Appendix E

Summary of Responses to Independent Science Reviews

E SUMMARY OF RESPONSES TO INDEPENDENT SCIENCE REVIEWS

Italicized text in the Independent Science Advisors (ISA) / Independent Science Panel (ISP) Recommendations Column shows additions/refinements from the 2012 ISP. The ISA 2010 Column identifies the section(s) where the recommendation was made in the 2010 ISA report, often with additional detail. The same applies with the 2012 ISP Column and the 2012 ISP report. Status category of "Alternative" indicates that the recommendation was considered and/or tried, but an alternative approach was chosen (explanation included in Notes Column).

ISA/ISP Recommendation	2010 ISA	2012 ISP	Treatment in Plan	Status	Notes
Plan Scope					
Biological Goals and Objectives (BGOs): the plan should (1) include explicit, hierarchical goals for the maintenance of biological diversity and ecosystem function in addition to goals for listed or sensitive species intended for permit coverage; (2) evaluate the impact of various planning scenarios on those biodiversity and ecosystem function goals, in addition to evaluating impacts on covered species; and (3) choose conservation strategies and policies that best satisfy this suite of biological goals while also meeting renewable energy goals. *2012: The ISP recommends that the Objectives start with functional criteria, such as conserving "sufficient acreage to support viable populations of*	2.1	2.1	The intent and use of BGOs in informing the plan's conservation strategy as well as the BGO development process are summarized in Volume I and documented in more detail in Appendix C (BGOs). Appendix C contains specific goals and objectives, which include functional criteria for covered resources. A hierarchical set of goals and objectives for the conservation measures were established at the landscape-level, natural community-level, and species-level. Volume IV analyzes the impacts of plan alternatives relative to quantitative and qualitative biodiversity and ecosystem targets set in the BGOs.	Complete	

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species X…." rather than putting in placeholders for arbitrary acreages or percentages of vegetation communities or modeled habitat…We urge planners to lay out a transparent and biologically reasoned approach as DRECP continues developing Goals and Objectives.					
Permit Duration: The advisors recommend 30 years as the maximum that is scientifically defensible in light of environmental variability, the pace of climate change, and the likely life of energy developments.	ES and 2.3		Volume I states that the DRECP's ESA ITP and NCCP permit durations would extend through 2040 and that the BLM LUPA implemented as part of the DRECP will remain in place for the duration of the permit (or longer), except it may be modified in accordance with the Federal Land Policy and Management Act (FLPMA).	Complete	
The Plan should address the needs of whole, intact, **natural communities** and mosaics of communities at the landscape scale to accommodate natural ecological processes rather than focusing just on individual species. Special protective measures should be taken to conserve rare or unique plant communities or species assemblages. *2012: Revise the Natural Communities designations.*	ES and 2.4	ES4 and 2.3	Volume III and Appendix Q (Baseline Biology Report [BBR]) address the relationship between natural communities and landscape factors, including the role of landscape factors such as connectivity in maintaining ecological processes. This discussion guided reserve design as well as setting BGOs at the appropriate landscape, natural community, and species levels, with acknowledgement that these levels are interrelated. In Volume II, Conservation and Management Actions (CMAs) address the protection of natural communities, including those considered statewide or locally rare.	Complete	

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Descriptions and ecological justification for designation of Natural Communities should be clear and analytically meaningful. The current community designations are overly broad and scientifically indefensible, with each encompassing extreme variations in vegetation structure and composition, climate and soil conditions, supported wildlife species, and ecological processes. At a minimum, the Mojave, Sonoran, and Colorado deserts need to be clearly differentiated.			Refinements to the treatment of natural communities include incorporation of new, fine-scale mapping data, an updated organizational structure, upgraded community descriptions/documentation, and rarity analysis/planning. The organization was developed with leadership from CDFW's Vegetation Classification and Mapping Program (VegCAMP) and includes 3 hierarchical classification levels/scales, and the levels used for effects analysis and conservation planning are compatible with National Vegetation Classification Standard (NVCS) mapping classification and hierarchy.		
A team of biologists should carefully craft a **list of species and subspecies** for which take authorizations should be sought via the Plan. Should consider plant species that are on CNPS List 1B and 2. *2012: Review, revise and explain the Covered Species list. We recommend that there be an immediate and thorough review and revision of the Covered Species list based on clearly documented and scientifically*	ES and 2.5	ES2 and 2.4	Volume I presents the Covered Species List used to prepare the Draft DRECP. An interagency group of biologists (Covered Species Group and REAT Managers) used a systematic and iterative species filtering process, which is described in detail in Appendix B. The process included documentation of coverage decisions with science- and policy-based rationale. CNPS-listed taxa in the Plan Area and of concern were considered regardless of list status (i.e., California Rare Plant Ranks 1A through 4). Similarly, both the CSSC and BLM Sensitive Lists were considered as part of this process.	Complete	The Covered Species List is considered final when the plan is adopted.

