I.3 PLANNING PROCESS

I.3.1 Bureau of Land Management Land Use Planning Process

I.3.1.1 Planning Criteria

In accordance with Bureau of Land Management (BLM) planning regulations (43 Code of Federal Regulations [CFR] 1610.4-2) for BLM-administered lands, the BLM developed planning criteria to help guide data collection, alternative formulation, and impact analysis. The following criteria define the decision space or "sideboards" that define the scope of the planning effort and are based on laws, regulations, and agency guidance, serving to keep the planning process focused.

- The Environmental Impact Statement (EIS) portion of this document and land use plan amendments will be completed in compliance with the Federal Land Policy and Management Act (FLPMA), Endangered Species Act (ESA), National Environmental Policy Act (NEPA), Omnibus Public Lands Management Act of 2009, National Historic Preservation Act of 1966, and all other applicable federal laws, proclamations, legislative designations, executive orders, court orders, and management policies of the BLM.
- The DRECP is primarily driven by the need to accommodate renewable energy development and biological resource conservation. The effect of decisions on renewable energy and biological resource conservation affects other resources, uses, and values, including but not limited to physical, cultural, social, and scenic values, and uses such as land use authorizations, recreation, and mineral development within the DRECP area. In order to appropriately conserve these other resources and uses, decisions will be made on these other resources to respond to the effect on them from renewable energy development and biological resource conservation. Planning decisions will respond to changes in renewable energy and biological resource management.
- Resources, uses, and values not affected in any way by renewable energy and biological resource management are outside the scope of this Land Use Plan Amendment (LUPA). These resources, uses, and values will continue to be managed pursuant to the existing BLM land management plans, including the California Desert Conservation Area (CDCA) Plan of 1980 as amended, the Caliente Resource Management Plan (RMP), and Bishop RMP.
- The BLM will continue to manage resources and uses on BLM-administered lands by existing land use planning decisions unless specifically amended by the Record of Decision (ROD) for the LUPA and EIS component of this document.

- The BLM land use plan and resource management plans, as amended, will recognize valid existing rights (e.g., mining claims).
- The BLM will coordinate with local, state, tribal, and federal agencies during the EIS process to strive for consistency with existing plans and policies, to the extent consistent with federal law and the purposes of FLPMA. Pursuant to FLPMA, states are authorized to furnish advice to the Secretary of the Department of the Interior with respect to the development and revision of land use plans, land use guidelines, land use rules, and land use regulations for the public lands and with respect to such other land use matters as may be referred to them by the Secretary.
- The BLM decisions will be consistent and compatible with the existing Lower Colorado River Multiple Species Conservation Program and the Coachella Valley Multiple Species Habitat Conservation Plan (HCP) and Natural Community Conservation Plan (NCCP), to the extent the HCP and NCCP are consistent with federal law and FLPMA.
- The BLM decisions will be consistent and compatible with the NCCP and General Conservation Plan (GCP) decisions made by the California Department of Fish and Wildlife (CDFW) and U.S. Fish and Wildlife Service (USFWS), respectively, in responding to permit applications based on the DRECP's NCCP and GCP components, to the extent the NCCP and GCP are consistent with federal law and FLPMA.
- The BLM will coordinate with tribal governments and will provide strategies for the protection of recognized traditional uses in the EIS process, consistent with other planning criteria and in accordance with the purpose and need for the DRECP.
- The BLM will take into account appropriate protection and management of special-status plant and animal species on BLM-administered lands in the EIS and will engage in all required consultation under federal law, including any take permits necessary under the Bald and Golden Eagle Protection Act for golden eagles affected by Covered Activities.
- The BLM will take into account appropriate protection and management of cultural resources on BLM-administered lands in the EIS and will engage in all required consultation.
- The BLM will recognize existing National Landscape Conservation System (NLCS) designations, and BLM decisions will be consistent and compatible with the values for which the special designations were established.
- The BLM will recognize in the EIS the specific niche occupied by public lands in the life of the communities that surround them or that are surrounded by them and in the nation as a whole.
- The BLM will encourage public participation throughout the process.

- Environmental protection; promotion of physical, cultural, social, and scenic values; and energy production are all desirable and necessary objectives of sound land management practices and are not to be considered mutually exclusive priorities.
- The BLM will support planning to provide renewable energy opportunities to help meet public consumptive uses that contribute to climate change.
- Under constitutional principles, federal law, and regulation, and through policy implemented over significant periods of time, BLM is responsible for managing public land resources, including species and species habitat on public land. The BLM's decision on the LUPA portion of the DRECP is not constrained or determined by any other agency's action, except as required by federal law, such as the ESA.
- As described earlier, however, the BLM is coordinating with the other agencies and is directed by statute to consider other federal, state, local, and tribal programs and policies. The BLM will secure an ESA Section 7 biological opinion for its land use plan amendments, but as a federal agency, it is not an applicant for or recipient of permits from the state under the California Endangered Species Act (CESA) or the Natural Community Conservation Planning Act (NCCPA).

I.3.1.2 Types of Land Use Plan Decisions

Land use plan decisions for public lands fall into two categories: (1) desired outcomes (goals and objectives) and (2) allowable uses (including restricted or prohibited uses) and actions anticipated to achieve desired outcomes (management actions). Goals are broad statements of desired outcomes (e.g., maintain ecosystem health and productivity, promote community stability, ensure sustainable development) that usually are not quantifiable. Objectives identify specific desired outcomes for resources. Objectives are usually quantifiable and measurable. Desired future conditions can be identified in goals or objectives.

After establishing desired outcomes, the BLM identifies allowable uses for land use allocations and management actions that are anticipated to achieve these goals and objectives. "Allowable uses" is an umbrella term that defines what uses are allowable, restricted, or prohibited on certain land use allocations or areas, including subsurface mineral estate managed by the BLM. Management actions are proactive measures that will enhance resource values and can include but are not limited to resource restoration projects, daily activities, and administrative designations such as Areas of Critical Environmental Concern (ACECs) and, in the CDCA, NLCS lands.

The CDCA Plan (1980, as amended), as well as the Bishop and Caliente RMPs, establish goals and objectives, allowable uses, and management actions that will remain valid unless they are amended in the ROD.

I.3.1.3 Site-Specific Implementation Decisions and Requirements for Further Environmental Analysis

The BLM decisions evaluated in the portions of the DRECP that constitute the EIS are land use plan decisions that would guide and inform future renewable energy development and resource conservation on public (federal) lands in the Plan Area. Land use plan decisions are subject to protest to the Director under the planning regulations at 43 CFR 1610.5-2. The decisions would not authorize any specific projects or imply such approval. Any future projects would still require additional site-specific environmental analysis and a separate land use authorization such as a right-of-way grant or lease.

Implementation decisions generally relate to on-the-ground actions that BLM approves. These types of decisions generally require site-specific NEPA analysis. When the BLM considers an application, the BLM decision maker must determine if it would conform to the applicable land use plan (43 CFR 1610.5-3; Department of the Interior 2008) and what level or type of environmental documentation or analysis is required in accordance with NEPA. The BLM would retain the discretion to deny renewable energy right-of-way applications, along with geothermal leases and post-lease development, based on site-specific issues and concerns, even in areas identified as Development Focus Areas (DFAs) and Solar Energy Zones. The public would have opportunities to participate and comment during the NEPA process.

Unlike land use plan decisions, implementation decisions are not subject to protest under the planning regulations. Most implementation decisions are subject to various administrative remedies, particularly appeals to the Office of Hearing and Appeals (Interior Board of Land Appeals) unless otherwise specified by law or regulation.

I.3.1.4 Integration with the Conservation Planning Process

In addition to the BLM LUPA-specific planning criteria, types of land use plan decisions, and future site-specific implementation decisions, the BLM LUPA planning process is integrated with the conservation planning process for the DRECP. The planning criteria noted in Section I.3.1.1 recognize that the DRECP is primarily driven by the need to accommodate renewable energy development and biological resource conservation, as well as the effects of agency decisions related to those two resources on other resources, uses, and values. The proposed conservation lands designations in the LUPA have been coordinated with the biological conservation planning process and identification of the reserve design envelope as described in Section I.3.4, and renewable energy development areas identified on BLM lands have been coordinated with identification of DFAs as part of the DRECP renewable energy development planning process.

I.3.2 Natural Community Conservation Plan Planning Process

This section provides a description of the planning process used to develop the NCCP. Exhibit I.3-1a and I.3-1b illustrate the concepts and definitions of the NCCP. The NCCP includes an NCCP Conceptual Plan-Wide Reserve Design and a DRECP NCCP Reserve Design, and the approach to developing these is described in Sections I.3.2.1 and I.3.2.2.

I.3.2.1 Approach to the NCCP Conceptual Plan-Wide Reserve Design

The DRECP Plan-Wide Conservation Strategy is the Plan-wide description of how to achieve Plan-wide BGOs in the Plan Area. The Plan-wide BGOs, biological Conservation Planning Areas, biological Conservation Priority Areas, BLM Conservation Lands, and DRECP biological conservations actions are the essential elements of the DRECP Plan-Wide Conservation Strategy. The NCCP Conceptual Plan-Wide Reserve Design is the envelope defining high-priority resources needing the most durable protection and management. This envelope includes the Legislatively and Legally Protected Areas (LLPAs), BLM LUPA conservation designation lands with durability tools and/or management agreement, and biological Conservation Priority Areas on non-BLM lands. The NCCP Conceptual Plan-Wide Reserve Design reflects the highest priority areas for the creation and long-term management of habitat reserves for the conservation of the 37 proposed Covered Species and representative examples of the natural communities and processes that support the Covered Species in the Plan Area.

The following standards and criteria were used to develop the NCCP Conceptual Plan-Wide Reserve Design:

- Conserve representative landscapes and natural communities to maintain the ecological integrity of large habitat blocks, ecosystem function, and biological diversity.
    - LLPAs and Military Expansion Mitigation Lands (MEMLs) were considered existing conservation areas and as such are and would continue to be protected and managed for natural resources, including Covered Species and the natural communities and processes that support them. The LLPAs and MEMLs formed building blocks of the NCCP Conceptual Plan-Wide Reserve Design.
    - Ecoregion subareas were used to subdivide the Plan Area into ecological units to ensure the capture of representative landscapes across the Plan Area.

- Conserve important habitat areas that also provide habitat linkages for the movement and interchange of organisms within the Plan Area and to areas outside the Plan Area.
  - Important habitat linkage areas were included in the NCCP Conceptual Plan-Wide Reserve Design using species-specific linkage information for key Covered Species, including desert tortoise (*Gopherus agassizii*), Mohave ground squirrel (*Xerospermophilus mohavensis*), and desert bighorn sheep (*Ovis canadensis nelsoni*).
  - Landscape-scale, multispecies habitat linkage information was used to identify movement corridors between habitat blocks inside and outside the Plan Area.
  - Species-specific threats and stressor information was incorporated to identify the linkage areas critical for inclusion in the NCCP Conceptual Plan-Wide Reserve Design.
- Including the NCCP Conceptual Plan-Wide Reserve Design and Biological Conservation Actions, protect and maintain habitat areas large enough and of appropriate quality to support sustainable populations and contribute to the recovery of declining or vulnerable Covered Species.
  - Resource-specific conservation strategies were developed for logical groupings of Covered Species, including:
    - Species-specific conservation strategies
    - Riparian and wetland conservation strategy
    - Dune conservation strategy
    - Plant Covered Species
    - Agricultural species conservation strategy
  - Species-specific conservation factors were considered for each of the 37 Covered Species to determine areas necessary for inclusion in the NCCP Conceptual Plan-Wide Reserve Design and Biological Conservation Actions to support sustainable populations, including:
    - Species' population trends
    - Species' stressors and threats
    - Species' distribution and density
    - Terrestrial habitat intactness
    - Climate refugia
- Include conservation of environmental gradients and areas of high habitat diversity.

