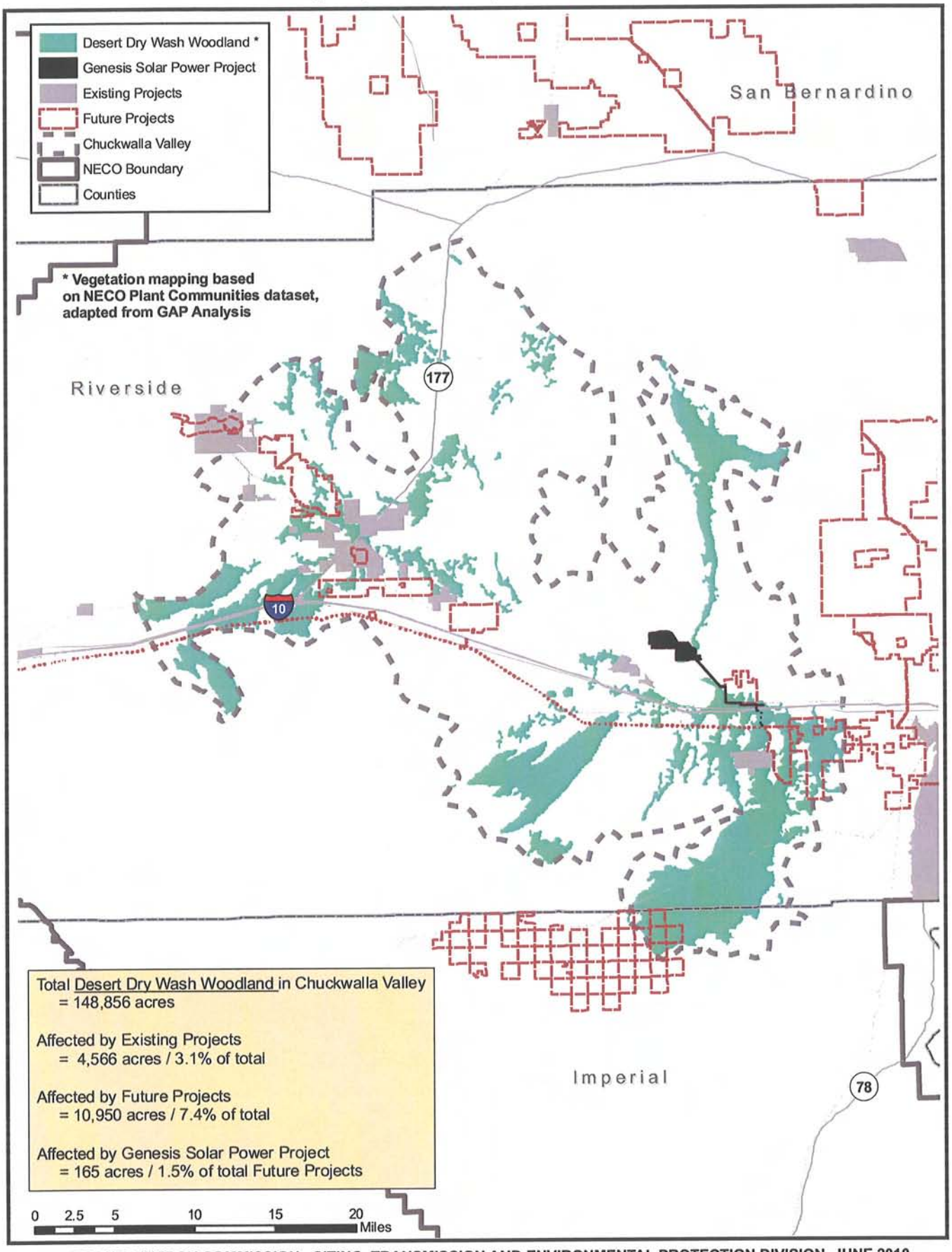


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 21

Genesis Solar Energy Project - Desert Dry Wash Woodland - Chuckwalla Valley

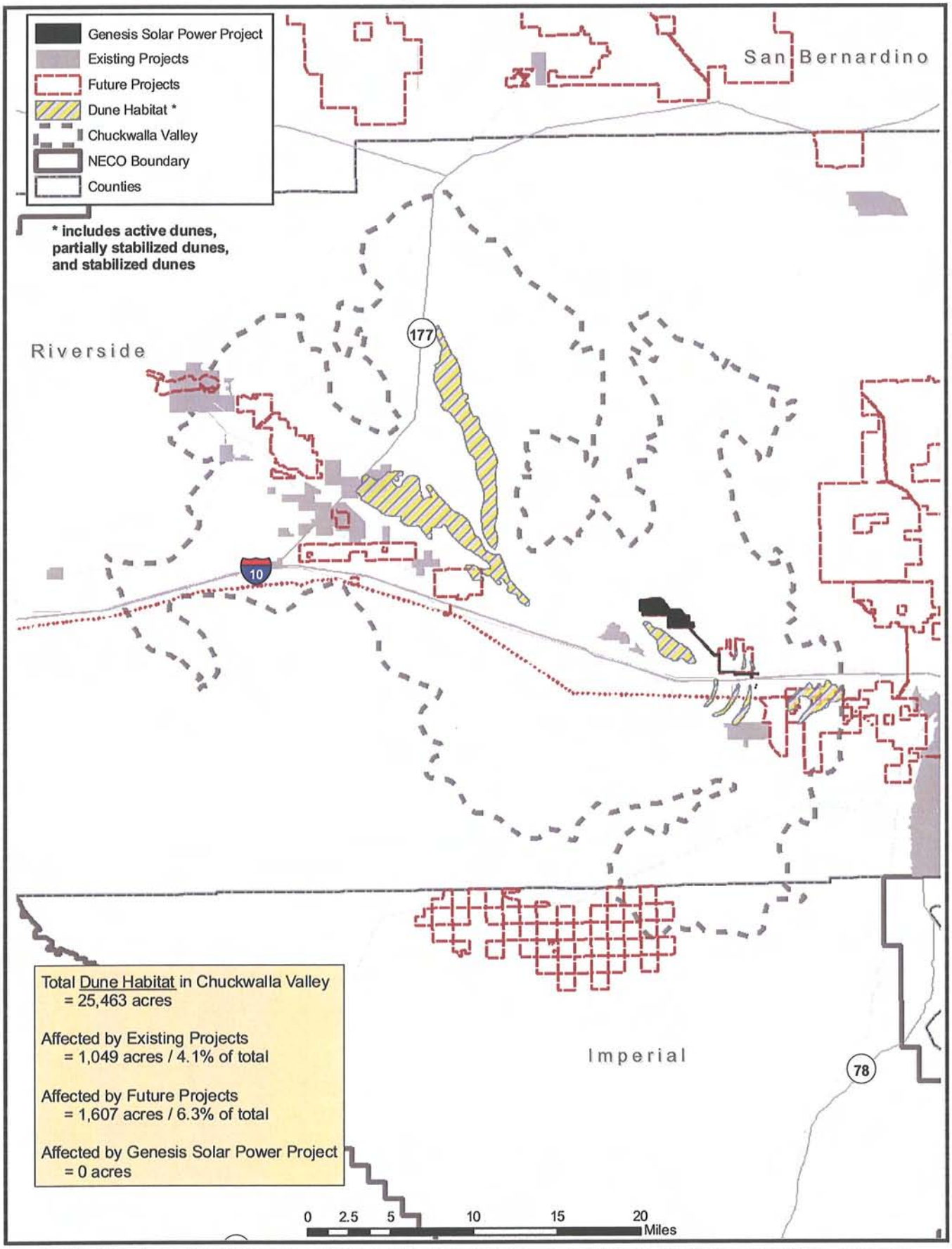