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justified decision-making. At the very least, the rationale for excluding California Species of Special Concern (CSSC) and BLM Sensitive Species must be clear.					
DRECP should consider whether the list of Covered Species should be supplemented with additional **Planning Species** for which take authorizations are not necessary but that can assist with meeting plan goals. *2012: Reiterated 2010 recommendation.*	ES and 2.6	2.5	The Covered Species List filtering process considered a large number of potential taxa, including those proposed as planning species. Two planning species, desert kit fox and burro deer, are included in the plan. The DRECP Gateway, a custom Internet portal powered by Data Basin, includes models for ISA-recommended planning species (e.g., American badger, Le Conte's thrasher) that are inputs into the DRECP Conservation Value Model, which will inform plan implementation. Other planning species models were evaluated but deemed unsuitable for inclusion by CBI and other experts. Also, some recommended planning species were considered in the conservation analysis/planning process through the fine-scaled vegetation alliance mapping (e.g., ironwood, Joshua tree, blackbrush, spiny hop sage).	Complete	The Covered Species List, designated Planning Species, and set of other non-covered taxa in DRECP analysis datasets are sufficiently broad to include some wide-ranging taxa and others representative of the functional categories discussed in the planning species recommendations.
The Plan should map and conserve **special habitat features** that support diverse and endemic wildlife communities.	ES and 2.7	2.6	The DRECP Land Cover data used for effects analyses and reserve design incorporates spatial information for special habitat features, including wetlands, seeps, springs, washes, sand dunes, mines, and geological features such as playa, and	Complete	

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2012: While some special features were included in the Gap Analysis, most of the special features recommended by ISA 2010 appear to have been ignored, although ISP 2012 believes that appropriate data are available to address them.			cliffs and ridges. Appendix A, the DRECP BBR Metadata (within Appendix Q of the Draft DRECP), contains descriptions of the primary data layers. The DRECP Gateway also contains such documentation and displays the special habitat features (within Land Cover data). A hierarchical set of BGOs for conservation measures were established at the landscape-level, natural community-level, and species-level (Appendix C). Special habitat features were identified and considered during the processes of setting the BGOs and developing CMAs. Volume IV provides the conservation effects analyses that address special habitat features.		
The Plan should strive to maintain **essential ecological processes**. *ISP 2012 recommends a stronger focus on ecological processes, especially when there is concern about ecosystem function into the future.*	ES and 2.8	2.6	Essential ecological processes were considered in a manner similar to special habitat features above. The Biological Resources chapters in Volumes III and IV address ecological processes.	Complete	
The Plan should identify and strive to capture broad, unfragmented **environmental gradients** within reserve areas.	ES and 2.9	2.6	Volume III and Appendix Q (BBR) include discussions of the natural communities and their patterns in the desert regions that are directly related to physical features and processes, which create the	Complete	

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ISP 2012 recommends clearly presenting the methods and metrics used to conserve environmental gradients in the Plan. Climate gradients should also be incorporated into species distribution models.			various environmental gradients in the Plan Area. Environmental gradients were also considered in the reserve design process (Appendix D) and effects analysis (Volume IV). Climate gradients are considered in the desert tortoise, Mohave ground squirrel, desert bighorn sheep distribution models and broadly in the effects analysis (Volume IV). Climate change analysis occurs primarily through landscape-level modeling approaches, which are used for analysis of potential impact to environmental gradients, to inform the reserve design and will help guide the implementation of conservation actions (see Appendix P).		
The Plan should review all **direct and indirect impacts** of the various types of renewable energy developments and associated features and avoid, minimize, and mitigate all adverse effects.	ES and 2.10		This recommendation is addressed in Volume II's description of Covered Activities. It describes the different types of renewable energy projects and transmission covered by the Plan, and the Conservation and Management Actions to be implemented with Covered Activities. Volume II (see No Action Alternative) also contains impact assumptions particular to certain renewable development types. Volume IV provides the effects analysis and describes in detail the anticipated direct, indirect, and temporary impacts of the Covered Activities.	Complete	