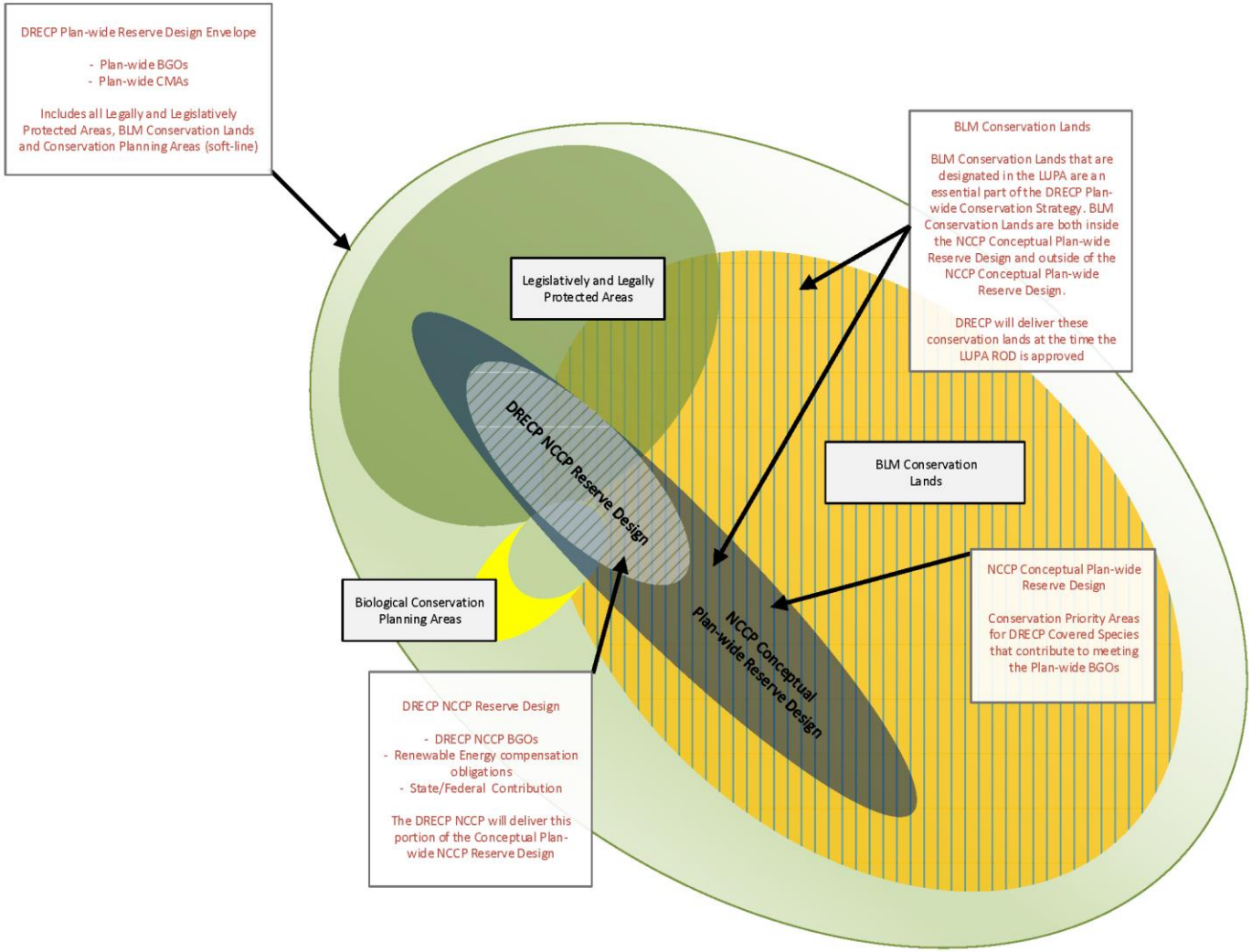


Exhibit I.3-1a DRECP and NCCP Reserve Design Concepts and Definitions

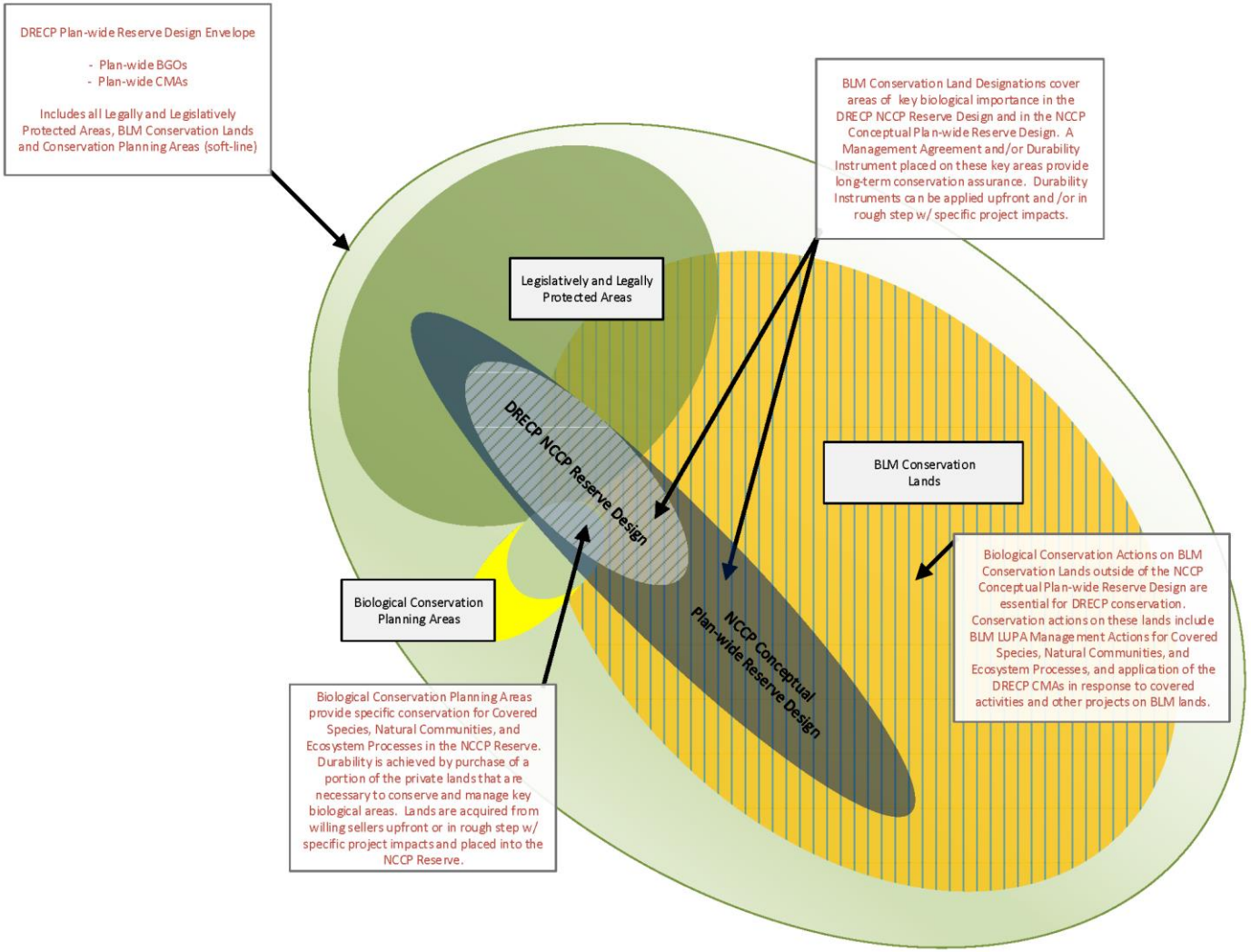


Exhibit I.3-1b DRECP and NCCP Reserve Design Durability Concepts

I.3.2.2 Approach to the DRECP NCCP Reserve Design

The DRECP NCCP addresses renewable energy and transmission Covered Activities and provides for the conservation and management of Covered Species at a scale commensurate with the scale of the impacts that will result from Covered Activities. The DRECP NCCP Reserve Design identifies priority areas for the DRECP NCCP Reserve and consists of certain BLM Conservation Designations Lands and certain biological Conservation Priority Areas. The DRECP NCCP Reserve Design is a subset of the NCCP Conceptual Plan-Wide Reserve Design, and the DRECP NCCP Reserve Design was developed using the same standards and criteria as the NCCP Conceptual Plan-Wide Reserve Design. The DRECP NCCP Reserve Design was identified based on best available information on Covered Species presence, distribution, and life history requirements, as well as the effects of Covered Activities and associated compensation requirements. Acquisition and non-acquisition compensation for the impacts of the DRECP Covered Activities would be directed primarily to areas within the DRECP NCCP Reserve Design.

I.3.3 General Conservation Plan Planning Process

The DRECP Plan-Wide Conservation Strategy is the Plan-wide description of how to achieve Plan-wide BGOs in the Plan Area. The Plan-wide BGOs, Plan-Wide Reserve Design Envelope, and Conservation and Management Actions (CMAs) are the essential elements of the DRECP Plan-Wide Conservation Strategy. The GCP contributes to the DRECP Plan-Wide Conservation Strategy through establishing a process for issuing incidental take authorizations for renewable energy and transmission projects on nonfederal lands through programmatic, strategic habitat conservation at a landscape scale. The GCP would contribute to meeting the BGOs through acquisition and non-acquisition actions (and monitoring and adaptive management) in the DRECP Conservation Area implemented as compensation for Covered Activities on nonfederal lands and by ensuring Covered Activities on nonfederal lands are implemented consistent with the avoidance and minimization actions identified in the DRECP CMAs.

This section provides a description of the GCP planning process used to develop the DRECP conservation strategy for nonfederal lands. For renewable energy development on nonfederal lands, individual project proponents, local jurisdictions, or state agencies may need incidental take authorization under Section 10(a)(1)(B) of the ESA for project-related impacts to federally listed species. Two applicants, the California Energy Commission (CEC) and California State Lands Commission (CSLC), have requested individual incidental take permits under the GCP as part of the DRECP planning process. CEC has renewable energy project licensing authority for thermal power plants that are 50 or more megawatts in size. The CSLC has landowner jurisdiction over small proportions of the nonfederal lands within the Plan Area. To provide a streamlined permitting process for CEC and CSLC, and for

future applicants who may wish to participate in the DRECP after it is approved, the USFWS is structuring the GCP component of the DRECP as an "umbrella" type of programmatic HCP. The proposed GCP and its streamlined application process are detailed in Appendix M.

The USFWS is working directly with CEC and CSLC to document how their proposed permit applications would meet issuance criteria and be consistent with the GCP component of the DRECP, and will likewise work with future applicants who wish to participate in the GCP. If, after public review of the GCP component of the draft DRECP Environmental Impact Report (EIR)/EIS, the USFWS determines issuance criteria for the GCP are met, the USFWS can issue permits to CEC and CSLC and begin considering streamlined issuance of permits to future applicants for renewable energy development proposals that are consistent with the GCP after the ROD is signed.

I.3.4 DRECP Biological Conservation Planning Process

This section describes the DRECP biological conservation planning process used to develop the DRECP biological conservation strategy, which forms the biological foundation for the BLM LUPA and the foundation of the NCCP and GCP that the CDFW and USFWS will consider for approval under the NCCPA and ESA. The DRECP biological conservation strategy is the approach for conserving Covered Species and natural communities, and the landscape and ecological processes that support them, within the Plan Area. It includes the biological elements of the BLM LUPA and addresses the impacts of proposed Covered Activities through prescribing CMAs for the renewable energy and transmission development elements of the DRECP.

The process described below focuses primarily on the biological conservation components of the planning process, but this conservation planning process was fully integrated with the BLM land use planning process described in Section I.3.1, the NCCP planning process described in Section I.3.2, the GCP planning process described in Section I.3.3, and the renewable energy planning process described in Section I.3.5. This integrated planning process, which considered all biological resources on federal and nonfederal lands and non-biological resources and uses on BLM-administered lands within the Plan Area, produced the DRECP alternatives described in Volume II of this document. The integration process included combining the biological and non-biological elements of the BLM LUPA with the biological conservation elements for the GCP and NCCP with the renewable energy planning elements to produce a single integrated planning document.

As part of the DRECP integrated planning process, scientific input and recommendations were incorporated at all stages. Early in the planning process, the DRECP Independent Science Advisors (ISA) provided written recommendations that were used to inform the DRECP biological conservation planning process (DRECP ISA 2010). During development of the profiles for the Covered Species, individual species experts provided review of the

baseline information being used for the DRECP Covered Species. In 2012, a second group of scientists was convened, the DRECP Independent Science Panel (ISP), which provided additional written recommendations for incorporating the latest science into the DRECP (DRECP ISP 2012). In late 2012 and early 2013, independent species modeling experts were gathered to review, revise, and refine the species distribution models being used for DRECP Covered Species. Appendix E provides a summary of responses to the DRECP ISA and ISP recommendations.

The biological conservation planning process included the following roughly sequential steps:

1. Establish the conservation focus (e.g., Covered Species and natural communities)
2. Gather baseline biological information
3. Identify Biological Goals and Objectives (BGOs)
4. Develop reserve design
5. Develop Conservation and Management Actions (CMAs)
6. Develop Monitoring and Adaptive Management Program (MAMP)

These biological conservation planning steps are described in Sections I.3.4.1–I.3.4.6.

I.3.4.1 Establish the Biological Conservation Focus

The biological conservation focus includes the species and natural communities that the conservation strategy would focus on conserving. Proposed Covered Species, habitats, and natural communities would be "covered" under the action alternative's conservation strategy and include those taxa addressed in the EIR/EIS for which the applicants will seek incidental take permits for Covered Activities under Section 2835 of the NCCPA and/or Section 10 of the ESA. The biological conservation focus was established through:

- DRECP Planning Agreement (May 2010)
  - Preliminary lists of natural communities and species to be considered in the initial planning focus for the DRECP were identified in the Planning Agreement developed by Renewable Energy Action Team (REAT) agencies.
- DRECP ISA recommendations (October 2010)
  - Recommendations for additions and removals from the Planning Agreement list of species were provided by the ISA.
  - Natural community classification and mapping recommendations provided by the ISA.

- Stakeholder and public input
  - Stakeholder input gathered through:
    - Regular stakeholder meetings from 2010 through 2012
    - A stakeholder member-based Covered Species Working Group and Resource Mapping Working Group
    - Comments collected on numerous early DRECP documents, including the *DRECP Draft Natural Communities and Covered Species Preliminary Description* (DRECP 2010), the *DRECP Framework Conservation Strategy Report* (Dudek and ICF 2011a), the *DRECP Preliminary Conservation Strategy* (Dudek and ICF 2011b), and the *Description and Comparative Evaluation of Draft DRECP Alternatives* (CEC et al. 2012)
- Covered and Planning Species lists and selection process
  - The proposed Covered Species list for the public review draft DRECP includes 37 covered taxa (Table I.3-1).
  - Potential species for consideration as Covered Species were selected using iterative stakeholder input and a systematic filtering process detailed in Appendix B to this document. Agencies reviewed the results of the filtering process. The agency review process resulted in modifications to the results of the filtering process that included recommendations for removal of 11 species originally identified in the filtering process for consideration as proposed Covered Species and shifting of an additional two species for consideration as proposed Covered Species to Planning Species. The list of these species and the rationale for these decisions is shown in Table I.3-2. The combination of the Appendix B filtering process and agency review (Table I.3-2) yielded the proposed Covered Species for the Draft DRECP (Table I.3-1).
  - Planning species would not be covered for take, but these species were used in the development of the conservation strategy. The planning species include burro deer (*Odocoileus hemionus eremicus*) and desert kit fox (*Vulpes macrotis arsipus*).
- Natural community mapping and classification system
  - The development of the DRECP land cover map included the collection of new mapping data in key portions of the Plan Area, development of a Plan-wide hierarchical natural community classification system, and standardization of existing mapping data in areas without new data.
  - The DRECP land cover map established both the structure and the data for characterizing the natural communities. Table I.3-3 is the list of natural communities used in developing the conservation strategy, which includes 31

natural communities within 9 general community groupings. Additional detail regarding the natural communities in the Plan Area is provided in the *Baseline Biology Report* (included as Appendix Q to this document).

Table I.3-1
Proposed Covered Species List

Common Name	Scientific Name	Federal Status[1]	State Status[2]	CNDDB[3] Conservation Status
Amphibian/Reptile				
Agassiz's desert tortoise	*Gopherus agassizii*	FT	ST	G4 S2
Flat-tailed horned lizard	*Phrynosoma mcallii*	BLM/FS	CSC	G3 S2
Mojave fringe-toed lizard	*Uma scoparia*	BLM	CSC	G3G4 S3S4
Tehachapi slender salamander	*Batrachoseps stebbinsi*	BLM/FS	ST	G2 S2
Bird				
Bendire's thrasher	*Toxostoma bendirei*	BCC/BLM	CSC	G4G5 S3
Burrowing owl	*Athene cunicularia*	BLM	CSC	G4 S2
California black rail	*Laterallus jamaicensis coturniculus*	BCC/BLM	ST/FP	G4T1 S1
California condor	*Gymnogyps californianus*	FE	SE/FP	G1 S1
Gila woodpecker	*Melanerpes uropygialis*	BLM/BCC	SE	G5 S1S2
Golden eagle	*Aquila chrysaetos*	BLM	FP	G5 S3
Greater sandhill crane	*Grus canadensis tabida*	BLM/FS	ST/FP	G5T4 S2
Least Bell's vireo	*Vireo bellii pusillus*	FE/BCC	SE	G5T2 S2
Mountain plover	*Charadrius montanus*	BCC/BLM	CSC	G2 S2?
Swainson's hawk	*Buteo swainsoni*	BLM/FS	ST	G5 S2
Tricolored blackbird	*Agelaius tricolor*	FC/BCC/BLM	CSC	G2G3 S2
Western yellow-billed cuckoo	*Coccyzus americanus occidentalis*	FC/FS/BCC/BLM	SE	G5T3Q S1
Willow flycatcher (including southwestern)	*Empidonax traillii* (including *extimus*)	Southwestern: FE	SE	G5 S1S2 Southwestern : G5T1T2 S1
Yuma clapper rail	*Rallus longirostris yumanensis*	FE/BCC	ST/FP	G5T3 S1
Fish				
Desert pupfish	*Cyprinodon macularius*	FE	SE	G1 S1
Mohave tui chub	*Siphateles (Gila) bicolor mohavensis*	FE	SE/FP	G4T1 S1
Owens pupfish	*Cyprinodon radiosus*	FE	SE/FP	G1 S1

Table I.3-1
Proposed Covered Species List

Common Name	Scientific Name	Federal Status[1]	State Status[2]	CNDDB[3] Conservation Status
Owens tui chub	*Siphateles (Gila) bicolor snyderi*	FE	SE	G4T1 S1
Mammal				
California leaf-nosed bat	*Macrotus californicus*	BLM/FS	CSC	G4 S2S3
Desert bighorn sheep	*Ovis canadensis nelsoni*	BLM	FP*	G4T4 S3
Mohave ground squirrel	*Xerospermophilus mohavensis*	BLM	ST	G2G3 S2S3
Pallid bat	*Antrozous pallidus*	BLM/FS	CSC	G5 S3
Townsend's big-eared bat	*Corynorhinus townsendii*	BLM/FS	CSC/ Candidate	G4 S2S3
Plant				
Alkali mariposa-lily	*Calochortus striatus*	BLM	(CRPR 1B.2)	G2 S2
Bakersfield cactus	*Opuntia basilaris* var. *treleasei*	FE	SE (CRPR 1B.1)	G5T3 S3
Barstow woolly sunflower	*Eriophyllum mohavense*	BLM	(CRPR 1B.2)	G2 S2
Desert cymopterus	*Cymopterus deserticola*	BLM	(CRPR 1B.2)	G2 S2
Little San Bernardino Mountains linanthus	*Linanthus maculatus*	BLM	(CRPR 1B.2)	G2 S2
Mojave monkeyflower	*Mimulus mohavensis*	BLM	(CRPR 1B.2)	G2 S2
Mojave tarplant	*Deinandra mohavensis*	BLM	SE (CRPR 1B.3)	G2G3 S2S3
Owens Valley checkerbloom	*Sidalcea covillei*	BLM	SE (CRPR 1B.1)	G3 S3
Parish's daisy	*Erigeron parishii*	FT	(CRPR 1B.1)	G2 S2
Triple-ribbed milk-vetch	*Astragalus tricarinatus*	FE	(CRPR 1B.2)	G1 S1

Notes:

1 Federal Status—FE: Federally Endangered; FT: Federally Threatened; FC: Federal Candidate Species; FS: Forest Service Sensitive; BLM: Bureau Land Management sensitive; BCC: Bird of Conservation Concern

2 State Status—SE: State Endangered; ST: State Threatened; CSC: California Species of Concern; FP: Fully Protected; *: limited hunting; CRPR = California Rare Plant Rank. See https://www.cnps.org/cnps/rareplants/ranking.php for an explanation of CRPRs.

3 CNDDB = California Natural Diversity Database. See http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/spplants.pdf, page v, for an explanation of these ranks.