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 22

Genesis Solar Energy Project - Dune Habitat - Chuckwalla

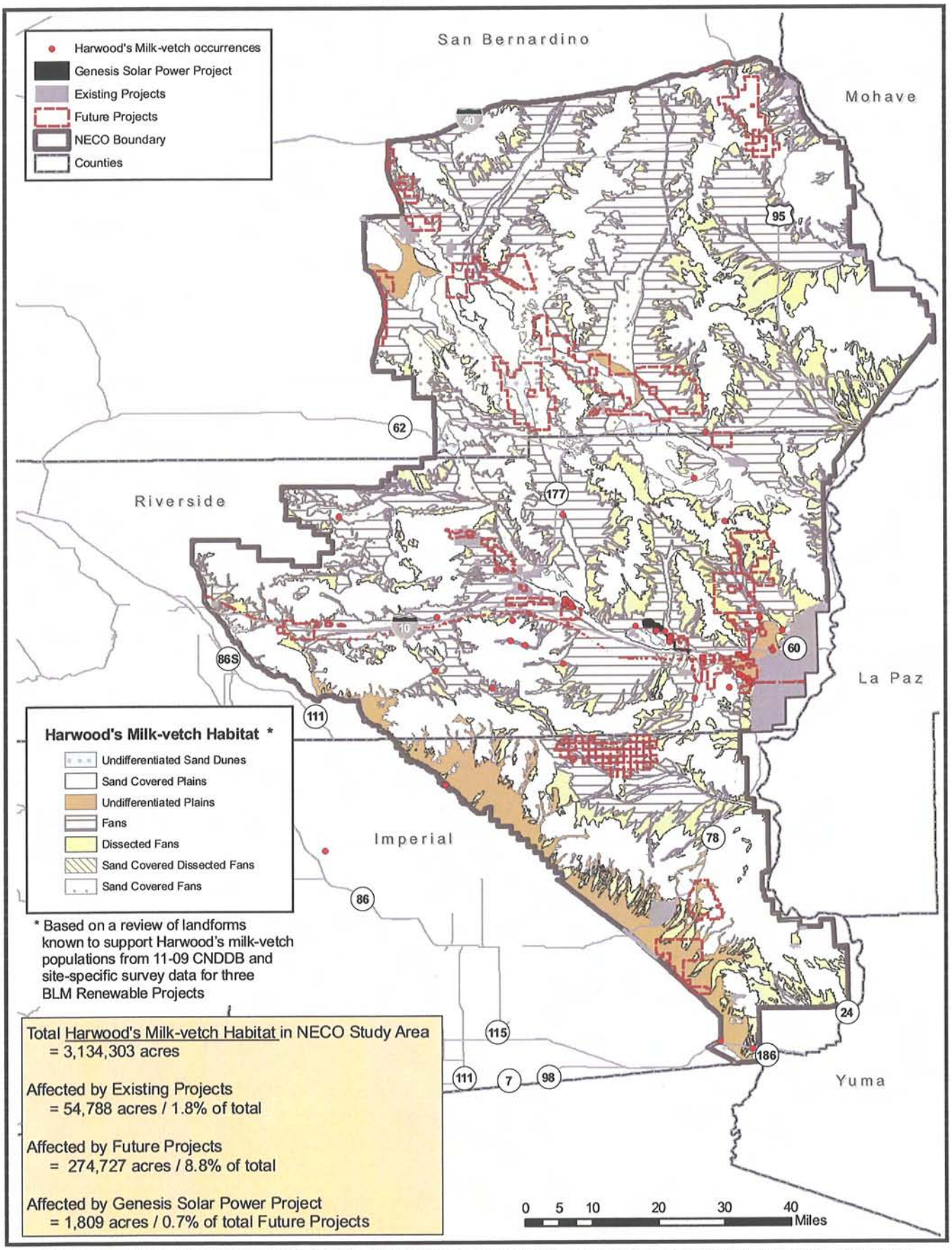


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental

BIOLOGICAL RESOURCES - FIGURE 23

Genesis Solar Energy Project - Harwood's Milk-Vetch Habitat



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION, JUNE 2010

SOURCE: CEC, BLM, Aspen Environmental