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Principles for Addressing Information Gaps and Uncertainties					
Obtain additional **independent scientific input and review** of data, models, maps, and other analytical tools and products at important milestones during the planning process. Additional scientific input and review of interim products will help reduce uncertainties, avoid costly errors, build support, and increase the potential to meet DRECP goals. *2012: Add scientific expertise. We recommend that DRECP immediately create a process that provides continuing, senior scientific leadership and fosters frequent and substantial engagement between the scientific community and the consultants and agency technical staff preparing the Plan.*	ES and 1.2 and 3.6	ES1 and 4.1	Independent science input has been solicited throughout the planning process through the ISP and ISA as well as other methods. CEC contracted with numerous species experts and other qualified scientists to review the species profiles and habitat models for proposed Covered Species. In January 2013, we convened a forum of researchers and modelers with expertise in species distribution modeling with REAT agency biologists to review existing species habitat models and provide species-by-species recommendations on data sources and modeling approaches. Experts from the Conservation Biology Institute (CBI), University of California Berkeley (UCB), University of California Davis (UCD), University of California Santa Barbara (UCSB), and the United States Geological Survey (USGS) collaborated to develop the modeling recommendations. In direct response to ISA/ISP recommendations and to strengthen the DRECP's scientific foundation, the DRECP expanded its specialist team with additional scientific experts from the REAT agencies and CBI. Agency and CBI experts in species, climate change, and modeling have contributed to the development and scientific vetting of DRECP interim products and the plan itself.	Complete	Scientific review of DRECP products will continue until the final DRECP is adopted and through the adaptive management phase.

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			CBI is a well-respected organization of scientists with specialized expertise that has been providing scientific leadership for the development of the DRECP.		
Invest in completing a seamless, up-to-date, high-resolution, hierarchical **vegetation (or landcover) map** as soon as possible. *2012: Highly recommend that various analyses (e.g., species models, reserve design, representation analyses) be updated as the new and better mapping becomes available.*	ES and 3.1	2.7	In direct response to this recommendation, CEC, BLM, and CDFW funded and completed a vegetation mapping effort covering a large portion of the DRECP Plan Area. This is a significant achievement for the state and desert planning considering the large size of the mapped area and the level of detail in the product. This high-resolution vegetation data was used to update Covered Species models as well as the DRECP land cover map, which represents a composite of the best available natural community and other land cover data for the entire Plan Area. The land cover map is mapped at fine-scale and medium-scale resolutions and is the basis for reserve design and effects analyses at the regional and landscape-scale planning levels. The land cover map incorporates the current NVCS-compatible land cover mapping classification and hierarchy. (See Appendix Q [BBR] for metadata and discussions on data layers).	Complete	
Use **list of CA Terrestrial Natural Communities and CA Vegetation Alliances.**	2.4.1	2.3	Based on direction from CDFW, the DRECP land cover map uses the NVCS hierarchical classification system, generally at the macrogroup or group level, and upon	Complete	

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ISP 2012 recommends that the DRECP Natural Communities be revised using a more ecologically sound approach and finer-resolution categories. One promising approach would be to stratify Ecological Sections (or Subsections) by NVCS Groups.			which the CA Terrestrial Natural Communities and CA Vegetation Alliances is based.		
The advisors recommend that a **special features map** similar to that created for the Central Mojave Vegetation Database be made for the rest of the planning area.	3.1.2	2.6	The DRECP land cover data used for effects analyses and reserve design incorporates spatial information for special habitat features, including wetlands, seeps, springs, washes, sand dunes, mines, and geological features such as playa, and cliffs and ridges. Appendix A, the DRECP BBR Metadata (within Appendix Q of the Draft DRECP), contains descriptions of the primary data layers. The DRECP Gateway displays the special habitat features (within Land Cover data).	Complete	
A variety of **existing maps and GIS data layers** should be consulted during planning and incorporated into a central GIS database for use in spatially explicit models or other purposes. *2012: Address mapping and land classification errors as well as*	3.1.3	ES5 and 2.7	Volume III and Appendix Q (BBR) include maps as necessary to depict the baseline conditions in the Plan Area. These include maps for ecoregions, physical geology, hydrology, groundwater, slope, aspect, surficial geology, topography, soils, habitat connectivity, and land cover (including natural communities). Plan development involved consulting a variety of other maps and data layers. Within Appendix Q, see Appendix A for metadata and central	Complete	New, relevant maps and GIS data will continue to be reviewed as they become available for incorporation into DRECP datasets.