Table I.3-2
Covered Species List Revisions Since 2013

Common Name	Scientific Name	Rationale
Planning		
Burro deer	*Odocoileus hemionus eremicus*	Widely distributed; listing not likely during permit term
Desert kit fox	*Vulpes macrotis arsipus*	Widely distributed; influenced reserve design; not a sensitive species,
Removed		
Arroyo toad	*Anaxyrus californicus*	Not likely to be affected by Covered Activities due to distribution; addressed through riparian CMAs; take can be avoided through riparian setbacks
Arizona bell's vireo	*Vireo bellii arizonae*	Operational effects only; in the Plan Area, associated with the Colorado River only, which will not be affected by the Plan
Elf owl	*Micrathene whitneyi*	Not likely to be affected by Covered Activities; distribution addressed through riparian CMAs; in the Plan Area, associated with remnant riparian areas in the Colorado River only, which will not be affected by the Plan; take can be avoided through riparian setbacks
Peninsular bighorn sheep	*Ovis canadensis nelsoni* (Peninsular Ranges Distinct Population Segment)	Not likely to be affected by Covered Activities due to distribution; primarily in LLPAs
Mojave river vole	*Microtus californicus mohavensis*	Not likely to be affected by Covered Activities due to habitat; addressed through riparian CMAs; take can be avoided through riparian setbacks
Bare-stem larkspur	*Delphinium scaposum*	Occurs in Whipple Mountains only, which would not be affected by the Plan; not likely to be affected by Covered Activities due to distribution
Cushenbury buckwheat	*Eriogonum ovalifolium* var. *vineum*	Not likely to be affected by Covered Activities; primarily confined to federal lands; avoidance surveys required on BLM lands
Flat-seeded spurge	*Chamaesyce platysperma*	Not enough baseline information for take coverage; conserved through dune CMAs
Lane mountain milk vetch	*Astragalus jaegerianus*	Primarily confined to federal lands except for 2,000 acres in-holdings within BLM ACEC and approximately 200 acres in CSLC lands; avoidance surveys required on BLM lands

Table I.3-2
Covered Species List Revisions Since 2013

Common Name	Scientific Name	Rationale
Munz's cholla	*Cylindropuntia munzii*	Occurs largely on Chocolate Mountains gunnery range (Department of Defense lands), which DRECP cannot manage; can avoid; avoidance surveys required on BLM lands
Palmer's jackass clover	*Wislizenia refracta* ssp. *palmeri*	Avoidance surveys required on BLM lands; Addressed through dunes CMAs
Parish's alkali grass	*Puccinellia parishii*	Avoidance required through wetlands CMAs; avoidance surveys required on BLM lands
Parish's phacelia	*Phacelia parishii*	Known occurrences primarily located on BLM lands; avoidance surveys required on BLM lands
White margined beardtongue	*Penstemon albomarginatus*	Minimal potential for effects by Covered Activities; primarily on BLM lands; avoidance surveys required on BLM lands

Table I.3-3
Natural Communities List

General Community Groupings	Natural Community
California forest and woodlands	Californian broadleaf forest and woodland
	Californian montane conifer forest
Chaparral and coastal scrubs (cismontane scrub)	Californian mesic chaparral
	Californian pre-montane chaparral
	Californian xeric chaparral
	Central and south coastal California seral scrub
	Central and south coastal Californian coastal sage scrub
	Western Mojave and western Sonoran Desert borderland chaparral
Desert conifer woodlands	Great Basin pinyon–juniper woodland
Desert outcrop and badlands	North American warm desert bedrock cliff and outcrop
Desert scrubs	Arizonan upland Sonoran Desert scrub
	Intermontane deep or well-drained soil scrub
	Intermontane seral shrubland
	Intermountain dry shrubland and grassland
	Intermountain mountain big sagebrush shrubland and steppe
	Lower bajada and fan Mojavean–Sonoran Desert scrub
	Mojave and Great Basin upper bajada and toeslope

Table I.3-3
Natural Communities List

General Community Groupings	Natural Community
	Shadscale–saltbush cool semi-desert scrub
	Southern Great Basin semi-desert grassland
Dunes	North American warm desert dunes and sand flats
Grasslands	California annual and perennial grassland
	California annual forb/grass vegetation
Riparian[1]	Madrean warm semi-desert wash woodland/scrub
	Mojavean semi-desert wash scrub
	Sonoran–Coloradan semi-desert wash woodland/scrub
	Southwestern North American riparian evergreen and deciduous woodland
	Southwestern North American riparian/wash scrub
Wetlands[2]	Arid west freshwater emergent marsh
	Californian warm temperate marsh/seep
	North American warm desert alkaline scrub and herb playa and wet flat
	Southwestern North American salt basin and high marsh

Notes:
[1] The DRECP land cover map also includes a small acreage of "undifferentiated" riparian land cover.
[2] The DRECP land cover map also includes a small intermountain basins alkaline–saline shrub wetland and Southwestern North American alkali marsh/seep vegetation and "undifferentiated" playa and open water land cover.

I.3.4.2 Gather Baseline Biological Information

Baseline biological information comes from a wide variety of sources and consists of information in the scientific literature, spatial data for Covered Species and natural communities, and a variety of other relevant physiographic geographic information system (GIS) data, including land use and ownership data, climate data, existing land management plans and conservation plans, and expert knowledge. Once the data were gathered, they were analyzed, organized, and documented, including in the following:

- Early DRECP documents (referenced in Section I.3.4.1)
- Biological resources affected environment discussion (Chapter III.7)
- DRECP *Baseline Biology Report* (Appendix Q)
  - Physical and ecological process descriptions
  - Natural community descriptions
  - Covered Species profiles and models
  - References and metadata

The gathering and use of biological information and data is an ongoing process, and biological information and data are continuously being updated and refined throughout the planning process as new data become available. The process for collecting and integrating new information through Plan implementation is also an important component of the MAMP, which is described in Section I.3.4.6.

I.3.4.3 Identify Biological Goals and Objectives

Biological goals are broad guiding principles for a biological conservation strategy. Biological objectives are biological conservation targets or conditions that articulate a desired outcome resulting from implementation of a biological conservation strategy. For the DRECP conservation planning process, the BGOs have been expressed at two levels: (1) Plan-wide BGOs and (2) Step-Down Biological Objectives (see Appendix C). These levels are described as the following:

- At the Plan-wide level, the BGOs describe the overall guiding principles, conservation targets, and conditions considered necessary to conserve the landscape and ecological processes, natural communities, and Covered Species across the Plan Area. Plan-wide BGOs are an expression of the total desired conservation for each biological resource independent from the contribution provided from DRECP implementation.
- The Step-Down Biological Objectives describe how implementation of the DRECP would contribute to meeting the Plan-wide BGOs. Because the DRECP does not address all activities and uses in the Plan Area, the DRECP cannot bear the full burden of achieving Plan-wide BGOs. For that reason, the Step-Down Biological Objectives represent the desired conservation for each biological resource that would result from DRECP implementation. The Step-Down Biological Objectives would be adopted as biological objectives of the BLM land use plans, as described in Section I.3.1, and as the biological objectives of the NCCP and GCP, as described in Sections I.3.2 and I.3.3.

A description of the BGO development process is provided in Appendix C. Table C-1 in Appendix C provides the landscape, natural community, and Covered Species BGOs. The following are key points regarding the BGO development process:

- BGO development was guided by the broad biological goals established in the DRECP Planning Agreement (May 2010):
    - Provide for the long-term conservation and management of Covered Species within the Plan Area
    - Preserve, restore, and enhance natural communities and ecosystems that support Covered Species within the Plan Area

- Stakeholders and public participation in the BGO development process was facilitated through:
  - Early DRECP documentation, including the *DRECP Preliminary Conservation Strategy* (Dudek and ICF 2011a)
  - BGOs Stakeholder Workshop (January 2012)
  - Stakeholder meeting on BGOs and Draft BGOs Memo (March 2012)
  - *Description and Comparative Evaluation of Draft DRECP Alternatives* (CEC et al. 2012)
  - Posting of preliminary draft BGOs for key species on DRECP website on April 10, May 20, and June 17, 2013
  - BGOs were developed through a synthesis of the baseline biological information (Section I.3.4.2) for the landscape elements, natural communities, and Covered Species identified as the DRECP biological conservation focus (Section I.3.4.1).
  - Covered Species and natural community distribution in the Plan Area, status and trends, life history, sensitivity to potential threats and stressors, and the potential to be affected by Covered Activities and other uses
  - Principles of conservation biology (see Appendix D, Reserve Design Development Process and Methods) and physical/ecological process information guided the establishment of landscape-scale goals focusing on reserve design, connectivity, and ecological processes.
  - The BGOs follow a three-tiered approach based on the concepts of scale and are hierarchically organized at the following levels:
    - Landscape
    - Natural community
    - Covered Species
- The primary Plan-wide goals at the landscape, natural community, and Covered Species level are stated below. These primary Plan-wide goals were the guiding vision for developing the specific Plan-wide BGOs for landscape features, natural communities, and Covered Species.
  - At the *landscape level*, the primary Plan-wide goal is to create a Plan-wide, connected, landscape-scale reserve system consisting of a mosaic of large habitat blocks of constituent natural communities that maintains ecological integrity, ecosystem function, and biological diversity, and that allows adaptation to changing conditions (including activities that are not covered by the DRECP), and includes temperature and precipitation gradients, elevation gradients, and a

diversity of geological facets to accommodate range contractions and expansions in response to climate change.

  - At the *natural community level*, the primary Plan-wide goal is to promote biodiversity and ecological function of each natural community (Table I.3-3), and to benefit native or Covered Species dependent on, or closely associated with, each natural community.
  - At the *species level*, the primary Plan-wide goal is to protect, manage, and contribute to recovery of viable self-sustaining populations of Covered Species throughout the species' distribution in the Plan Area, including conserving sufficient habitat and resources to adapt to environmental change through time.

- The Plan-wide conservation objectives typically express the desired geospatial configurations of conservation and/or desired resource conditions. The following factors were considered in developing the Plan-wide objectives:
  - Resource distribution in the Plan Area
  - Species movement and dispersal in the Plan Area
  - Population structure
  - Data quality (e.g., species occurrence data, species habitat model results, natural community mapping)
  - Expert knowledge of the resource
  - Species population trend, including stressors and threats
- The Step-Down Biological Objectives express how implementation of the DRECP would contribute to meeting the Plan-wide BGOs. The Step-Down Biological Objectives are structured to include specific objectives for the following elements of the DRECP conservation strategy for each biological resource:
  - Reserve design elements of the Step-Down Biological Objectives describe the desired conservation that would occur in existing conservation areas, BLM LUPA conservation designations on BLM-administered lands, and non-BLM lands added to the DRECP Conservation Area through DRECP implementation.
  - Avoidance and minimization elements of the Step-Down Biological Objectives describe the desired avoidance and minimization that would be implemented under the DRECP conservation strategy for biological resources associated with Covered Activities.
    - Monitoring and adaptive management elements of the Step-down Objectives describe the monitoring and management that would be implemented under the DRECP conservation strategy.

The DRECP BGOs developed through this process are provided in Table C-1 of Appendix C.

I.3.4.4 Develop Reserve Design

Drawing upon the wealth of wildlife agency, other public agency, and outside scientific and stakeholder input, the reserve design development process was a collaborative and iterative process. The multiyear process was led by REAT agency (USFWS, BLM, CDFW, and CEC) staff from state and local field offices, the CSLC, and other participating agencies (including the National Park Service and California State Parks), and focused on applying the best available data and expert knowledge to the reserve design process. Key aspects of the reserve design development process and approach are described below with additional detail provided in Appendix D.

I.3.4.4.1 Purpose of the Reserve Design Process

The primary purpose of the reserve design development process was to:

- Develop a reserve design envelope that identifies important areas for conservation in the Plan Area, outside existing protected areas, to meet Plan-wide BGOs for Covered Species, natural communities, and the associated landscape features and processes
- Fulfill relevant requirements of the NCCPA
- Identify areas not important for the conservation of Covered Species, natural communities, and associated landscape features and processes where siting renewable energy development would have the least conflicts with biological resources

The reserve design envelope developed through the reserve design process described here would not be implemented under any DRECP alternative. Instead, the reserve design envelope was used to create a DRECP Plan-Wide Reserve Design Envelope for each action alternative (Preferred Alternative and Alternatives 1–4), including the BLM LUPA conservation designations and Conservation Planning Areas for each alternative as described in Volume II. Additionally, the reserve design process informed the development of the Interagency Plan-Wide Conservation Priority Areas for each alternative, which are the basis for the NCCP Conceptual Plan-Wide Reserve Design of each alternative. Finally, the reserve design envelope described here was used in the identification of DFAs for each alternative, as described in Section I.3.6.

I.3.4.4.2 Goals and Principles for the Reserve Design

As described in Section I.3.4.3, the DRECP biological goals provide the overall conservation vision for the reserve design, and the DRECP biological objectives describe the desired conditions of the reserve design. The BGOs developed for landscape features

and processes, natural communities, and Covered Species are provided in Appendix C. These Plan-wide BGOs guided development of the DRECP reserve design envelope.

Additionally, the following conservation planning principles guided the reserve design development process:

- Maximize conservation area size
- Maintain connectivity
- Minimize edge
- Target high-quality, representative examples of all natural communities
- Target areas with limited access
- Buffer urban and rural use impacts
- Preserve irreplaceable and threatened biological resources
- Fully represent environmental gradients
- Consider ecoregions and watersheds
- Consider full ecological diversity within communities
- Contribute to the long-term conservation of all Covered Species
- Consider management needs

Additional information regarding reserve design principles is provided in Appendix D, Section D.2.2.

I.3.4.4.3 Reserve Design Methods

The reserve design envelope was developed over several years using a phased planning process, as recommended by the DRECP ISA (2010), and was guided by the DRECP BGOs and principles of conservation planning (Section I.3.4.4.2). The reserve design envelope was developed from a systematic and objective approach (Margules and Pressey 2000; Carroll et al. 2003; Moilanen et al. 2009) using several independent methods and that were iteratively evaluated and refined. An overview of the reserve design planning process is provided below and in Exhibit I.3-2.

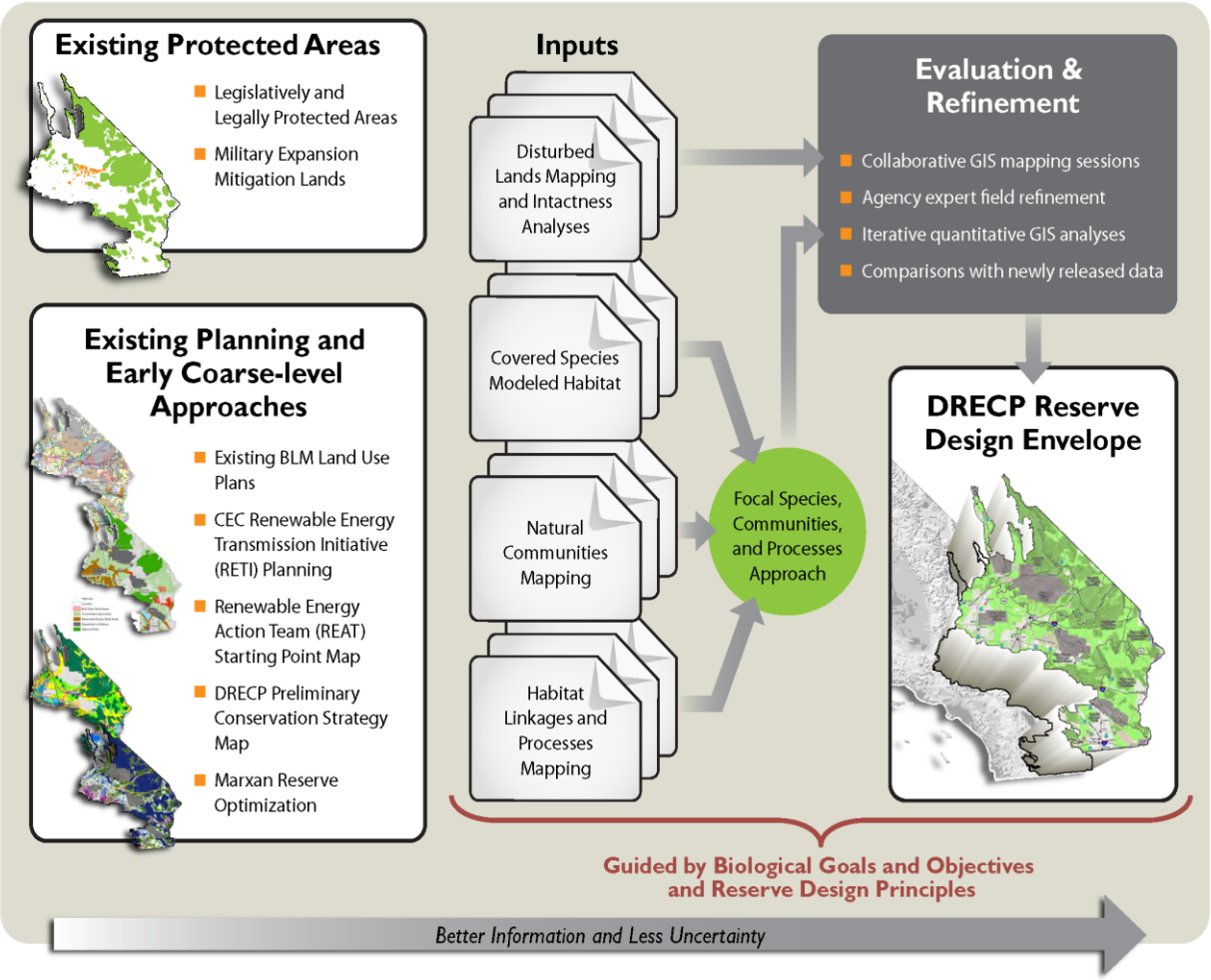


Exhibit I.3-2 DRECP Reserve Design Process

Identifying the Reserve Design Planning Area and Existing Protected Areas

The initial step in the reserve design process was to identify the reserve design planning area and existing protected areas. The reserve design planning area includes the entire Plan Area outside of Other Lands (see Glossary of Terms). Other Lands not considered part of the reserve design planning area include military lands, BLM Open Off-highway Vehicle (OHV) areas, BLM Imperial Sand Dunes Recreation Area Management Plan Open OHV area, Johnson Valley OHV Shared Use area, and tribal lands. Although Other Lands may contain biological resources important to the reserve design, these lands were not part of the reserve design process.

Additionally, reserve design was not conducted within existing protected areas. Existing protected areas serve as building blocks for the reserve design envelope; however, the boundaries are these lands were considered fixed for reserve design planning. Existing protected areas include LLPAs and MEMLs, as described below. More information on existing protected areas is provided in Appendix D, Section D.3.3.

- LLPAs: Wilderness Areas, National Parks, National Preserves, National Wildlife Refuges, California State Parks, CDFW Conservation Areas (Ecological Reserves and Wildlife Areas), CDFW mitigation and conservation easement areas, privately held conservation areas including mitigation banks and land trust lands, Wilderness Study Areas, Wild and Scenic Rivers, National Scenic and Historic Trails
- MEMLs: Lands conserved as mitigation for the expansion of Department of Defense installations

Existing Planning and Early Coarse-Level Approaches

Existing planning and early coarse-level approaches served as initial inputs into the DRECP reserve design process and included existing BLM land use planning designations (i.e., resource conservation areas identified through the BLM CDCA and Resource Management Plans), Renewable Energy Transmission Initiative planning products, REAT Starting Point Maps, the DRECP Preliminary Conservation Strategy map, and the Marxan reserve optimization analysis. Additional information about these initial inputs is provided in Appendix D, Section D.3.4. These existing plans and coarse-level approaches helped establish the early conservation context for the phased reserve design planning process and also helped to identify areas where renewable energy development would have the least conflict with biological resources, which helped to shape the DFAs through the process of Plan integration (see Section I.3.6).

Disturbed Lands Mapping and Intactness Analyses

Disturbed lands mapping and intactness analyses, from multiple sources, were used to further identify degraded and less ecologically intact areas considered less important for the reserve design. These mapping products and analyses were inputs into the evaluation and refinement phase leading to the reserve design envelope. These mapping products and analyses included:

- DRECP disturbed lands mapping: The DRECP land cover map has evolved over time as new and better data became available, and a more refined hierarchical classification system was developed (for more information see the DRECP *Baseline Biology Report* [Appendix Q]). The initial DRECP land cover map used during early phases of the reserve design process identified disturbed lands as including cultivated croplands, quarries, mines, gravel pits, oil wells, other disturbed lands, and rural lands with high road densities. The initial data sources for mapping disturbed lands included the California Gap Vegetation data layer (Lennartz et al. 2008), the California Farmland Mapping and Monitoring Program data (California Department of Conservation 2009), and a rural lands model based on road density (Dudek and ICF 2011b). Where new mapping data were subsequently available

(CDFG 2012; Aerial Information Systems 2013), the DRECP land cover map (and mapping of disturbed lands) was updated with the new information, which was subsequently used in the focal species, natural communities, and processes approach and during the evaluation and refinement process.

- REAT agency field reconnaissance of the Renewable Energy Study Areas (RESAs): The DRECP *Preliminary Conservation Strategy* (Dudek and ICF 2011b) identified RESAs to be studied further for the siting of renewable energy development. As part of the study of the RESAs, REAT agency field staff conducted field reconnaissance and imagery interpretation to refine the RESAs by identifying disturbed areas and other lower biological conflict areas where DFAs could be developed. This step also identified areas of high biological value where DFAs should not be developed. Attachment A of Appendix D provides additional information on the REAT agency Renewable Energy Study Area Field Reconnaissance.
- Intactness analyses: Several intactness analyses were used in the planning process, and each were developed for separate planning purposes not associated with the DRECP (Randall et al. 2010; Marshall et al. 2000; Cameron et al. 2012; Stoms et al. 2011). They provided independent, objective sources of information on terrestrial intactness with which to compare the DRECP disturbed lands mapping. In general, the intactness analyses are in agreement with the DRECP disturbed lands mapping and lower biological conflict areas. The mapped disturbed lands and lower biological conflict areas had low terrestrial intactness/high degradation. More information on intactness analyses is provided in Appendix D, Section D.3.5.

Focal Species, Natural Communities, and Processes Approach

As documented in the DRECP *Baseline Biology Report* (Appendix Q) and Chapter III.7, vast improvements to key biological databases have been made over the course of the DRECP planning process. The focal species, natural communities, and processes approach leveraged these new data sources and improvements to create an initial reserve design envelope using better information with less uncertainty. Key biological database improvements were made for Covered Species modeled habitat data (see Appendix C of the *Baseline Biology Report* in Appendix Q), natural community mapping (see Volume III, Section III.7.4.1, Flora, Natural Communities, and Other Land Covers), and habitat linkage and processes mapping (e.g., see Volume III, Section III.7.8, Landscape Habitat Linkages and Wildlife Movement Corridors). These data improvements facilitated and served as inputs to a focal species, natural communities, and processes approach, which created an initial reserve design envelope from “driver” resources. Additional details on this approach are provided in Appendix D, Section D.3.6.

This approach involved creating a composite map of important areas for key Covered Species, natural communities, and processes (i.e., the reserve drivers). The reserve drivers used in this approach included desert tortoise; Mohave ground squirrel; bighorn sheep; microphyll woodland; dunes and sand resources; flat-tailed horned lizard; hydrologic features; and West Mojave corridors, rare natural communities, and environmental gradients. Reserve drivers were selected because these resources are important to the overall DRECP conservation strategy and generally occur across a range of subareas and habitats of the Plan Area, such that conserving the areas important for the reserve drivers would also conserve the areas important for the other Covered Species and natural communities. Important areas for desert tortoise, Mohave ground squirrel, and bighorn sheep were based on REAT agency interpretations of the species distribution models and recent occurrence data for these species, which correspond to the BGOs for these species.

Evaluation and Refinement

The initial results from the disturbed lands mapping and intactness analyses and the focal species, natural communities, and processes approach were evaluated and refined, in the context of existing planning and early coarse-level approaches, through:

- Collaborative GIS mapping sessions: Reserve design delineation and decisions made in developing the reserve design envelope were done through Web-based meetings facilitated by interactive GIS mapping sessions. Agency field experts and technical staff, including staff from the USFWS, BLM, CEC, CDFW, and Dudek, gathered to identify and map the draft reserve design envelope. Exhaustive interactive GIS comparisons of early planning data; coarse-level approaches; disturbed lands mapping; intactness; the focal species, natural communities, and processes approach; habitat models for all Covered Species, mapping for all natural communities, other habitat linkage data, environmental gradients, and other geospatial data layers were evaluated in collaborative mapping sessions to develop the reserve design envelope. Additional information on these sessions is provided in Appendix D, Section D.3.7.1.
- Agency expert field refinement: Additional refinement of the reserve design envelope resulted from input gathered by USFWS staff as they reviewed and conducted ground truthing in desert tortoise linkage habitat in the Ord–Rodman Linkages in the Stoddard Valley and Johnson Valley areas. This field reconnaissance and evaluation is provided in Attachment B of Appendix D.
- Iterative quantitative GIS analyses: GIS analyses were conducted periodically throughout the evaluation and refinement process to quantitatively track and assess the capture of the species, natural communities, and landscape elements/processes. Early mapping approaches, interim maps, and draft versions of the reserve design

envelope developed at various stages of the reserve design process were quantitatively assessed to determine the conservation levels of modeled species habitat for all Covered Species, mapping of all natural communities, and data for habitat linkages, environmental gradients, and ecological processes. These quantitative analyses were stratified to assess representation of conserved resources by ecoregion subarea, county, and ownership class. These quantitative GIS evaluations provided a systematic way of comparing and evaluating various reserve design configurations and reserve design delineation decisions.

- Comparisons with newly released data and models: Comparisons of the reserve design envelope to recent conservation analyses were conducted, including additional intactness analyses developed by the Conservation Biology Institute as provided in Appendix D, Section D.3.7.4.

I.3.4.4.4 Reserve Design Envelope Summary

The reserve design envelope was developed from the methods described above and is shown in Figure I.3-1. The reserve design envelope covers approximately 8,365,000 acres, which is 44% of the approximately 19,013,000-acre reserve planning area. The reserve design envelope plus the existing protected areas (i.e., LLPAs and MEMLs) together encompass 84% of the reserve planning area (approximately 16,027,000 acres).

The reserve design envelope and existing protected areas combined cover at least 80% of the reserve design planning area in 7 of the 10 ecoregion subareas. This reflects the importance of these ecoregion subareas in the reserve design envelope because these ecoregion subareas are located in the most remote portions of the Plan Area, contain the most intact landscapes, and support important areas for Covered Species and natural communities. In the Imperial Borrego Valley, Pinto Lucerne Valley and Eastern Slopes, and West Mojave and Eastern Slopes ecoregion subareas, the reserve design envelope encompasses less area primarily due to more intensive land uses in these less-remote areas, resulting in less-intact landscapes and more degraded habitat not considered important for meeting the conservation needs of the Covered Species and natural communities.

I.3.4.4.5 DRECP Plan-Wide Reserve Design Envelope for Each Alternative

The reserve design envelope will not be implemented under any DRECP alternative. Instead, the reserve design envelope was used to guide the identification of the BLM LUPA conservation designations and Conservation Planning Areas, which together with the existing protected areas (i.e., LLPAs and MEMLs) comprise the DRECP Plan-Wide Reserve Design Envelope for each alternative (i.e., the Preferred Alternative and Alternatives 1 through 4).

Additionally, the DRECP Plan-Wide Reserve Design Envelope for each alternative includes an interagency Plan-wide Conservation Priority Area, which is the basis for the NCCP Conceptual Plan-Wide Reserve Design of each alternative. The NCCP Conceptual Plan-Wide Reserve Design reflects the highest priority areas for the creation and long-term management of habitat reserves for the conservation of the 37 proposed Covered Species and representative examples of the natural communities and processes that support them in the Plan Area (see Section I.3.2 for more information on the NCCP planning process). The Interagency Plan-Wide Conservation Priority Areas were designed to build off of the existing conservation areas and include BLM LUPA conservation designation lands where durability tools and/or management agreements would be prioritized and biological Conservation Priority Areas on non-BLM lands.

The following standards and criteria were used to develop the Interagency Plan-Wide Conservation Priority Areas (and Conceptual Plan-Wide NCCP Reserve Design):

- Conserve representative landscapes and natural communities to maintain the ecological integrity of large habitat blocks, ecosystem function, and biological diversity.
    - LLPAs and MEMLs were considered existing conservation areas that are and would continue to be protected and managed for natural resources, including Covered Species and the natural communities and processes that support them. The LLPAs and MEMLs formed building blocks of the Interagency Plan-Wide Conservation Priority Areas.
    - Ecoregion subareas were used to subdivide the Plan Area into ecological units to ensure the capture of representative landscapes across the Plan Area.
- Conserve key habitat areas that also provide habitat linkages for the movement and interchange of organisms within the Plan Area and to areas outside the Plan Area.
    - Key habitat linkage areas were included in the Interagency Plan-Wide Conservation Priority Areas using species-specific linkage information for key Covered Species, including desert tortoise, Mohave ground squirrel, and desert bighorn sheep.
    - Landscape-scale, multispecies habitat linkage information was used to identify movement corridors between habitat blocks inside and outside the Plan Area.
    - Species-specific threats and stressor information was incorporated to identify the critical linkage areas.

- Maintain habitat areas large enough and of appropriate quality to support sustainable populations and contribute to the recovery of declining or vulnerable Covered Species.
    - Resource-specific conservation strategies were developed for logical groupings of Covered Species
        - Species-specific conservation strategies
        - Riparian and wetland conservation strategy
        - Dune conservation strategy
        - Plant Covered Species
        - Wide-ranging Covered Species conservation strategy
        - Agricultural species conservation strategy
    - Species-specific conservation factors were considered for each of the 37 Covered Species to identify the Interagency Plan-Wide Conservation Priority Areas, including:
        - Species' population trends
        - Species' stressors and threats
        - Species' distribution and density
        - Terrestrial habitat intactness
        - Climate refugia
- Include conservation of environmental gradients and areas of high habitat diversity.

The DRECP Plan-Wide Reserve Design Envelope described in Volume II for the Preferred Alternative and Alternatives 1–4 were developed through the integrated planning process described in this chapter and the Plan integration described in Section I.3.6. A Plan-wide and subarea analysis of the landscape, natural community, and Covered Species conservation provided by the reserve design for each alternative is provided in Volume IV, Environmental Consequences/Effects Analysis.

I.3.4.5 Develop Conservation and Management Actions

The CMAs are part of the conservation strategy associated with each alternative and are important elements of the Step-Down Biological Objectives that contribute to achieving the Plan-wide BGOs. The CMAs describe the avoidance and minimization measures for pre-construction, construction, operations, and decommissioning of Covered Activities. The CMAs also describe the compensation requirements for Covered Activities that would contribute to conservation and management within the reserve. The biological CMAs are

described in Volume II, Section II.3.1.2.5. Within BLM LUPA conservation designations (i.e., NLCS, ACEC, or Wildlife Allocation), the BLM worksheets (see Appendix L) for each land management unit (i.e., each named NLCS, ACEC, or Wildlife Allocation area) describe the unit-specific management actions that serve as CMAs for those portions of the BLM-administered lands in the Plan Area.

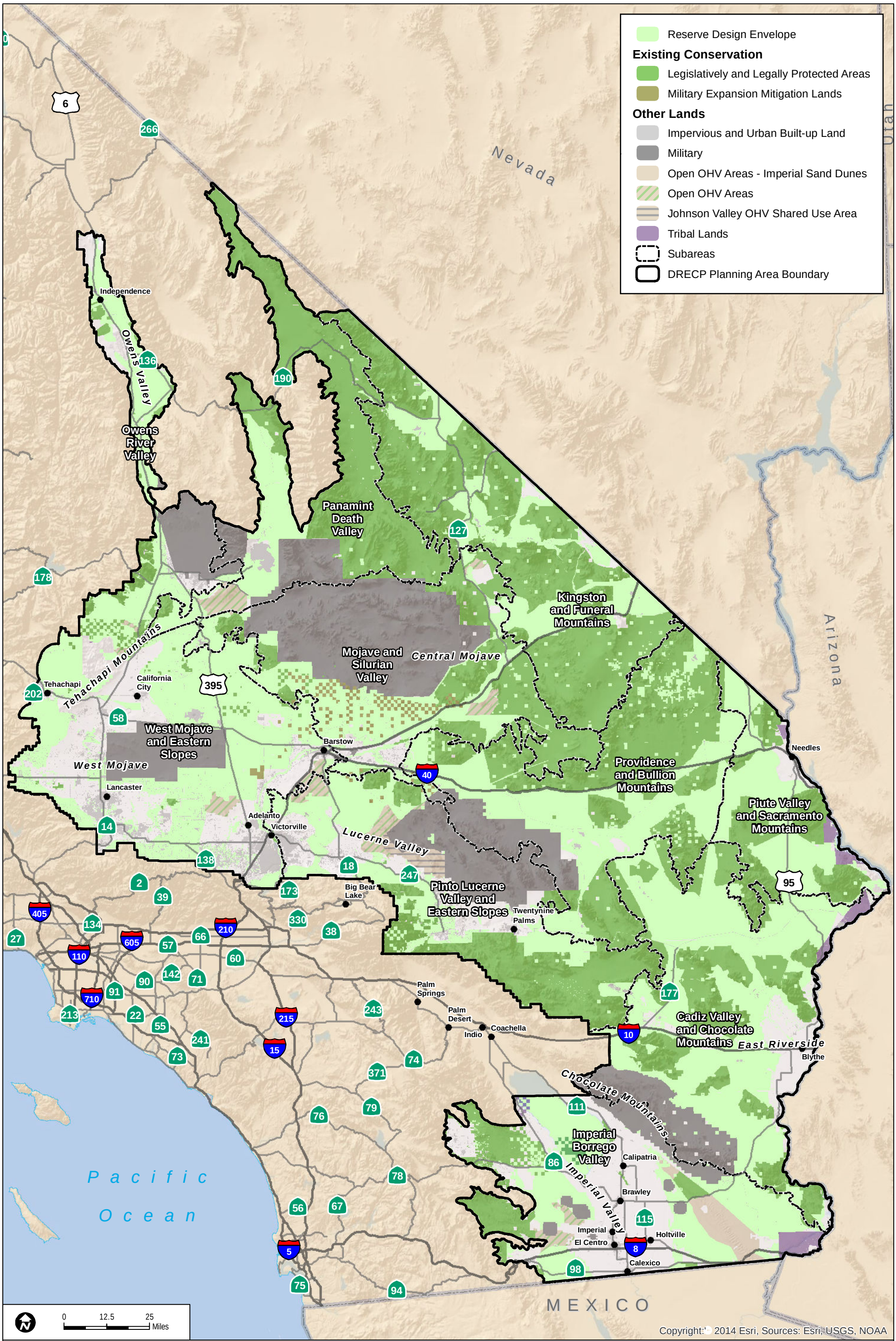
I.3.4.6 Develop Monitoring and Adaptive Management Program

The purpose of the MAMP is to monitor the implementation of conservation actions and to adaptively manage the species, natural communities, and ecological processes to ensure Plan implementation is effective and consistent with the BGOs and to ensure compliance with the requirements of the DRECP. The MAMP establishes scientific monitoring and management principles and a strong institutional structure with the authority to implement and enforce the conservation actions. The MAMP also provides the plan implementation context to support a feedback system that incorporates the results of previous studies into future management and monitoring actions. The MAMP encompasses monitoring for compliance with permit conditions (i.e., compliance monitoring), effectiveness monitoring including monitoring to determine achievement of BGOs, project-level monitoring, land use plan monitoring, and monitoring for validation of management actions. The MAMP is described in detail in Section II.3.1.3 of this document.

I.3.5 Renewable Energy Goals and Planning Process

I.3.5.1 Federal/BLM Renewable Energy Goals

As detailed in the discussion of the interagency and BLM purpose and need (Sections I.1.1 and I.1.2), a number of executive and secretarial orders and congressional mandates are designed to promote the development of domestic renewable energy resources. The BLM, as the largest federal land management agency in the desert, is charged with the development of renewable energy that is consistent with the BLM's multiple use and sustained yield mandate, as well as FLPMA's requirement to "preserve the unique and irreplaceable resources, including archaeological values, and conserve the use of the economic resources" of the CDCA (43 United States Code [U.S.C.] 1781[a][6]). The BLM is seeking to facilitate renewable energy development under Secretarial Order 3285A1 (Department of the Interior 2010) and meet the president's Climate Action Plan goals to facilitate additional renewable energy projects on the public lands to support 6 million homes by 2020; and at the same time, the BLM must strive to facilitate renewable energy that is consistent with protection of other important resources and values, including units of the National Park System, National Wildlife Refuges, other specially designated areas, and wildlife, cultural, historic, and paleontological values.