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important gradients.			DRECP database descriptions as well as map/data citations within Appendices B (Species Profiles) and C (Species Distribution Models). Substantial mapping QC/QA has occurred since the ISA/ISP reviews. The maps and GIS data layers that were incorporated into the DRECP land cover data were used in effects analyses and reserve design.		
The Plan should update and refine existing **species locality data** using a variety of sources, but avoid using plots of species presence data (e.g., from the California Natural Diversity Data Base [**CNDDB**]) as a primary foundation for siting developments or conservation actions. Most important, do not assume that absence of species observations in such data sets represents absence of the species, because the lack of species locality data in many areas is more indicative of insufficient survey effort than absence of the species. *2012: makes specific recommendations for data sets*	ES and 1.2 and 3.3	2.7	CNDDB is but one of many inputs into the foundation for reserve design (and Development Focus Area [DFA] selection) and other planning decisions. CNDDB data, published range maps (e.g., California Wildlife Habitat Relationships maps), and several other occurrence data sources (e.g., BLM, USFWS, eBird, CalHERP, etc.) were incorporated into the species profiles and DRECP Species Occurrence Database (see Appendix A within the BBR). Each species profile (see Appendix B within the BBR) provides a detailed discussion of occurrence and range information (including historical and recent occurrences) and, as applicable, the utility of the data is discussed (e.g., completeness of data). Any uncertainties regarding the range and distribution are discussed for species, as applicable, both in the "Distribution and Occurrences within the Plan Area" and "Data Characterization" sections of the species profiles.	Complete	

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			Specific data sources identified in the ISA 2012 Report were reviewed and several additional datasets (e.g., eBird, USGS Mohave ground squirrel model) were incorporated into the DRECP Species Occurrence Database when possible and feasible. Some of the data sources had apparent errors or lacked enough location specificity for use in plan-related tasks. The DRECP Gateway also provides documentation for species occurrence data.		
We recommend careful use of **habitat suitability models or species distribution models** (SDMs). SDMs allow point locality data to be extrapolated to determine probability of occurrence maps. *2012: Improve species distribution models. We recommend development of new species distribution models by scientists having appropriate modeling and biological expertise, and using the most scientifically defensible variables, resolutions, and methods to ensure realistic depictions of habitat suitability and levels of*	1.2 and 3.4	ES3 and 2.8	Revised and scientifically vetted SDMs informed many elements of the plan, including reserve design, effects analysis, implementation planning (e.g., via CBI Conservation Values Model), BGOs, CMAs, and updated species profiles. The BBR (Appendix C within Appendix Q) describes the DRECP Species Modeling Forum whereby researchers and modelers with expertise in species distribution modeling were gathered with REAT agency biologists to review existing species habitat models and provide species-by-species recommendations on data sources and modeling approaches as well as address issues common to species modeling in general (e.g., setting appropriate thresholds). For taxa with	Complete	

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uncertainty. Revised models should include either expert models or statistical models, not both, with preference for statistical rather than opinion-based models.			multiple available models, this forum allowed selection of the one most relevant to the DRECP's purposes and discussion of the differences among the various models for a given taxon. Experts from the CBI, UCB, UCD, UCSB, and USGS collaborated to develop the recommendations and some provided advice on specific technical issues arising during DRECP SDM development work. This comprehensive input-gathering process provided robust feedback from species experts, agency specialists, and modelers, and was used to scientifically vet, refine, and improve the DRECP species habitat models for all proposed Covered Species. Statistically based Maxent models were used for a majority of the DRECP Covered Species. Where statistically based models were not recommended by CBI due to data limitation or species-specific considerations, expert-based models were developed. Species habitat models used for the DRECP were developed by several entities, including the forum experts and Dudek. Supporting documentation with detailed information on methods, data, and processing is on the DRECP Gateway. In addition to the Forum review process described above, nearly every species profile and habitat model was peer reviewed by an independent expert for that species.		

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Distribution of sensitive **invertebrates** should be determined. *2012: echoes the ISA 2010 recommendations for a comprehensive data-gathering effort to appropriately identify invertebrate taxa as Covered Species in the Plan area.*	2.5.5	2.4.5	Agencies conducted outreach to invertebrate experts identified in Appendix C of the ISA report (2010) (Individuals with Known Expertise Regarding Sensitive Invertebrates in the DRECP Planning Area) to solicit recommendations on invertebrate taxa to be further considered for inclusion on the Covered Species List or otherwise considered in planning (see Appendix B on Covered Species List methods). No sensitive invertebrates are proposed for regulatory coverage due to expert opinion regarding the lack of baseline information necessary for coverage and likely protection of certain desert invertebrate hotspots through strict avoidance CMAs. Sensitive invertebrates that are closely associated with specific natural communities, such as species endemic to certain dune systems and wetland features, are generally discussed in Volume III.	Complete / Alternative	A comprehensive data-gathering effort was not feasible during the planning process.
Use appropriate spatially explicit **maps and models** to address information gaps to the degree feasible.	ES and 3.5		See the responses for the **existing maps and GIS data layers** and **species habitat models** recommendations on the previous pages.	Complete	