Sources: ESRI (2014); CEC (2013); BLM (2013); CDFW (2013); USFWS (2013)

FIGURE I.3-1

Reserve Design Envelope

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I.3.5.2 California's Renewable Energy Requirements and Energy Goals

The DRECP is an important part of California's strategy for significantly increasing the use of renewable energy and reducing the burning of fossil fuels. The state's drive to develop more renewable energy resources rests on two mandates. The first is a statutory requirement that at least 33% of retail electricity sales in California must come from renewable resources by December 31, 2020 (California Public Utilities Code, Sections 399.15[b][2][B] and 399.30[c][2]; California Public Resources Code, Section 25740). This standard, known as the Renewables Portfolio Standard (RPS), is one of the most ambitious renewable energy requirements in the country. The Global Warming Solutions Act of 2006 (AB 32) is the other mandate propelling the state's renewable energy effort to reduce greenhouse gases (GHG) emissions to address the threats posed by climate change, discussed in Section I.3.5.2.2. A number of regulatory programs are being established to achieve the statutorily mandated GHG reduction to 1990 levels by the year 2020. In addition, executive orders by the governor have established a long-range goal of reducing the 1990 level of GHG emissions by 80% by 2050 (California Executive Order S-3-05). To achieve the 2050 GHG reduction goal, California will need to develop new zero- or low-carbon energy sources such as renewable electricity generating plants above and beyond those required to meet the current RPS mandate and 2020 GHG reduction goals.

I.3.5.2.1 Renewables Portfolio Standard

California's RPS prescribes that a percentage of each utility's retail electricity sales must come from eligible renewable energy resources. The RPS was first introduced in 2002 as a requirement that 20% of the state's electricity come from renewable resources by 2017 (SB 1078, Section 3). The state's initial objectives in adopting the RPS included diversification of the state's electricity generation resources, reduction of California's dependence on fossil fuels, improved air quality and public health, and stimulation of new jobs and economic growth (SB 1078, Section 3). Four years later, legislation was enacted to accelerate the RPS requirement and, among other things, to acknowledge that new and modified transmission facilities were needed to accommodate the growth in renewable energy resources (SB 1078, Section 13).

The current RPS mandate—which requires electric utilities to procure energy equal to at least 33% of their retail sales from eligible renewable resources by the end of 2020—was originally introduced in the same 2008 executive order that launched work on the DRECP (California Executive Order No. S-14-08). In this executive order, Governor Arnold Schwarzenegger explicitly linked California's drive to develop renewable energy resources to a more recent commitment to reduce GHG emissions (California Executive Order No. S-14-08). As part of the push to expand renewable energy resources, the governor also directed the CEC and CDFW to work with other state and federal agencies to expedite the

development of RPS-eligible resources and to develop the DRECP as a way to "facilitate the RPS desert project approval process" (California Executive Order No. S-14-08).

Governor Edmund G. Brown Jr. continued support for both the expanded RPS and work on the DRECP. In 2011, the Legislature passed and Governor Brown signed a statutory RPS requirement that compels investor-owned utilities, publicly owned utilities, and other retail sellers of electricity to procure energy equal to 33% of their retail sales from renewable sources by 2020, and to also meet interim targets of 20% renewable generation by the end of 2013 and 25% by the end of 2016 (California Public Resources Code, Section 25740, and California Public Utilities Code, Sections 399.15[b][2][B] and 399.30[c][2]). In 2013, Governor Brown and the Legislature took the additional step of authorizing the California Public Utilities Commission (CPUC) to require retail sellers of electricity to procure more qualified renewable generation than the minimum amount required under the RPS (AB 327). Governor Brown and U.S. Department of Interior Secretary Ken Salazar signed a memorandum of agreement in 2012 committing to continue cooperative state and federal efforts on renewable energy, including completion of the DRECP and the coordinated licensing of renewable energy projects, in order to accomplish state and federal objectives, including the RPS and GHG emissions reductions (Department of the Interior and the State of California 2012). That agreement noted that a "substantial increase" in development of qualified RPS projects was needed to meet the 33% target, and described expansion of renewable energy generation as "a key priority for California's economic and environmental future."

I.3.5.2.2 Greenhouse Gas Emissions Reductions

Climate change emerged as a major policy concern of California's lawmakers and governor since 2000. The state's natural gas-fired generating plants and shares of out-of-state coal plants owned by or under contract to California utilities are major contributors to GHG emissions from the state's electricity sector, while renewable generation is essentially free of GHG emissions. As a consequence, the state's move to expand the RPS requirement to 33% was seen as a way not only to achieve the original goals of the RPS program, but also to help the state meet its GHG targets.

California's landmark climate change legislation, AB 32, was enacted in 2006 to require that California's statewide GHG emissions be rolled back to their 1990 levels by 2020. This mandate in AB 32 will require a reduction of nearly 30% in the state's GHG emissions compared to the level of emissions that would be expected in 2020 in the absence of the legislation, according to the Climate Change Scoping Plan (Scoping Plan) that the California Air Resources Board (CARB) adopted in 2008. The state's plan for rolling back GHG emissions in this and future decades relies on a number of initiatives that include significant cutbacks in GHG emissions from the generation of electricity. The electricity

sector accounted for 23% of the state's overall GHG emissions in 2002–2004, according to the 2008 Scoping Plan (CARB 2008, p. 13, Table 1) and 19% in 2011 according to the draft of the first update to the Scoping Plan (CARB 2013, p. 21). The 2008 Scoping Plan relies on two major initiatives for the planned reduction in GHG emissions from the electricity sector: (1) improvements in the energy efficiency of utilities, businesses, and residents, which are expected to save the equivalent of an estimated 26.3 million metric tons of carbon dioxide equivalent (MMT CO_2E) a year by 2020; and (2) greater reliance on renewable energy in place of electricity generated from fossil fuel plants, which is expected to save 21.3 MMT CO_2E by 2020 (CARB 2008, p. 17, Table 2).

Beyond the 2020 GHG reduction mandate in AB 32, the state's governors have established higher long-term GHG emission goals for the state. In 2005, Governor Schwarzenegger set GHG reduction targets that included the 2020 goal that appeared in AB 32, as well as a goal to reduce emissions 80% below the 1990 levels by the year 2050 (California Executive Order S-3-05). Governor Brown reaffirmed the 2050 GHG goals of his predecessor, and, in 2012, signed Executive Order B-16-12 to specifically apply the 80% GHG reduction target for 2050 to the transportation sector as an added impetus to the deployment of zero-emission vehicles (California Executive Order B-16-12). Since many of the planned zero-emission vehicles are expected to be electric vehicles, these transportation-specific goals will translate into higher demand for electricity to charge the state's growing number of electric vehicles. This demand will need to be met in large part through added renewable and other zero-carbon electricity resources if the state is to meet its RPS and GHG targets.

While CARB's Scoping Plan does not specifically include measures calculated to achieve the 2050 GHG emission reduction goal, the plan notes that the climate change programs implemented to meet the 2020 reduction goal also put the state on the path to meet the more ambitious long-term reductions. The long-range targets will require additional programs and technologies that cannot be defined in detail at this time, according to the Scoping Plan (CARB 2008, p. 117):

> The 2020 goal was established to be an aggressive, but achievable, mid-term target, and the 2050 greenhouse gas emissions reduction goal represents the level scientists believe is necessary to reach levels that will stabilize [the] climate [CARB 2008, p. 4] … Reducing our greenhouse gas emissions by 80% will require California to develop new technologies that dramatically reduce dependence on fossil fuels, and shift into a landscape of new ideas, clean energy, and green technology. The measures and approaches in this plan are designed to accelerate this necessary transition, promote the rapid development of a cleaner, low carbon economy, create vibrant livable communities, and improve the ways we travel and move goods throughout the state. This transition will require close coordination of California's

> climate change and energy policies, and represents a concerted and deliberate shift away from fossil fuels toward a more secure and sustainable future [CARB 2008, p. ES-2].

In its own assessment of the need for expansion of renewable energy resources, the California Energy Commission found that "(p)reliminary estimates of renewable energy needed to achieve the 2050 GHG emission reduction goal suggest that California's renewable electricity percentage may need to increase to more than 70% [of total generation], depending on the pace and policies affecting electrification of the transportation sector, retiring coal generation, and whether existing nuclear plants are relicensed" (CEC 2011a).

CARB adopted the "First Update to the Climate Change Scoping Plan" in May 2014 (http://www.arb.ca.gov/cc/scopingplan/2013_update/first_update_climate_change_scoping_plan.pdf). The update continues to support the Scoping Plan and California's efforts to build a clean, affordable, and reliable energy system. In addition, it identified the need to develop a "comprehensive greenhouse gas reduction program for the State's electric and energy utilities by 2016."

I.3.5.3 Overview of the Renewable Energy Planning Process and Development Focus Area Design Process

To support the respective state and federal renewable energy goals, the DRECP identifies desert locations that are most compatible with renewable energy development and areas where the DRECP's mitigation and conservation efforts will be focused. The configuration of DFAs (areas to which renewable energy development will be directed under the DRECP) was a collaborative process that considered and integrated state and federal renewable energy goals, natural resources conservation needs, culturally important areas, recreation, and visual resources in the Plan Area, and information from renewable energy, conservation, utility, military, tribes, recreationists, and affected local stakeholders.

The following sections describe some of the underlying principles, processes, and projections used to estimate the potential need for renewable energy in the California desert and to identify DFAs and other energy development components of the different Plan alternatives. The processes used in developing the biological conservation elements of the DRECP are described separately in Section I.3.4.

I.3.5.3.1 Guiding Principles

The REAT agencies and stakeholders identified the following principles to guide the identification of areas compatible with renewable development:

1. Generation should be developed either on already-disturbed land or in areas of lower biological value, and conflict with both biological and non-biological resources should be minimized.
2. Areas identified for generation should have high-quality solar, wind, and/or geothermal renewable energy resources.
3. Generation should be sited close to existing transmission and in areas where transmission could be expected as a reasonable extension of the existing transmission system and planned system upgrades, as identified by the Renewable Energy Transmission Initiative , or other transmission plans.
4. Generation should, to the maximum extent possible, be aggregated to avoid transmission sprawl, reduce cost, and reduce disturbance across the Plan Area. Again, this principle aims to minimize disturbance to biologically, culturally, recreation, and visual valuable areas.
5. The Plan should provide sufficient areas for development flexibility to ensure the Plan does not constrain competition within the market or unnecessarily result in distorted or environmentally incompatible incentives when implemented (i.e., where feasible, the Plan should remain market neutral between different technologies or different project configurations).

I.3.5.3.2 Steps in the Planning Process

To plan for future energy development consistent with federal and state policies and mandates, the following steps to identifying the best locations for renewable energy were identified:

1. Identify the need for desert renewable energy generation: Estimate the desert-located renewable generation needed to meet California's renewable energy goals and the federal goals. This estimate, which is subject to a number of variables and uncertainties, is based on policies and programs affecting the supply of electricity and climate change, projected mix of renewable and other zero- and low-carbon technologies, economic forecasts, and many other factors. Taking these variables into consideration, the CEC developed a number of plausible scenarios to ascertain the potential need for renewable energy in the desert region in the coming decades. Scenarios and input variables were honed over the course of more than a year based on public comments received from stakeholders. As explained in Section I.3.5.4., the

scenario planning effort ultimately focused on the potential need for renewable energy through 2040. The potential need identified in the scenarios was then adjusted to account for the uncertainty of long-range planning estimates, the desire to ensure flexibility and competitiveness in the renewable energy development industry, and the possibility that limited transmission capacity could constrain renewable energy development in one or more of the DFAs. The scenario planning exercise made use of the renewable energy calculator, a spreadsheet-based planning tool developed by the CEC that is described in Section I.3.5.4.3.

2. Estimate the acreage that may be needed: Estimate the acreage that may be needed to achieve the renewable energy goals identified above, accounting for differences in technology and local constraints on development, including land ownership issues and site-specific constraints to development such as too-steep slope and environmental resource constraints (e.g., natural or cultural resources that need to be avoided). This step is described in Section I.3.5.5.
3. Identify suitable locations for DFAs and allocate megawatts among them: Use resource distribution data, in combination with agency and stakeholder input, to identify and characterize areas suitable for renewable energy development based on the principles laid out above and accounting for the conservation goals identified during the reserve design process. Once DFA locations are identified, estimate renewable energy profiles that allocate generation capacity (megawatts) to each technology and between DFAs for the purpose of transmission planning, resource impacts analysis, and mitigation development. The method for this is described in Appendix F1.
4. Develop a conceptual transmission plan: Develop a conceptual transmission plan to accommodate the new renewable energy generation planned for each DFA, with assistance from transmission planners from the municipal and investor-owned utilities that will purchase renewable power generated in the Plan Area, U.S. Department of Defense, CPUC, and California Independent System Operator. This plan is described in Appendix K.

I.3.5.3.3 Planning Projections

CEC staff derived the following planning assumptions that were used to guide development of the DRECP, to help identify and map the DFAs, and to guide development of the DRECP alternatives.

1. Plan for 20,000 megawatts (MW) of new renewable energy resources in the Plan Area by 2040. Over the course of more than a year, the CEC worked to develop a set of economic, energy, and environmental projections that would allow a reasonable estimate of the amount of renewable electricity that will be generated within the

DRECP to meet renewable energy and GHG emissions targets. The revised July 2012 calculator-produced scenario projects that between 17,163 and 19,419 MW of renewable electricity generating capacity may be needed by 2040 from the Plan Area (Appendix F3). To account for the many uncertainties in this projection, allow for flexibility, and ensure the DRECP can accommodate the level of renewable energy development that may be needed in the region, the REAT agencies decided to allow for a margin of error and plan for the development of up to 20,000 MW of new renewable electricity generation and associated transmission capacity. This process is described in more detail in Sections I.3.5.4.4 and I.3.5.4.5.

2. Estimates of technical and economic potential largely determine which technologies are most likely to be employed to achieve 20,000 MW of new renewable energy. For example, the capacity expected from geothermal resources within the Plan Area is approximately 2,800 MW under all alternatives because this was judged to be a reasonable projection of geothermal resources in the area given the availability of suitable sites, existing technologies, and development costs, as well as the anticipated evolution of these factors through 2040.
3. The 20,000 MW of new renewable generation capacity were distributed to DFAs based on the availability of generation resources in each DFA relative to the overall availability of resources across the Plan Area. Consequently, for each subset of DFAs that ultimately became alternatives, a different combination of wind, solar, and geothermal resources were estimated, which would result in different construction and operational impacts.

I.3.5.3.4 Planning Time Frame

From the outset, the DRECP has been envisioned as a long-term, programmatic planning document that will guide renewable energy development and conservation efforts in the region for decades to come. As explained in Section I.3.5.2, the state's long-term targets for renewable energy development are driven in part by the goal of reducing GHG emissions by 2050 to a level 80% lower than GHG emissions in 1990. For this reason, the REAT agencies initially focused on a plan that would accommodate the anticipated need for renewable energy through 2050 (CEC 2011b). However, as explained below, planners later settled on 2040 as a more appropriate planning period.

Early CEC staff calculations to determine the state's likely renewable energy needs showed the need for renewable energy development in California would nearly double between 2040 and 2050 (CEC 2011c). This was largely due to added demand growth that would have to be met entirely from zero- or low-carbon resources to keep the state on track to meeting its 2050 GHG reduction goal. This anticipated jump in electricity demand and the heavy reliance on new zero- or low-carbon electricity resources to meet it between 2040

and 2050 are largely the result of the need for additional reductions in GHG emissions during that decade and a dramatic acceleration in the expected electrification of the transportation sector (from 18 million to 40 million electric vehicles) (CEC 2011c). In addition, the growth demand for zero-carbon energy between 2040 and 2050 will be fueled by continued electrification of other economic sectors (e.g., the industrial sector) as they attempt to reduce GHG emissions as well.

As noted in Section I.3.5.2 and as described in the Scoping Plan, additional renewable and other zero- or low-carbon generating technologies are expected to evolve in coming decades in ways that might fundamentally change the available options and strategies for meeting renewable energy and GHG reduction targets over time. Off-shore wind and tidal generation, for example, are immature renewable technologies that will require significant technological development, but might ultimately reduce future need for desert-based solar and wind generation (CEC 2013a). For these reasons, and because the use of a 2050 planning horizon for the DRECP would have required planning for dramatically more renewable energy capacity notwithstanding the uncertainties that come with planning for electricity system capacity 30 years in the future, the agencies agreed that 2040 was a more prudent and realistic time period for the DRECP planning effort. The 2040 planning window was judged to be long enough to put California on a trajectory to meet its 2050 GHG emissions reduction goals, while providing an opportunity to make adjustments closer to 2040 for new technologies and trends that emerge. The accelerated development of zero- or low-carbon generation that may be needed after 2040 can better be planned in the future when more is known about those evolving technologies and conditions.

I.3.5.3.5 Role of Zero-Carbon, Nonrenewable Energy

As described above, the federal and state governments have established mandates and policy goals for development of new renewable energy resources, and those mandates and goals are one of the primary reasons for the DRECP planning effort. But planning estimates of the amount of renewable energy capacity that will be needed in the desert, especially the longer-range projections, are also based on California's goals for GHG emission reductions by 2050, which will require that more of the state's electricity generation come from sources with no or very low carbon emissions and also require more of that zero- or low-carbon electricity to power a rapidly expanding fleet of electric vehicles, which is estimated at 40 million in California by 2050 (EEEI 2009, p. 4).

GHG goals could in theory be met through development of non-renewable energy resources with zero- or low-carbon emissions instead of the solar, wind, and geothermal facilities that are the focus of the DRECP. The primary non-renewable technologies with no or little carbon emissions include nuclear power plants and fossil fuel generation combined with carbon capture, utilization, and sequestration (CCUS). The CEC considered the extent to

which these technologies could serve as a viable substitute for renewable energy resources in meeting the state's long-range GHG emissions goals, and concluded they are not likely to play a significant new role during the 2040 planning period.

When developing the energy need projections for the DRECP, CEC staff judged that new nuclear power plants were unlikely to be built during the planning period to meet California's electricity demand because of a 1976 state moratorium on new nuclear plants and existing and anticipated public opposition to constructing new nuclear facilities. The planning scenarios developed for the DRECP also presumed that the state's two existing nuclear plants, San Onofre and Diablo Canyon, would cease operations when their current federal licenses expire in 2022 and 2024, respectively, increasing the need for renewable or other zero-carbon energy to replace the lost nuclear generation (CEC 2012, p. 9).[1] In addition, the final planning scenario anticipated that Arizona's Palo Verde Nuclear Generating Station, which provides about 6,000 gigawatt-hours (GWh) a year of zero-carbon electricity to California, would not provide electricity to the state in 2040, either because it will be shut down or California utilities will divest their interests in the plant (CEC 2012).

Coal-fired generation with CCUS is unlikely to be commercially viable by the 2030s because of the need for expensive new storage, pipeline, and transmission facilities and other technological, environmental, regulatory, and economic challenges. The technology remains unproven at a commercial scale. The only U.S. facility under development at the time the DRECP planning parameters were developed, the Kemper County Integrated Gasification Combined Cycle project in Mississippi, has a revised price tag of $4.7 billion ($8,075/kW), will only sequester 65% of the carbon emissions it produces from coal combustion, and has engendered substantial opposition from environmental groups (Sun-Herald 2013).

Natural gas generation with CCUS is viewed as more feasible in California than coal-fired CCUS and likely to occur on some scale. However, CCUS requires the right combination of reliable sequestration sites, technological advances, high carbon prices, and low fuel prices. Before large-scale natural gas CCUS could be developed in California, detailed assessments would need to demonstrate that geologic formations can safely hold large quantities of carbon dioxide for decades. Because of these uncertainties, it is not clear that CCUS will play a major role in meeting 2040 GHG emissions targets. Furthermore, even if natural gas generation with CCUS proves to be technologically and economically feasible in coming decades, the state may opt for renewable energy because of its environmental advantages over use of natural gas, including avoidance of methane gas discharges that occur during natural gas production and transportation.

[1] The operator of the San Onofre plant decided on June 7, 2013, to permanently close the facility

For these reasons, DRECP planners did not consider nuclear power and fossil fuel with CCUS to provide a likely alternative path to meeting GHG emission reduction targets during the DRECP term. Depending on future technological developments and energy costs, CCUS—especially natural gas generation with CCUS—may play a role in meeting GHG emissions reduction targets beyond 2040.

I.3.5.3.6 Gigawatt-Hours, Megawatts, and Acres

A gigawatt-hour is a unit of electricity that is generated or consumed over time, and therefore is the appropriate measure of California's total energy demand and its progress toward meeting its RPS benchmark. This would also seem to make gigawatt-hours the best measure of renewable energy that is likely to be needed from the Plan Area to keep the state on track to meet its RPS and GHG-reduction benchmarks. But the value of using gigawatt-hours is limited when planning for energy generation and transmission since gigawatt-hours does not provide a measure of the system's capacity—or, more precisely, the amount of electricity that might be generated and moved through transmission lines at any particular point in time. Capacity is usually expressed in terms of megawatts, which are the normal measure of both generating facility and transmission path size. Power plant developers, utilities, and regulatory agencies generally plan electricity generation and transmission by megawatt capacities.

At the same time, GCPs, NCCPs, and LUPAs are all, in a fundamental sense, land use and land management plans where conservation, development, and other uses are identified by lines on maps and by the acreage associated with various land use designations. For a plan like the DRECP, acres become a very important currency in renewable energy planning.

Moving between these three currencies of energy planning—gigawatt-hours, megawatts, and acres—is not an easy or precise calculation. Converting gigawatt-hours to megawatts, and megawatts to acres, depends on the generating technology that will be used. One megawatt of solar plant capacity will produce a different annual gigawatt-hours than a megawatts of wind, geothermal, or biomass generating capacity, and even different types of solar plants—thermal solar compared to photovoltaic technologies, for example—have different "capacity factors" that indicate how many gigawatt-hours they are likely to generate for a given megawatt capacity. In similar fashion, different renewable energy technologies have different acreage requirements for a given number of megawatts.

This means that in order to estimate the number of acres needed to accommodate the anticipated renewable energy generation, planners must make assumptions about the likely mix of wind, solar thermal, solar photovoltaic, and other technologies, as explained in Section I.3.5.5.1. However, the decisions that will determine the actual mix of technologies in California's renewables portfolio will largely fall to project developers, utilities, and the CPUC as they plan and build future projects.

I.3.5.4 Estimating the Quantity of Renewable Energy Generation Within the Plan Area

The amount of generating capacity (megawatts) that California will need to meet its RPS and GHG mandates and goals cannot be forecast with great precision. But the uncertainty inherent in these kinds of projections does not obviate the need for programmatic planning as the best way to conserve natural resources while accommodating renewable energy development. The development components of the DRECP are based on a reasonable estimate of the amount of renewable resources that will be needed in California's desert region over the next three decades. This section describes the variables that go into estimating the amount of new renewable resources that will need to be developed within the Plan Area by 2040.

I.3.5.4.1 Major Variables in Estimating the Amount of Renewable Energy Generation in the Plan Area

Projecting future electricity needs—both overall electricity demand and the need for renewable energy resources to meet state and federal policy goals—starts with estimates involving economic growth and demand. Some of the most important factors in projecting the future demand for electricity in California and the need for renewable energy are:

- Population and economic growth forecasts
- Anticipated savings due to improvements in energy efficiency technologies and their deployment
- Anticipated savings from cost-related energy conservation
- Increased use of electric vehicles and estimated per-vehicle consumption of electricity, which will represent a significant new demand for electricity if California is to achieve its GHG emission reduction goals
- Electrification of other economic sectors (e.g., the industrial sector) in order to reduce GHG emissions
- The extent to which electricity providers use GHG offsets instead of direct reductions in electricity-sector GHG emissions to meet the state's market-based cap-and-trade GHG limits
- The extent to which California's RPS compels the development of renewable resources in amounts greater than would be realized from the cap-and-trade GHG limits alone

The amount of renewable energy that will need to be developed in coming decades might also be affected by legislation or regulatory requirements that increase the existing RPS mandates, which could compel additional renewable development.[2] Future changes in the RPS requirement could also affect the extent to which renewable generation on the customer side of the meter (e.g., rooftop solar) contributes to meeting RPS requirements.[3]

Furthermore, estimates of the amount of renewable energy needed in California are based on the electricity sector contributing to GHG emission reductions in proportion to the sector's total emissions. It is possible, however, that the electricity sector could eventually be called upon to achieve more than its proportional share of emissions reductions if the industrial sector, or perhaps more likely the transportation sector, is unable to achieve proportional emissions reduction targets. This would have the effect of increasing the amount of zero- and low-carbon generation that is required.

Rooftop solar and other distributed generation installations have the advantage of providing generating capacity closer to where the electricity is actually used, and—in the case of rooftop and parking lot solar—can often be installed with few of the adverse environmental impacts that ground-mounted solar or wind facilities can cause. But as explained in Volume II, Section II.8.2.1, distributed generation alone cannot provide enough generating capacity to meet California's renewable energy needs.

Some renewable technologies have time-of-day and weather-related limitations. For example, solar power without any electricity storage capacity only contributes electricity during daylight hours. On a summer day, electricity consumption peaks in the afternoon with air conditioning use and is lowest (off-peak) in the night. Most forecasts that include large-scale transportation electrification anticipate a substantial increase in off-peak electricity use as cars are charged at homes during the night, and thus the need for greater off-peak generation, both renewable and otherwise, is anticipated over time. Wind and geothermal resources might be helpful in meeting this off-peak demand, but solar would not. Forecasters expect that challenges to integrating more renewables into the electricity system may be solved through advances in energy storage technologies, using time-of-use electricity rates to shift load and smooth the peaks and valleys of electricity demand, diversifying the types of resources in the state's generation mix, and other measures.

Finally, the challenges of estimating the future need for renewable electricity generation can be complicated by unanticipated events. For example, equipment problems at San Onofre Nuclear

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[2] As noted previously, California Assembly Bill 327 was enacted in 2013 to give the CPUC authority to require retail sellers of electricity to procure more qualified renewable generation than what is mandated by the RPS statute.

[3] While increasing utility customers' self-generation using zero-carbon resources such as rooftop solar panels helps reduce GHG emissions, such generation does not currently contribute significantly to a utility meeting its RPS obligation.

Generating Station prompted the temporary closure of the plant in early 2012 and then the decision in June 2013 to permanently retire the plant. While the closure of the San Onofre Nuclear Generating Station does not affect the 2040 planning scenarios, which had anticipated the plant would close by 2040, it does increase the amount of renewable energy needed to meet the state's 2020 GHG emission reduction mandate since the plant provided 2,200 MW of zero-carbon generation.

I.3.5.4.2 Factors Affecting Future Renewable Energy Generation Goals Within the Plan Area

After estimating how much renewable energy capacity may be required in California, planners had to determine how much renewable energy might reasonably be developed within the Plan Area. The California desert is especially attractive to renewable energy developers because of factors that include high insolation (solar radiation) values for solar facilities, favorable wind characteristics, and large areas of undeveloped land capable of accommodating utility-scale projects. For these and other reasons, most large, utility-scale solar and wind projects that have been proposed and permitted in California to date are located in the Plan Area. Of the RPS contracts approved by the CPUC for in-state central-station renewable resources, a majority of the solar and wind megawatts are in the Plan Area (CPUC 2013).

Extrinsic factors may also act to reduce the generation goals for the Plan Area. These include:

- Proportion of projected statewide need that will be met by electricity imports from out-of-state renewable energy sources (e.g., wind projects developed in the Pacific Northwest)
- Amount of renewable energy that will be developed in California outside the DRECP, including from rooftop solar installations and other small distributed generation projects
- How much of the zero- and low-carbon energy needs might be met with non-renewable resources such as nuclear power and fossil fuel generation with CCUS

I.3.5.4.3 Estimating the Generation Goals for the DRECP

As discussed above, many different factors may affect the expected future generation goals for the Plan Area. To facilitate stakeholder involvement and ensure a transparent development process, CEC's electricity analysts developed a spreadsheet tool called the renewable energy acreage calculator.[4] The calculator was developed to estimate:

- Anticipated future renewable energy needs within the Plan Area based on statewide economic and demographic projections, projected energy efficiency and cost-related

[4] This has also been referred to as the renewable energy calculator.

conservation savings, the availability of non-renewable zero- and low-carbon energy, GHG targets, limits on procurement of out-of-state renewable resources, a mix of in-state geographical distribution of renewable technologies, and other inputs

- The minimum acreage footprint required to develop any given scenario, based on the acreage requirements of geothermal, wind, and solar technologies

The calculator was developed early during the DRECP planning process and presented to the Stakeholder Committee along with various planning scenarios and projections derived from a specific set of economic and energy assumptions.[5] Over the course of more than a year, CEC staff developed various planning scenarios to estimate renewable energy needs in 2040 and 2050, before DRECP planners eventually decided to focus on 2040.[6] These planning scenarios were shared with the Stakeholder Committee for review and comment, with subsequent versions refined in response to comments received and new information developed by CEC staff.

The purpose of this process was not to compute a precise number of megawatts or acres for DRECP renewable energy planning. Instead, use of the calculator assisted DRECP renewable energy planning in the following important respects:

- The planning scenarios helped the REAT agencies and public better understand how different factors such as the rate of economic growth, energy efficiency, and mix of renewable technologies might affect the amount of generation and transmission that might be needed to meet renewable energy goals in the Plan Area.
- The planning scenarios helped the agencies select 2040 as a more appropriate planning horizon for the DRECP than 2050.
- The scenarios were also used to compare the different land requirements that may result from different technology mixes. For example, the development area that would be required to accommodate a renewable portfolio consisting of 60% solar generation and 40% wind generation to one in which those percentages were reversed.
- At the end of the process, the planning scenarios collectively provided a rough estimate of the amount of renewable energy capacity that may be needed from the Plan Area by 2040, and they provided a starting point for the acreage requirements

[5] The calculator spreadsheet is available at several locations on the DRECP website with values that represent the various planning scenarios developed by CEC. The spreadsheet for any of these scenarios can be opened and modified to generate new scenarios. One such example is at http://drecp.org/meetings/2011-12-05_meeting/presentations/D-Vidaver_DRECP_calculator_2011-11-29.xls, with an accompanying explanation of the calculator at http://drecp.org/meetings/2011-12-05_meeting/presentations/D-Vidaver_Calculator_Description-2011-11-29.pdf.

[6] See Section I.3.5.3.4 for an explanation of why 2040 was selected as the planning horizon.

necessary when siting generation to keep California on track to meeting its 2050 GHG reduction goals.

- Scenarios were also used to compare how different economic and energy estimates affected the estimated need for renewable energy capacity in the desert.

Planning scenarios ranged from a high of 43,125 MW based on 2050 estimates (CEC 2011d) to a low of 17,121 MW based on 2040 estimates (CEC 2012). The collaborative process of developing and refining planning scenarios culminated in mid-2012 with CEC's release of a revised planning scenario that estimated a need of 17,121 MW of new renewable energy generating and transmission capacity by 2040 to keep California on the trajectory it needs to meet the 2050 GHG emissions reduction target (CEC 2012). Due to the previously described uncertainties with long-range electricity system projections, no single planning scenario was adopted as the basis for determining how much land should be identified for renewable energy project development in the DRECP; instead, the range of scenarios was considered illustrative of the range of potential generation needed by 2040.

The REAT agencies considered the final 17,121 MW planning scenario to be a reasonable estimate of renewable energy needs in the DRECP, and it was one that addressed some of the comments from stakeholders on earlier estimates. For that reason, this particular planning scenario is described in greater detail in Section I.3.5.4.4.

I.3.5.4.4 The July 2012 Planning Scenario

The final planning scenario in July 2012 estimated a need for up to approximately 17,000 MW of incremental renewable energy development in the DRECP. The scenario estimated the net energy for load—the total amount of electricity required to meet demand in California—at 337,000 GWh in 2040, excluding the projected need by 2040 to power electric vehicles. Electrification of the transportation sector was estimated to add an additional 63,074 GWh to the need in 2040. Overall, the July 2012 scenario was about 18,000 GWh less than the estimate in the previous scenario and assumed an annual load growth of 0.586%, which is below historic levels and presumed an overall decline in per-capita consumption of electricity between now and 2040. Planners included these more conservative assumptions in response to revised economic forecasts, public comments on the previous scenarios, and other considerations.

The July 2012 scenario assumed that statewide, utility-side renewable distributed solar generation (small facilities between 2 and 20 MW in size) will provide 24.2% of the state's incremental (i.e., post-January 1, 2011) renewable energy generation capacity in 2040,

followed by central-station solar photovoltaic (18.5%), small rooftop solar (18.0%[7]), wind power (15.8%) central-station solar thermal (9.3%), geothermal (7.7%), and biomass (6.6%). But not all renewable generation was expected to be in the Plan Area. Planners allocated the megawatts associated with each central-station renewable technology to areas in and outside the DRECP based on recent historical trends, as well as technical and economic potential to site certain resources in different regions. The 17,121 MW scenario anticipated, for example, that all 3,612 MW of central-station solar thermal projects will be built within the Plan Area, but that only 70% of the 7,224 MW of central-station photovoltaic projects and only half of the 6,155 MW of wind will be located within the Plan Area.

In addition, this scenario assumed that 25% of the state's anticipated renewable energy in 2040 would be provided in the form of imports into California of renewable electricity generated outside the state. Under the RPS statute, 25% is the maximum level of imports that can be used to satisfy the state's RPS requirement. This scenario is based on achieving a 58% reduction in California's 1990 baseline GHG emissions by 2040, which will keep the state on the linear progress it needs to achieve the targeted 80% reduction in 2050. Following completion of the July 2012 scenario, CEC staff continued to evaluate stakeholder comments and further reviewed the assumed 1990 GHG emission baseline. In constructing the July 2012 scenario, staff made two assumptions related to GHG emissions: (1) the 1990 GHG emissions baseline is 115.84 MMT CO_2E, and (2) GHG offsets would allow the sector to increase GHG emissions above the 2040 cap.

In reviewing the GHG emissions baseline, it was found, however, that the following assumptions are correct: (1) the 1990 GHG emissions baseline is 110.63 MMT CO2E, and (2) the current cap-and-trade regime allows entities with compliance obligations to acquire offsets in lieu of allowances, but does so while reducing allowances issued to a level below the aggregate emissions cap by an amount equal to offsets that may be used. (In other words, the 58% reduction in GHG emissions assumed for 2040 constitutes a hard cap that cannot be exceeded by using offsets, contrary to the assumption made by staff in developing the July 2012 scenario.)

These assumptions were corrected, and the July 2012 scenario was recalculated. As a result, the output of the July 2012 scenario changes as follows: (1) the total zero-carbon load from 336,597 to 355,885 GWh, or about 5.7%, and (2) an additional 19,288 GWh of renewable (i.e., zero-carbon energy) will be necessary. This raises the DRECP capacity need from 17,121 MW as detailed in the original July 2012 scenario to 19,491 MW.

[7] This percentage represents the addition of the 7,000 MW of rooftop solar assumed to be added beyond the 3,000 MW California Solar Initiative target, assumed to be met in the 2009 CEC demand forecast.