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Consider **subdividing the planning area** into ecologically relevant planning subunits that account for heterogeneity in climate, vegetation, geology, etc., across the region. *ISP 2012 also echoes the 2010 ISA recommendation of subdividing and that representation goals should be established for each Covered Species and Natural Community by subregion.*	ES and 1.2, 2.2, 4.2	2.2	In Volume III and the BBR (Appendix Q), the Plan Area was subdivided by ecoregion and ecoregion subsections based on the USFS National Hierarchical Framework adopted by the USFS Ecological Classification and Mapping Task Team (ECOMAP). Ecological sub-units were grouped by DUDEK for DRECP planning purposes. The effects analysis (Volume IV) and other plan elements also employ these planning subunits.	Complete	
Use **conceptual and quantitative models**. *And **decision support models**.*		4.5	CBI has developed several conceptual and quantitative models including the DRECP Terrestrial Intactness, Species Stack, Climate Refugia (see Appendix P), Climate Velocity, and Conservation Values models, which inform reserve design (Appendix D), adaptive management, and other plan elements. All DRECP models are documented in detail on the DRECP Gateway. Available conceptual ecological models were used for some species profiles (e.g., a stressor model for desert tortoise and a water management model for Yuma clapper rail). Published or otherwise adopted ecological models are available for several proposed Covered Species, natural communities, and processes and citations are provided where they are used in the plan.	In progress	Additional conceptual models (e.g., threats and stressor-based models) will be developed as needed to implement CMAs in an adaptive management approach.

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			Decision support models (e.g., desert tortoise spatial decision support system, Stoms et al. 2013)[1] were consulted during preparation of the biological effects analysis (Volume IV) and reserve design process (Appendix D).		
Anticipating Climate Change: We recommend that participants continue to track the evolving scientific literature on climate change effects in the planning area, while planning a reserve network that is as comprehensive and robust as possible to this uncertain future. *2012: Incorporate a climate change scenario into the DRECP reserve design. To effectively address climate change in the DRECP, we recommend a select few climate scenarios, in the form of downscaled climate model simulations, to be used consistently across the matrix of DRECP concerns, and to evaluate vulnerabilities and linkages to other stressors on species and habitats.*	3.5	ES6 and 4.4	Appendix P summarizes the state of recent climate science as it relates to the DRECP area and presents a few selected climate scenarios. CBI has completed modeling on climate refugia and velocity at the landscape level. In addition, climate change analyses are available for Mohave ground squirrel, desert bighorn sheep, and desert tortoise, as well as a few other taxa to provide additional data for species-level climate change planning purposes. These climate change data will inform the plan implementation, including the adaptive management program and CMAs.	Complete	

[1] Stoms, D. M., S. L. Dashiell and F. W. Davis. 2013. Siting solar energy development to minimize biological impacts. *Renewable Energy* 57: 289–298.

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Match the **scale and resolution** of each analytical task to the scale and resolution of the issues being addressed.	1.2		As a general planning principle and analytic approach, these recommendations have been incorporated throughout the plan preparation process. For example, in Appendix Q's section on Physical Conditions, there are discussions for the different ecoregions, climate patterns, geomorphological conditions, hydrology and watersheds. Likewise, this appendix and Volume III describe the existing ecological and biological settings, with reference to scale issues (e.g., fire is primarily a threat in the western Mojave portion of the Plan Area). The species profiles and analyses are scale-dependent, including discussions tailored to both wide-ranging species (e.g., golden eagle, desert bighorn sheep, and desert tortoise) and narrow endemic species, including several plant species and other area- and habitat-restricted species such as fish. The effects analysis in Volume IV takes into consideration regional effects of development on species and their habitats, landscape factors, natural communities, and ecological processes based on the BGOs presented in Appendix C. For example, for desert bighorn sheep conservation needs to address potential movement bottlenecks created by Interstates 15 and 40, so these critical crossings are identified in the BGOs and	Complete	

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			targeted in the conservation actions for this species.		
Principles for Siting and Designing Renewable Energy Developments					
To the greatest degree possible, site all renewable energy developments on previously **disturbed land**.	ES and 1.2		The issue of siting development relates to both development of the DRECP reserve system and identification of areas suitable for renewable energy development (i.e., the DFAs). Volume I summarizes conservation and renewable energy planning principles consistent with this recommendation. Appendix D (Reserve Design Process and Approach) documents in detail how this recommendation (and those that follow) was implemented and planning decisions were refined and validated through an iterative approach involving comparison with conceptual landscape-level models addressing anthropogenic disturbance (e.g., Terrestrial Intactness, Stoms et al. [2013], TNC). This siting principle is carried forward into the CMAs (Volume II), which include best management practices (BMPs), other project design features, and avoidance and minimization measures that will further reduce impacts of resources in accordance with this recommendation.	Complete	
To the greatest feasible extent, avoid and **minimize any new disturbance of soil surfaces**.	ES and 1.2		See the above response for the **disturbed land** recommendation.	Complete	