Stakeholders have also indicated in their comments that that customer-side distributed generation (i.e., rooftop solar) assumptions in the July 2012 scenario may be too low. Additional customer-side distributed generation was factored into the revised scenario to address this concern, producing the following results: (1) if an additional 5,000 MW of customer-side distributed generation is added, 19,491 MW falls to 18,327 MW; and (2) if an additional 10,000 MW of customer-side distributed generation is added, 19,491 MW falls to 17,163 MW.

An overview of the renewable energy acreage calculator and a more detailed presentation of the revisions to the July 2012 scenario are included in Appendix F3.

I.3.5.4.5 A 20,000-Megawatt Plan

The calculator's revised July 2012 scenario estimates that between 17,163 MW and 19,491 MWs of renewable energy capacity would need to be built in the Plan Area by 2040. Planners determined that a capacity greater than the lowest end of this range should be included in the Plan to account for the inherent uncertainties with all of the various 2040 calculator projections, the potential for unplanned events that could increase the need for renewable electricity from the Plan Area, and the desire to provide flexibility and competitiveness in the development of renewable resources. Furthermore, the other planning scenarios developed over the previous year demonstrated that there are other plausible circumstances where greater renewable generation would be needed within the Plan Area over the same time period to meet California's GHG emissions targets.

The following factors were among the considerations in deciding to plan for more than the low end of the range 17,163 MW:

- Assumptions used in the revised July 2012 scenario, or any of the other planning scenarios, may prove incorrect. For example, developers and utilities might turn to California-based generation to fill more than 75% of the state's renewable energy needs, economic growth might be greater (or future energy efficiency savings might be less) than anticipated in the scenario, or generators might use less than the maximum allowed offsets under the cap-and-trade GHG reduction program. Any of these—or any number of other deviations from calculator values—would increase the need for renewable generation in California, and in the DRECP, higher than anticipated by the calculator.
- Renewable energy development is a market-driven process where flexibility and competition will best serve state and federal policies that encourage development of renewable energy resources. The goals of market flexibility and competition are promoted by providing some head room in the DRECP's capacity and ensuring that the Plan's ability to accommodate needed renewable energy development is not set

so low that it ends up constraining, instead of facilitating, sensible renewable development that minimizes environmental impacts.

- Transmission capacity from any particular DFA will likely need to be expanded to serve new renewable projects in the DFA. The high cost of building new transmission may mean that transmission upgrades will not be economical until a "critical mass" of renewable projects are initiated and begin the process of connecting to the transmission system. This raises the possibility that one or more of the DFAs designated in the DRECP for renewable energy development will not be available to developers. In that case, planning for a higher level of generation and transmission capacity in each of the DFAs will help ensure the DRECP works as intended even if one or more designated DFAs are not available, or immediately available, for renewable energy development in significant quantity.
- Other plausible scenarios for 2040 demonstrated circumstances in which the need for renewable energy resources in the Plan Area could be higher. For example, a 2040 case prepared in October 2011, based on somewhat less conservative assumptions than the revised July 2012 scenario, estimated that 22,000 MW of renewable energy capacity would be needed within the DRECP (CEC 2011c).

With these considerations in mind, the REAT agencies agreed that 20,000 MW was an appropriate capacity for DRECP planning purposes. This number is substantially greater than the low end of the range (17,163 MWs) identified in the final scenario prepared with the calculator, especially since the 20,000 MW does not include renewable projects that have already been approved in the Plan Area. However, in light of the uncertainties of long-term energy projections and the need to plan for a level of renewable development that will not fall short of the basic goals for the DRECP planning effort, the REAT agencies agreed that 20,000 MW was an appropriate planning objective for the DRECP.[8]

A more recent report prepared by the CEC suggests that California's need for electricity may be lower over the next 10 years than the demand that was anticipated at the time DRECP calculations were made. The draft demand forecast prepared by CEC staff in 2013 for the years 2014–2024 anticipates a reduced demand for electricity statewide compared to the forecasts used in the renewable energy calculator from 2011 to 2012 (CEC 2013b). If these forecasts prove true, and if the pattern of lower electricity demand continues through the remainder of the DRECP's 25 years, development of new renewable energy capacity in the DRECP could fall well below the 20,000 MW planned in the DRECP if regulations and policies remain unchanged.

[8] Some variations of the 20,000 MW target can be found in other documents, including the *Description and Comparative Evaluation of Draft DRECP Alternatives* dated December 17, 2012, which used a 20,323 MW target. These differences are relatively minor, and the REAT agencies determined that using a round number as the planning target is more appropriate given the programmatic nature of the DRECP and the imprecision that is inherent in long-term renewable energy projections.

The fact that agencies are planning to accommodate as much as 20,000 MW of renewable generation and transmission does not mean that much development will occur. If energy and economic variables, governmental requirements, and other factors translate into a need for only 10,000 or 15,000 MW of renewable generation in the DRECP, that is all that will be built under the DRECP. On the other hand, if economic or regulatory circumstances change again—if for example the state or federal governments adopt new energy or climate change laws or policies that *increase* the need for renewable energy generation—the DRECP will be better able to achieve its intended purposes of reducing project impacts and conserving sensitive species and habitats.

I.3.5.4.6 Estimating Initial Acreage Requirements for Generation in the Plan Area

The relative mix of renewable generating technologies that are used to achieve Plan-wide energy goals affect the acreage needed to generate any given amount of renewable electricity. Specifically, the relative proportion of utility-scale solar thermal, solar photovoltaic, and wind generation within the 20,000 MW is the biggest variable in trying to predict how many acres would be required for generation within the Plan Area. Further, some technologies, such as utility-scale solar thermal and photovoltaic plants, are likely to be located entirely or predominantly within the DRECP because of the high insolation values in the desert and availability of suitable land. In contrast, other technologies, like wind facilities, are more likely to be, and capable of being, distributed in other parts of the state as well as in the Plan Area. To account for the potential variation in distribution, higher wind and lower wind scenarios were developed from the calculator.

For the purpose of estimating future acreage needed for generation, a conversion factor, (known as the *acreage yield factor*) from megawatts to acres is required. Different technologies require different amounts of land per megawatt of capacity. For example, central-station solar plants require approximately 7 acres per megawatt of capacity, while wind facilities require about 40 acres for every megawatt of generating capacity. This means that megawatt for megawatt, wind generation requires much more land for construction than solar. Table I.3.4 lists the conversion factors for each technology considered within the DRECP. To estimate the minimum footprint for each calculator scenario, the capacity (megawatts) attributed to each technology was multiplied by the acreage yield factor.

To simplify the estimation process, the acreage yield factor associated with each technology was held constant. Although future technological changes are likely to increase energy capacity per acre over the lifetime of the Plan, the incremental introduction of technological improvements would only lead to a gradual reduction in the average acreage requirements across the entire Plan Area. To implicitly account for the future expected increase in generation efficiency, planners used values from the lower end of ranges indicated by

current research. For example, the National Renewable Energy Laboratory (NREL) estimates that the capacity-weighted average of the total land requirement for 1–20 MW solar projects in the United States is 8.9 acres/MW (NREL 2013, p. v); the scenarios developed by CEC staff assume a value of 7.1 acres/MW. NREL estimates a total impact area for wind plants of 72.4 acres (34.5 hectares)/MW (NREL 2009, p. 10); the value used by CEC staff was 40 acres/MW.

Table I.3-4
Acreage Requirements per Megawatt of Generation Capacity

Technology	Acreage Yield Factor (Acres/MW)
Central-station solar thermal	7.1
Central-station solar photovoltaic	7.1
Wind	40
Geothermal	6.0
Utility-scale distributed generation	7.1

Application of an acreage yield factor to the 20,000 MW generation planning goal provided an estimate of the acreage footprint required to construct generation facilities. However, it provided no guidance as to how other environmental factors might influence the acreage needed to allow sufficient flexibility to ultimately site up to 20,000 MW of generation. To assist in estimating the minimum acreage that may be need to successfully site generation, several scenarios that assumed different mixes of solar, wind, and geothermal generation from the calculator were used to develop a range of potential footprint estimates.

For the purpose of estimating the initial acreage requirements for renewable development, a range of "rule of thumb" discount factors was developed by planners in conjunction with CEC staff and industry stakeholders. These factors recognize that not every parcel of land can be developed, nor would every acre of a developable parcel be suitable for development. The use of a siting discount factor sought to account for a variety of different constraints that affect the actual development of generation facilities, including land use constraints, and the extent to which land is parcelized and ownership is fragmented in specific regions. Areas of the DRECP that are highly parcelized (i.e., with multiple small privately owned parcels) were viewed as more difficult to develop and less likely to accommodate generation than areas with larger parcel sizes. Conversely, public lands, which are under the control of a single managing agency, present fewer barriers to development and should have a lower discount factor (e.g., Solar Energy Zones) identified in the BLM Solar Programmatic EIS.

The lower discount factor for initial estimates of generation acreage requirements that assumed three times the raw calculator footprint estimates would be needed to successfully site generation. The upper discount factor assumed that five times the

calculator estimate would be needed to site generation. This gave a range between 861,000 and 1,710,000 acres for generation profiles that were 60% solar and 60% wind development, respectively.

Planners used these estimates in conjunction with the guiding principles laid out in Section I.3.5.3.1 to conceptualize the size and extent of areas that would need to be available for generation, and to identify initial RESAs discussed in the DRECP *Preliminary Conservation Strategy* (Dudek and ICF 2011b). These targets further assisted in understanding the likely degree of conflict with conservation goals. The use of these estimates also provided a target when developing various scenarios that included different subsets of DFAs.

I.3.5.5 Renewable Energy Resource Distribution and Development Potential

Section I.3.5.4 describes the expected generation targets for the Plan Area, but does not provide an assessment of the spatial distributions, extent, or quality of the resource available within the Plan Area. This section summarizes the information provided from state, federal, and stakeholder sources describing the distribution of potential generation resources used by planners in designating the areas best suited for renewable energy development.

Most of the Plan Area is recognized as a world-class renewable energy resource. There are potentially 10 million acres of solar resources, 11.5 million acres of wind resources, and 347,000 acres of geothermal resources within the DRECP boundary. This section describes the information used to move beyond general acreage estimates to characterize renewable energy potential and describes the development assumptions used to refine that potential using more detailed geographic attributes within the Plan Area.

I.3.5.5.1 Estimated Renewable Energy Resource Potential

The following is an assessment of the potential area available for renewable energy development within the Plan Area.

I.3.5.5.1.1 Solar

For solar development, potential solar insolation data from NREL (2009) were mapped across the desert to show relative areas of higher and lower annual solar insolation. These data were used to identify areas with at least 6.5 kWh per square meter per day to support viable solar energy generation from current technologies. Areas of relatively higher solar insolation (ranging from 7.6 to more than 8 kWh per square meter per day) were also identified, primarily in the west Mojave portion of the Plan Area.

Based on NREL (2009) data for solar resources (measured by direct normal solar insolation), approximately 10 million acres within the Plan Area have potential for the

development of solar resources (areas with insolation greater than 6.5 kWh per square meter per day). Geographically, the highest insolation values and greatest concentration of solar resources based on these data are located in the west and central Mojave regions.

I.3.5.5.1.2 Wind

Based on NREL (2009) data for wind resources (measured by meters per second at 50 meters [164 feet] above ground level), approximately 1.5 million acres within the Plan Area have potential for the development of wind resources (wind speeds greater than 5.6 meters [18 feet] per second are considered suitable based on the categories used in this dataset). The greatest concentration of wind resources based on these data are located in the Tehachapi region and various mountain ranges in the central and eastern Mojave regions. New wind speed data measured at 80 meters above ground level is now commercially available. DRECP did not obtain this new data because there was direct input from wind industry stakeholders that was informed by the new (80-meter) wind data (see Section I.3.5.5.2). Instead of using the 80-meter data, industry input was used to verify high-quality wind resource areas previously identified with 50-meter data and to add any additional areas of wind resource not initially identified with the 50-meter data.

I.3.5.5.1.3 Geothermal

Several factors were considered in the delineation of potential geothermal development areas. Known geothermal resource areas (California Department of Conservation 2001) were mapped, in conjunction with the current existing BLM geothermal lease areas. Additional potential geothermal lease areas in the Chocolate Mountains (Imperial County) were also included as potential geothermal development areas. As mapped, these areas represent the extent of the known and commercially operating geothermal resources in the Plan Area.

Approximately 350,000 acres within the Plan Area have been identified as known geothermal resource areas. The geothermal resource areas are concentrated in the Salton Sea and Imperial Valley areas, south of Owens Valley in Inyo County, and the north–central Mojave area.

I.3.5.5.2 Stakeholder-Defined Development Potential

The Center for Energy Efficiency and Renewable Technologies (CEERT) and the Large-Scale Solar Association (LSA) submitted a joint proposal for the development of solar energy in the Plan Area. The CEERT and LSA analysis identifies the chief characteristics of desirable solar resource lands, including above-average insolation, level topography (under 5 degrees of slope), and proximity to transmission (existing or planned high-voltage lines and

substations) (CEERT 2012). CEERT and LSA sought to identify up to two million acres within the DRECP boundary that should be analyzed for conflict with the conservation goals.

In November 2010, the California Wind Energy Association (CalWEA) presented "Wind Resource Considerations for the DRECP Process" to the Resource Mapping Working Group. The presentation included mapping and acreage calculations for areas of potentially viable wind resource development areas within the Plan Area. Subsequently, CalWEA updated its plan and identified wind-development focus areas that "include the highest quality wind resources that are within 10 miles of an existing transmission corridors and do not overlap with lands that have been classified by BLM as having special environmental concerns (Areas of Critical Environmental Concern (ACECs) and Desert Wildlife Management Areas (DWMAs))" (CalWEA 2012).

This information was considered by the REAT Agencies in subsequent development of the DRECP alternatives and DFA configurations.

I.3.5.6 Identification of Development Focus Areas

Using the principles laid out in Section I.3.5.3.1 to utilize disturbed lands where feasible, and to encourage compact development close to existing transmission, the planning process centered DFAs on already disturbed and degraded lands.

In developing the DFAs, the aim was to avoid areas that were viewed as making significant contribution to the biological and non-biological conservation goals. The location size and distribution of DFAs were ultimately the spatial tradeoffs and restrictions placed on the renewable energy resources identified in Section I.3.5.5 by the reserve design envelope, the method for which is discussed in Section I.3.4.4.

Various subsets of DFAs were identified to assist evaluation of the different potential tradeoffs between renewable energy goals and biological and non-biological conservation goals. Each subset of DFAs represented a different set of tradeoffs and resulted in potentially different mixes of energy generation types.

I.3.5.6.1 Estimating Renewable Energy Technology Profiles

To assist with the evaluation of different scenarios, energy profiles were developed based on the distribution of resources available within and between different subsets of DFAs. These profiles were developed to:

- Provide an estimate of the generation distribution for the transmission planning
- Estimate size of impacts to covered biological resources from construction and operational of generation facilities

- Determine the feasibility of any given scenario in relation to conservation goals.
- Estimate the distribution and size of impacts to non-biological resources

Each scenario contained a unique configuration of DFAs with varying quantities of renewable energy resource. Each scenario reflected a different mix of technologies that would combine to produce approximately 20,000 MW of new renewable energy capacity.

To estimate how DFA distribution could affect the mix and distribution of renewable energy development, a method that relied on the size and distribution of DFAs was developed. The method is briefly described below and more extensively described in Appendix F1. The technology profiling method made use of concepts from the calculator, including the acreage yield factor and siting discount factor described in Section I.3.5.4.6.

More extensive analysis was undertaken to arrive at spatially explicit siting discount factors based on the actual degree of parcelization, land ownership, and known regulatory polices of land managers that apply to different parts of the Plan Area (see Appendix F1 for more detailed analysis). To summarize, the acreage yield factor is a property associated with a specific technology, the siting discount factor is associated with a particular subarea of the Plan; the relationship between these factors is given in the equation below.

$$\text{MW per DFA} = \frac{\text{Acres of energy resource}}{\text{Acreage yield factor} \times \text{Siting discount factor}}$$

The application of the method relies on several assumptions or "rules" to ensure that consistent repeatable estimates were produced. The rules can be split into two groups. The first group includes geothermal facilities and utility-scale distributed generation (i.e., generation facilities less than 20 MW); both geothermal and utility-scale distributed generation were assumed to be fully developed in all plan alternatives. These technologies were accounted for first, and acreage occupied by either geothermal or utility-scale distributed generation was assumed unavailable for wind or solar. Geothermal has a relatively small footprint and is limited to specific areas within Imperial Valley and Owens Valley. Full development of geothermal as a baseload resource was viewed as an important statewide goal and therefore given priority. Utility-scale distributed generation was confined to areas with existing transmission facilities and located on disturbed land. As disturbed lands form the core of all DFA alternatives, utility-scale distributed generation was assumed to be less sensitive to changes in DFA configuration, and therefore a constant

in all alternatives. Utility-scale distributed generation is considered technology neutral but is defined as requiring 7.1 acres per megawatt. However, to account for small (1–5 MW) urban/suburban and infill projects, only 80% of all utility-scale distributed generation megawatts are assumed to require development acreage.

The second group includes large utility-scale wind and solar, which were assumed to require several thousand acres for development and would be more sensitive to the variation in availability of DFA acreage. For large-scale wind and solar, an unbiased estimate of generation distribution was developed that relied on the following rules:

1. All acreage within a DFA that was suitable for a given technology was considered of equal value (i.e., there was no weighting or grading of suitability within the DFA); areas were either suitable or unsuitable.
2. Each DFA will accommodate the generation capacity that is proportional to the energy resource capacity that it contains.
3. The area (acreage) of a DFA is a direct measure of the amount of renewable energy resources available. As a consequence of the assumptions described in this section, the acreage of a given DFA used for a particular technology was directly proportional to the total acreage available to that technology across the whole of the Plan Area.
4. No two technologies can have overlapping acreage (i.e., technologies are mutually exclusive). Therefore, for any estimate of technology mix and megawatt distribution, no DFA can be more than 100% utilized. As a consequence, the sum of the areas occupied by all generation types in a DFA is no greater than the total area available within a given DFA. This has implications for the ultimate technology mix that the DRECP can sustain, especially where the potential for solar and wind generation overlap.
5. For the purposes of estimating the distribution of generation capacity (megawatts) across the DFAs, each technology was presumed to have the acreage requirements described in Table I.3-4.
6. For the purposes of estimating the distribution of generation capacity (megawatts) across the DFAs, the DFA development potential is constrained by the siting discount factor described above and in Section I.3.5.4.6. The siting discount factor is a characteristic of a DFA and applies to all technologies within a given DFA.

I.3.5.6.2 Development of Combined Aggregation/Flexibility Scenario

The REAT agencies determined early on that the DRECP would need to provide flexibility to accommodate a variety of technology mixes and development patterns. The acreage needed to generate and deliver 20,000 MW of renewable electricity from the Plan Area is highly

sensitive to the relative mix of solar and wind projects, as explained above. Yet the actual mix of renewable technologies in the desert will not be dictated by the DRECP, instead depending to a great extent on which projects developers bring forward for permitting. A developer's decision whether to seek permits often turns on whether a utility or other retail electricity provider commits to purchase power from the project at a favorable price.

Similarly, neither the DRECP nor the agencies reviewing a project will be making the initial decision about the proposed location of a project within the various DFAs. Which parts of designated DFAs are developed first and which receive the most projects will largely depend on decisions made by project developers and retail electricity providers—subject to agencies' decisions whether to approve the project at the proposed location and what conditions to attach to their approval.

To provide the needed flexibility, a "combined aggregation/flexibility scenario" was produced from the five input scenarios described in Appendix F1. The aggregated scenario used the maximum affected acreage values for each technology from each ecoregion subarea. The combined scenario therefore overstates the amount of renewable energy development that will occur Plan-wide because it shows the maximum number of acres that might be needed in any particular DFA or subarea, but it provides the flexibility needed in the Plan to account for various mixes of technology and development patterns that might occur. Please note, however, that the maximum number of acres that might be needed in any particular DFA or subarea does not represent a "cap" or limit on the megawatts of any particular renewable technology that may be approved for development there.

I.3.5.7 Transmission Planning Goals and Assumptions

The transmission planning undertaken for the DRECP is conceptual and programmatic in nature, intended to provide a reasonable estimate of the amount of new transmission that will be needed to support anticipated renewable energy development in the desert region, as well as its approximate location and acreage. DRECP planners did not attempt to identify and analyze specific new or expanded transmission lines—just as the DRECP does not plan and analyze specific renewable generation projects. Planning for transmission within the DRECP and between the DRECP and load centers requires building upon previous transmission planning efforts.

As part of the DRECP planning process, the Transmission Technical Group (TTG) was formed. The TTG included transmission planners from the major California electric utilities with a direct interest in the DRECP, including Southern California Edison, Los Angeles Department of Water and Power, San Diego Gas and Electric, Imperial Irrigation District, and Pacific Gas and Electric. It also included representatives from the U.S. Department of Defense (DOD), the California Independent System Operator, CPUC, and CEC. The details of TTG's analysis are set forth in Appendix K and include conceptual electric transmission lines within and outside of

the Plan Area. The work of the TTG was coordinated by three co-chairs who represented the California Independent System Operator, CPUC, and CEC.

The Garamendi Principles (SB 2431), which are used in California to minimize the costs and environmental impacts of new transmission projects, were used when preparing the DRECP transmission planning maps; thus map lines that indicate new transmission needs were drawn to follow existing transmission rights-of-way wherever possible (CEC 2007). But otherwise, the line segments represent only the electrical connections (i.e., the end-points of each line segment) and do not reflect specific siting plans or routes for new transmission lines. The new transmission lines identified through this exercise have not been evaluated for the specific locations, constructability, desirability, cost, or likelihood of their successful permitting. They also have not been studied by transmission planning groups to identify reliability concerns or effects on other transmission systems.

Transmission planning for the DRECP was neutral regarding potential transmission owner or developer. The transmission conceptual plan for the DRECP was assumed to serve Plan Area generation growth only, and it was dependent upon the location and extent of the new generation as well as the location of the load center receiving the electricity.

The transmission plan was based on the CEC's estimates of need for renewable energy generating capacity to meet RPS and GHG emissions targets, as described in Section I.3.5.2. The planning process identified, at a very high level, the necessary transmission system facility additions that would likely be needed to accommodate 20,000 MW of renewable generation that could be developed within the 2040 time frame.

The transmission system upgrades assume that a combination of available and new transmission capacity would be utilized to accommodate generation within the DFAs through 2040. The availability of existing transmission is based on the 2020 cases prepared by the California Transmission Planning Group (http://www.ctpg.us). For DRECP planning purposes, the available capacity identified by the California Transmission Planning Group's 2020 cases was also used as the available existing transmission capacity for 2040, since transmission upgrades for load growth and other grid-related expansion requirements were considered likely between 2020 and 2040.

The TTG did not address any transmission that might be built on DOD lands. Instead, the DOD provided the TTG with exit point locations at the military base boundaries for 1,500 MW of new transmission from the bases, and the TTG planned for collector lines to the nearest collector substations. For purposes of this analysis, and at the DOD's request, this 1,500 MW was in addition to the renewable generation included in each of the DRECP alternatives.

The TTG identified transmission system facility additions that would accommodate a specified number of megawatts of renewable generation that could be developed in the DFAs by 2040.

Each new identified element of the transmission system (e.g., substation, transmission line) was assigned a capacity (in megawatts) to accommodate the estimated new generation; the TTG also estimated the amount of land that would be affected by the facility's construction and operation. Standard transmission grid components were assembled to derive a conceptual transmission plan for each alternative. For substations, the estimated acres of permanent impact were based on the transmission voltages that the substations are designed to serve. Transmission line length and width were based on the distance (length) to substation locations and the width of the right-of-way required. Access road length and width were based on the size of the substation, the length of the transmission line, and standard construction methods. Each 230 kilovolt (kV) and 500 kV line was assumed to require a permanent access road. The use of helicopters to install transmission lines could reduce the need for access roads, but such a site-specific analysis was beyond the scope of the TTG effort.

The basic assumptions used to estimate impacts of transmission components included consideration of all transmission lines that are likely to be required to interconnect desert renewable energy projects. This included lines ranging from 34.5 kV to 500 kV, as well as substations and access roads. The amount and location of generation is different for each alternative and is described in Appendix K.

Information on the size and mix of generation technologies and how they are distributed in the DFAs enables the calculation of the expected length of generation interconnection tie lines; number, size, and location of new collector substations; and likely length of delivery lines to the main transmission grid. For transmission, the technology mix is important when assessing the maximum simultaneous delivery capacity for collector lines from all generators since this would indicate the maximum size (in megawatts) of a new line. The maximum simultaneous delivery capacity is defined as the point during the annual load cycle when delivery to load is likely to peak. This is primarily driven by the mix of wind and solar generation. Because solar and wind provide energy at different times of the day, delivery lines were sized to accommodate the expected simultaneous output of the different renewable technologies within each DFA for the time period (month and hour) used to conduct the transmission analysis. To do this, TTG members used their professional judgment to define the percentage of output that would result from the solar, wind, and geothermal generation within each DFA to estimate the maximum simultaneous output.[9] In contrast, collector lines that connect the generators within each DFA to the collector substations are sized to accommodate the maximum possible combined output of all generators within the DFA.

[9] The TTG assumed output at 90% for geothermal facilities, 80% for solar facilities, and between 28% and 52% for wind facilities (based on location).

I.3.6 Plan Integration

As described above, the DRECP planning process integrates three types of mapping elements: (1) BLM land use planning designations, (2) biological Conservation Planning Areas, and (3) renewable energy planning areas. As described further below, BLM land use planning designations are developed using the process described in Section I.3.1 and include conservation designations (NLCS, ACEC, Wildlife Allocation), as well as other designations, such as Special Recreation Management Areas and Extensive Recreation Management Areas. Biological Conservation Planning Areas were developed using the process described in Section I.3.4 and are based on biological (plant and wildlife species and their habitat) considerations and requirements under the NCCPA, ESA, and FLPMA. The renewable energy planning areas were developed using the process described in Section I.3.5 and are based on renewable energy resource considerations reflected in state and federal renewable energy policies, an evaluation of potential future demand for renewable energy represented in the CEC calculator, and renewable energy resource and technology information.

I.3.6.1 BLM Land Use Planning Designations

The BLM land use planning designations include areas suitable for renewable energy development; areas suitable for biological, cultural, and scientific conservation; and areas suitable for an emphasis on recreation, mineral extraction, grazing and other multiple uses. The requirements of Public Law 111-11 for conservation of nationally significant ecological, cultural, and scientific resources lead to the mapped areas identified as National Conservation Lands. The multiple use and sustained yield requirements of FLPMA lead to modifications in the management of recreation (including the establishment of Special Recreation Management Areas and Extensive Recreation Management Areas), allowing for continued exploration of mineral resources, establishment of Visual Resource Management Classes, and grazing. BLM also developed mitigation measures for impacts to the various multiple uses and resources it considers in managing its lands, and developed mitigation measures to maintain multiple use and sustained yield. Tribal input was considered in developing both the DFAs and areas for conservation, to remove important areas from DFAs and ensure adequate protection through inclusion in conservation areas.

BLM participated in the biological conservation planning process and considered conservation biology principles, as well as NCCPA and ESA requirements, in the development of land use designations (BLM LUPA conservation designations) intended to support the conservation and management of natural communities and Covered Species. BLM also participated in the renewable energy planning process in the development of land use designation (DFAs on BLM-administered lands) intended to support renewable energy and transmission development consistent with the goals of the DRECP.

I.3.6.2 Biological Conservation Planning

Each alternative includes a Plan-wide conservation strategy that includes areas for biological conservation, as well as other biological conservation strategy elements, such as CMAs and monitoring and adaptive management. The areas for biological conservation include a reserve design envelope used for the development of the LUPA, NCCP, and GCP, as described in Section I.3.4. The reserve design envelope and other biological Conservation Planning Areas incorporate BLM, NCCP, and GCP biological principles and planning processes, as described in Sections I.3.1, I.3.2, and I.3.3, respectively. The initial steps in identifying and mapping biological Conservation Planning Areas included establishing the conservation focus and defining a proposed Covered Species list, assembling baseline information, and identifying BGOs. The biological conservation planning process follows from these initial steps, as described in Section I.3.4, and concludes with mapping and describing a DRECP Plan-Wide Reserve Design Envelope for each alternative, as described in Section I.3.4.4.5.

The BLM LUPA, NCCP, and GCP focus on different geographical areas within the Plan Area (e.g., BLM-administered lands for the BLM LUPA, nonfederal lands for the GCP, federal and nonfederal lands for the DRECP NCCP). However, DRECP Plan-wide conservation strategy features are common to, and incorporated into, the BLM LUPA, NCCP, and GCP. For example, the LUPA, NCCP, and GCP all use the DRECP Plan-Wide Reserve Design Envelope, Plan-wide BGOs, Step-Down Biological Objectives, and biological Conservation Priority Areas as the basis for identifying biological Conservation Planning Areas specific to each component plan (e.g., BLM LUPA Conservation Designations, NCCP Conceptual Plan-Wide Reserve Design, and nonfederal Conservation Planning Areas in the GCP).

I.3.6.3 Renewable Energy Planning Areas

The renewable energy planning areas (i.e., the DFAs) were developed based on a consideration of mapped renewable energy resources and modeled renewable energy technology profiles on the one hand, and areas with important or sensitive natural resources, as identified in the biological conservation planning process and BLM's land use planning process, on the other. As described in Section I.3.5, the renewable energy planning process is guided by the need to reduce the environmental impacts of anticipated renewable energy development and the need to help achieve state and federal renewable energy goals. The DRECP assumes that renewable energy development will occur in identified DFAs and examines alternative configurations for DFAs and renewable energy technology profiles that could accommodate the development of renewable energy projects capable of generating up to 20,000 MWs of electricity. For planning purposes, the DRECP assumes that there could be a demand for up to 20,000 MWs of renewable energy generation within the term of the DRECP, as described in Section I.3.5. The configurations for DFAs in each DRECP alternative are common to the BLM LUPA, NCCP, and GCP, while recognizing that each of these actions address different geographical areas within the Plan Area.

Exhibit I.3-3 depicts in brief summary form the Plan integration process. The alternatives resulting from this process are described in detail in Volume II.

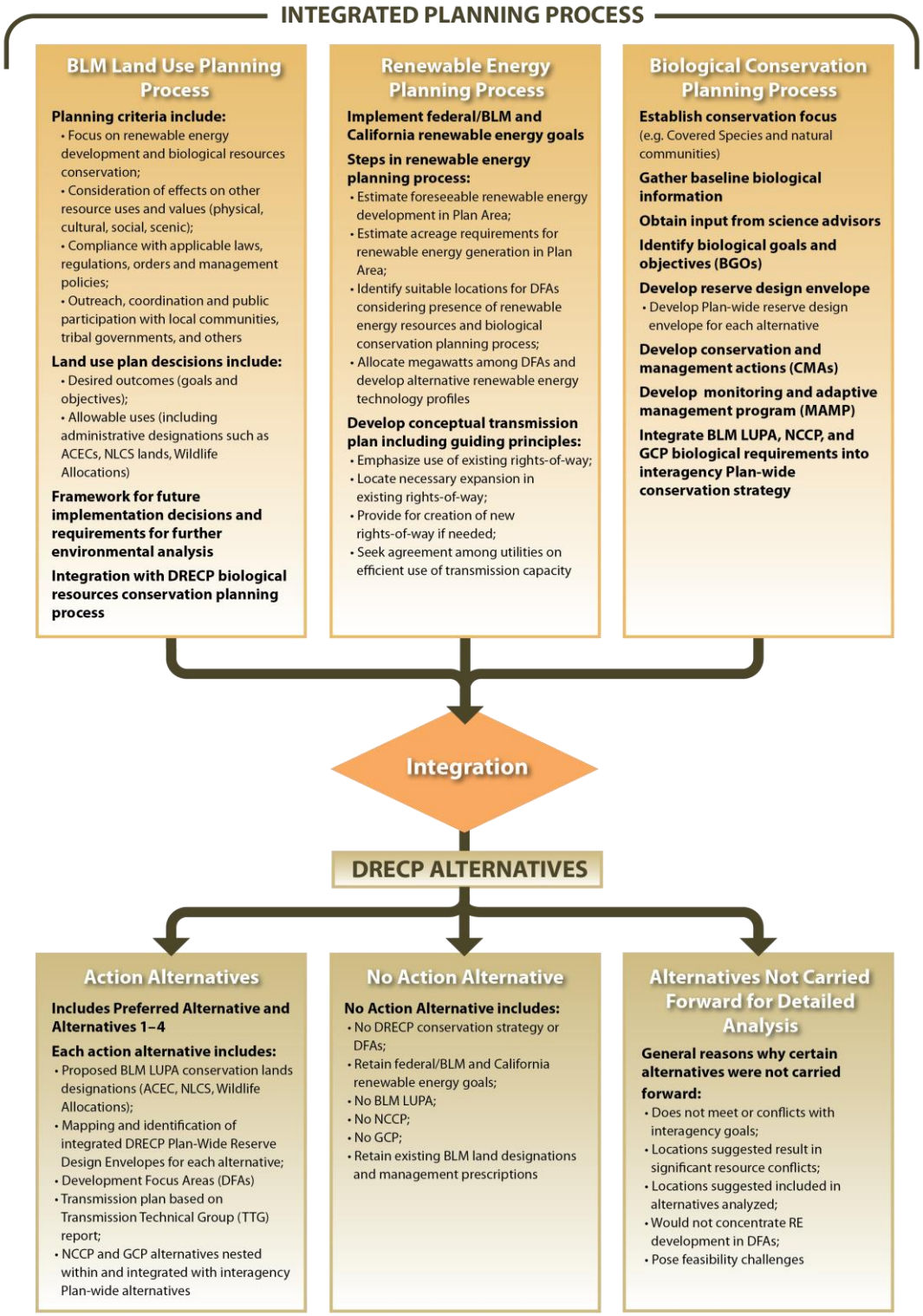

Exhibit I.3-3 DRECP Plan Integration Process

I.3.7 Duration of the DRECP

I.3.7.1 Bureau of Land Management Land Use Plan Amendment

BLM regulations under 43 CFR 1610.5-5 do not specify a term duration for LUPAs; therefore, the LUPAs approved as part of the DRECP would not expire and would remain in place until amended through future land use planning efforts as described in BLM regulations (43 CFR 1610). The BLM periodically evaluates land use plans to determine if new plan decisions are required (see BLM 2005, pp. 33–38). The plan amendment process is subject to NEPA and includes opportunities for participation by the public and other federal, state, and local agencies. The LUPAs approved as part of the DRECP could be amended in the future pursuant to changing conditions or law and policy as required by federal law and regulation, including FLPMA.

I.3.7.2 Endangered Species Act Incidental Take Permit Duration

The proposed term for any Section 10(a)(1)(B) incidental take permits issued under the GCP component of the DRECP would extend through 2040.

I.3.7.3 Natural Community Conservation Plan Duration

The NCCP portion of the DRECP would be effective through 2040. CDFW and, where it has jurisdiction, CEC would be able to issue incidental take authorization throughout the term of the NCCP.