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Avoid siting developments where they will disrupt **physical geological processes**.	ES and 1.2		This recommendation refers to maintaining geomorphic systems such Aeolian/active sand dunes systems, and surface and subsurface hydrology. See the above response on conserving **special habitat features**.	Complete	
All else being equal, encourage renewable energy developments that **maximize energy produced per unit land area**.	ES and 1.2		This recommendation is addressed through the establishment of Development Focus Areas (DFAs). Specifically the DFA locations were based in part on the work of the Renewable Energy Transmission Initiative (RETI)[2]. The RETI work examined the density of renewable resources in various areas as one basis for the environmental ranking of the RETI Competitive Renewable Energy Zones (CREZs). By utilizing the RETI work to capture CREZ portions within DFAs, DRECP ensures that there is flexibility within the DFAs for individual projects to maximize energy density and preserves the economic incentive to do so. This recommendation is also addressed by the fact that DFAs identified in the DRECP alternatives, by design, include areas with very high renewable energy resource potential (high sustained wind speeds, high solar radiation, and known areas of geothermal potential), which again ensures that there is flexibility within the DFAs for individual projects to maximize their energy density on the	Complete	

[2] http://www.energy.ca.gov/2008publications/RETI-1000-2008-003/RETI-1000-2008-003-F.PDF

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			landscape while taking into account other siting factors. For documentation relevant to this recommendation, see Volume II's Description of Covered Activities and Appendix F (Megawatt Distribution Methods). Due to uncertainties, such as acres per megawatt (MW), acres by technology, technology mix, scale (i.e., mix of commercial vs. distributed), and energy sources within or outside the Plan Area, for analytic purposes, ground disturbance "caps" were used to assess impacts for any renewable energy technology. These may be viewed as "worst case scenarios" because it can be assumed that technologies will be improved and that MW/area will increase over time.		
All else being equal, encourage renewable energy developments that **use less water**.	ES and 1.2		See the above response for the **disturbed land** recommendation. Minimizing water use will result from appropriate siting of development, selection of the appropriate renewable energy technology (e.g., wet vs. dry cooling of solar facilities), project design features, BMPs (e.g., dust suppression methods), and other avoidance and minimization measures.	Complete	
Principles for Mitigating Impacts					
DRECP should encourage and potentially fund a **research** project by an appropriate	ES and 4.4		The CEC R&D Division added this recommendation to its research priorities for future energy-related environmental	Complete	

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academic or research institution or research agency to review the history and **effectiveness of various mitigation and conservation actions** in California.			research funding. In addition, they held a solicitation for such projects and funded a desert tortoise study that is testing the efficacy of desert tortoise headstarting and jumpstarting as mitigation techniques. Additional research priorities identified by the REAT agencies will be evaluated and coordinated among the agencies during DRECP implementation. Funding for essential research will be identified and developed in various cooperative partnerships among agencies, implementing entities, permittees, the renewable energy industry, and other interested stakeholders.		
Habitat creation or restoration actions should not be considered as full mitigation for construction impacts.	ES and 4.4.1		This recommendation was implemented through preparation of the CMAs described in Volume II of the Plan.	Complete	
Transplantation or translocations should be considered a last recourse for unavoidable impacts, should never be considered full mitigation for the impact. Translocations or **reintroductions** into areas where the species has been previously extirpated should only be attempted if the original reason for the extirpation has been controlled.	ES and 4.4.2		The CMAs for covered plants do not include or consider transplantation as a project compensation or mitigation mechanism. Where required or allowed by current statute or regulation, some desert vegetation may be transplanted as a minimization or salvage measure (typically cactus or yucca relocation), and those instances are specified in the CMAs. Translocation of desert tortoise may be required in response to individual project siting, but in general, the DFAs are designed	Complete	

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			to minimize the need for translocation. CMAs do require translocations of desert tortoise in limited circumstances and subject to stringent implementation and monitoring requirements.		
The Plan should include mitigation actions to **reduce subsidies** to such species, including fencing of roads and eliminating trash and artificial water sources, perch sites, and nest sites.	ES and 4.4.3		See the response above for the **habitat creation or restoration** recommendation.	Complete	
Principles for Reserve Design and Conservation of Covered Species and Communities					
The Plan should implement and improve on well-researched conservation actions identified in **existing conservation and recovery plans**, provided they are subject to scientific peer review and do not conflict with our other recommendations.	ES and 1.2		This recommendation was implemented through preparation of the CMAs described in Volume II. The species profiles in Appendix Q contain summaries of existing conservation plans as they apply to the proposed Covered Species.	Complete	
DRECP should **identify areas** that are appropriate for siting renewable energy projects while also identifying the most important areas to conserve.	ES		See above response for the **disturbed land** recommendation.	Complete	
DRECP should use well-established scientific **principles of reserve design** to identify which lands should be added to existing reserve areas to increase	ES	ES7, 2.9.2	See above response for the **disturbed land** recommendation. Appendix P includes climate change considerations and scenarios informing reserve design. The REAT agencies led development of the	Complete / Alternative	As noted in the 2012 ISP report, the 2010 recommendation was implemented through the Marxan with Zones reserve design and post-Marxan reserve

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their size, contiguity, functionality, connectivity, and resilience to climate change. *2012: Revise and explain the reserve design. Although the consultants have followed ISA 2010 recommendations to apply objective site-selection algorithms and to use well-established reserve-design principles, the documents we reviewed do not adequately describe the methods, assumptions, and key decision points of the process. Furthermore, the design must be updated after items 1-6, above, are completed, and should more explicitly consider interactions among processes (e.g., climate change and development impacts on fire, invasive species, hydrogeology, and increased human use of the desert). The consultants have…used an appropriate planning tool (Marxan with Zones)… The reserve selection and design steps will need to be repeated using revised species distribution models and other adjustments,*			Reserve Design Envelope and the detailed documentation of the process to date (see Appendix D).		design refinements. However, instead of repeating these steps with updated data as the ISP suggested in 2012, ongoing improvements to the reserve design occurred in coordination with Landscape Intactness modeling work by CBI. These tools replaced a re-analysis with Marxan because CBI, in collaboration with the REAT agencies and consultants, found them to be more appropriate for the DRECP's specific planning needs, goals, and targets.

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and should be done in collaboration with experienced conservation planners.					
Principles for Adaptive Management and Monitoring					
Timing: Begin monitoring studies, and implementing adaptive management actions, immediately—during planning—to reduce uncertainties about plan outcomes and inform future plan decisions. *2012: Immediately craft an **Adaptive Management Plan**. Consistent with ISA 2010, ISP 2012 considers that a well-designed Adaptive Management Plan is the most critical element of a successful DRECP. The need to establish current baseline conditions for Before/After-Control/Impact (BACI) sampling designs underscores the urgency of initiating monitoring as soon as possible. We recommend convening one or more focused science advisory processes as soon as possible to help identify monitoring priorities and methods.*	ES and 6.1	ES8, 2.10, and 4.6	The Monitoring and Adaptive Management Program was prepared with assistance from CBI and is summarized in Volume I (presented in detail in Volume II). If there is a time lag (e.g., 2-3 years) between permit issuance/implementation and disturbance plus available funding, site baseline data could be collected as part of a BACI design. CBI collaborated with the DRECP agencies and the consultant team to develop an adaptive management framework and guidance on how to develop the adaptive management program to address this recommendation and others related to monitoring and adaptive management. CBI incorporated all DRECP models and decision tools into an adaptive management setting within the DRECP Gateway; models can be updated for monitoring and forecasting future conditions.	Complete / Alternative	Initiating field monitoring studies of the Plan Area has not been feasible during the plan development process, and significant work has been funded to gather data that is adequate to establish the regulatory baseline. Research funded by BLM, CDFW, and CEC has generated baseline condition data for some Covered Species, Planning Species, and natural communities.

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Institutional structure: Develop a formal institutional structure for adaptive management that ensures strong, effective feedback from monitoring and research studies to plan decisions, and use this structure to continually improve all aspects of the plan over time, during both plan development and implementation.	ES and 6.2	4.6	See the above response for the **Adaptive Management Plan** recommendation. The The governance structure also is included as a part of the Monitoring and Adaptive Management Program described in Volume II.	Complete	
Hypothesis-based monitoring: Use conceptual and quantitative models that formalize understanding of the systems of interest to guide development and testing of hypotheses with monitoring studies.	ES and 6.3	4.6	See the above response for the **Adaptive Management Plan** recommendation.	Complete	
Appropriate monitoring design. Use robust statistical sampling designs for monitoring programs to maximize reliability of resulting data, including (1) BACI designs for new energy developments and (2) systematic surveys across the plan area to better establish landscape-scale baseline conditions.	ES and 6.4	4.6	See the above response for the **Adaptive Management Plan** recommendation.	Complete	
Focused research studies. Implement focused research studies to address uncertainties	ES and 6.4.4		See above response regarding **research** and the **effectiveness of various mitigation measures**. In addition, six other	Complete	Additional research is anticipated in support of the DRECP in the implementation phase.

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about how to sustain covered species and communities.			CEC-funded research projects have generated SDM output, field data, and species population information that have substantially contributed to the state of knowledge for DRECP Covered Species. Additional CEC and BLM contracts and USFWS research priorities are addressing uncertainties related to golden eagles. Some CMAs in Volume II recommend specific research on Covered Species to address key uncertainties related to sustaining viable populations.		
Other Environmental Monitoring: At least the following physical conditions and processes should be systematically monitored using BACI designs for new developments and to establish baseline conditions and changes throughout the planning area: Ground water levels and impacts; local weather and impacts; and erosion and deposition effects.	6.4.5		See the above response for the **Adaptive Management Plan** recommendation.	Complete	
Invasive Species Management: Management of exotic plants should be considered as part of the energy development process and as a strategy for partly mitigating direct native habitat destruction due to energy development.	ES and 6.5.1		Volume II implements this recommendation through the CMAs.	Complete	

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Plan Documents					
Make all analyses and decision-making processes as **transparent and understandable** as possible, and avoid maps that compile multiple data inputs into a single data layer without adequate documentation and justification.	ES and 1.2	3.1	To improve the transparency of the work being performed by the DRECP agencies and consultants, and to provide associated maps, data sets, and assumptions/logic to the DRECP stakeholders and public in a manner that is more readily understood, CBI created the DRECP Gateway. Several appendices were added to the plan to document decision-making and analytical processes more thoroughly.	Complete	.
*Employ a **technical editor**. We recommend that a technical editor with a strong background in ecology be employed to purge unnecessary words, ensure consistency of terms, improve figure and map quality, and ensure completeness and clarity of presentation in all Plan documents. Key decisions in the planning process, and all scientific methods and assumptions, should be clearly documented to conventional scientific standards of transparency such that the decision-making rationale and uncertainties are sufficiently clear that the results of all analyses could be independently reproduced.*		ES9	See above response regarding **transparent** plan documents. In addition, the consultant team added additional technical editors to their team to address this recommendation.	Complete	Technical editing will continue throughout the planning process until adoption of the final plan.

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***Baseline Biology Report**: each section and subsection of the Baseline Biology Report should frame and justify what the conservation Goals and Objectives are for a particular Covered Species, Natural Community, Ecological Process, etc., with guidance for how those Goals and Objectives can be achieved via Reserve Design, Adaptive Management, and other Plan aspects.*		3.2	This recommendation was implemented through preparation of Appendices C (BGOs) and D (reserve design) as well as the CMAs in Volume II.	Complete	
***Species Accounts**: Species accounts need to be based on the most recent and credible scientific information, published or in reports. The potential impact of Covered Activities should be explicitly described and form the centerpiece of each account; and each account should focus on how the species' needs can and should be addressed by reserve design and adaptive management actions and to determine whether the species will be affected by climate change.*		3.3.1	DRECP contracted with outside species experts to review the species profiles. The species profiles in Appendix Q reflect revisions based on this review and review coordinated by CBI as well as include recent scientific publications and data from research studies in progress. Volume IV includes species-level effects analysis, including climate change considerations. Species' needs in the Plan Area are articulated in the BGOs (Appendix C), and CMAs for each Covered Species are provided in Volume II.	Complete	
Additional Recommendations					
***Analytical Framework and Science Component Integration**: We recommend immediately*		4.2	CBI and Dudek provided assistance (and continue to do so) to the agencies that is responsive to this recommendation	Complete	

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developing and vetting a more clearly thought-through analytical framework and system-integration strategy that will explicitly guide how Plan components will be synthesized into a defensible, coherent Plan that can be refined over time through adaptive management.			throughout multiple plan elements including the Planning Process, which is in Volume I, and the Monitoring and Adaptive Management Program, which is in Volume II. Science component data and documentation is available on the DRECP Gateway.		
***Addressing Future Conditions**: The ISP recommends that the reserve-design process more explicitly consider interactions between various processes that affect desert ecosystems and species, and how they are likely to change in the future. This is more than just addressing how the climate is changing, because numerous other processes (e.g., fire, invasive species, hydrogeology) already interact to affect desert ecosystems, and this interacting set of processes will change along with climate, development, and other factors.*		4.3	Appendix P not only addresses climate change but also other processes mentioned in this recommendation. This recommendation was also implemented through preparation of Appendix D on reserve design.	Complete	