

Appendix H

Conservation and Management Actions Documentation

H CONSERVATION AND MANAGEMENT ACTIONS DOCUMENTATION

H.1 Introduction

This appendix includes the supplemental information that supports the biological Conservation and Management Actions (CMAs) described in Volume II including the compensation component of the analysis of the DRECP alternatives in Volume IV.

Specifically this appendix includes the supporting documentation for:

- **Avoidance and Minimization CMAs** – This contains specific standards referenced in the biological CMAs in Section II.3.1.2.5.1 through Section II.3.1.2.5.6 including details regarding species-specific CMA requirements, methodology for implementing some species-specific CMAs, habitat restoration standards, and descriptive figures referenced in the biological CMAs.
- **Compensation CMAs** – This includes the approach for determining compensation for the impacts on biological resources regarding Desert Renewable Energy Conservation Plan (DRECP or Plan) Covered Activities and the application of the compensation approach to the DRECP alternatives.

H.2 Avoidance and Minimization CMAs Supporting Documentation

H.2.1 Survey Protocols

As described in the Plan-Wide Avoidance and Minimization CMAs (Section II.3.1.2.5.2) in **AM-PW-1** habitat assessments conducted for DRECP natural communities will comply with the most recent and applicable assessment protocols and guidance documents for natural communities and jurisdictional waters and wetlands that have been approved by the DRECP Coordination Group and responsible regulatory agencies including the following, as applicable:

- Vegetation Surveys: California Native Plant Society: Department Of Fish And Game Protocol For Combined Vegetation Rapid Assessment And Relevé Sampling Field Form (July 15, 2010)
- Proper Recognition of Channel Forms in the Desert: California Department of Fish and Game: A Review of Stream Processes and Forms in Dryland Watersheds (December 2010) <http://www.dfg.ca.gov/habcon/1600/1600resources.html>
- California Department of Fish and Game: A Review of Stream Processes and Forms in Dryland Watersheds (December 2010).

Additionally, the Plan-Wide Avoidance and Minimization CMA **AM-PW-1** describes that habitat assessments for species' suitable habitat will implement current survey protocols that have been approved by the DRECP Coordination Group at the time the surveys are required including the following, as applicable:

- California Department of Fish and Game: *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities* (November 24, 2009)
- U.S. Fish and Wildlife Service: *Guidelines for Conducting Botanical Inventories for Federally Listed, Proposed and Candidate Plants* (January 2000)
- U.S. Fish and Wildlife Service: *Preparing for Any Action that May Occur Within the Range of the Mojave Desert Tortoise* (*Gopherus agassizii*) (2010 Field Season)
- Working Group of Flat-Tailed Horned Lizard Interagency Coordinating Committee: *Flat-tailed Horned Lizard Rangelwide Management Strategy* (May 1997)
- California Energy Commission (CEC) and California Department of Fish and Game: *Swainson's Hawk Survey Protocols, Impact Avoidance, and Minimization Measures for Renewable Energy Projects in the Antelope Valley of Los Angeles and Kern Counties, California* (June 2, 2010)
- California Department of Fish and Game: *Staff Report on Burrowing Owl Mitigation* (March 7, 2012)
- U.S. Fish and Wildlife Service: *Least Bell's Vireo Survey Guidelines* (January 19, 2001)
- U.S. Fish and Wildlife Service: *Southwestern Willow Flycatcher Protocol Revision 2000*
- U.S. Fish and Wildlife Service: *Yuma Clapper Rail Survey Protocol* (January 2000)
- California Department of Fish and Game: *Mohave Ground Squirrel Survey Guidelines* (January 2003; minor process and contact changes in July 2010)
- Survey Protocols Required for NEPA/ESA Compliance for BLM Special Status Plant Species

H.2.2 DRECP Habitat Restoration Guidelines

The following provides the draft DRECP habitat restoration guidelines, which provide the elements that should be considered, as applicable, in developing site-specific habitat restoration actions used to restore areas disturbed by construction activities but not converted by long-term Covered Activities. These guidelines are referenced in the Section II.3.1.2.5.2 under the CMA **AM-PW-7**.

Native Plant Salvage and Relocation Guidelines

Habitat restoration actions that involve native plant salvage and relocation would address the following factors, as appropriate.

Succulent and Yucca Salvage

Growth Forms

Single-stemmed Cacti

Segmented Cacti

Salvage Techniques

Temporary Storage and Long-term Stockpiling

Succulent Donation or Sale

Transplanting

Other Perennial Special-Status Plant Species

Annual Special-Status Plant Species

Seed Collection

Soil Salvage

Topsoil Placement

Vertical Mulch

Land Restoration Guidelines

Habitat restoration actions that involve restoring surface disturbances would address the following factors, as appropriate.

Topsoil Salvage

Short-term Storage

Topsoil Replacement

Soil Testing and Analysis

Decompaction

Fertilizers and Additives

Re-contouring

Riparian and Wetland Areas

Upland Areas

Post-construction Site Stabilization

Erosion and Sediment Control

Plant Materials and Planting Guidelines

Habitat restoration actions that involve restoration using plant materials and planting would address the following factors, as appropriate.

Plant Materials and Handling

Plant Species Selection

Seed and Native Stock Collection and Storage

Propagation and Seed Amplification

Applicable Planting Techniques

Seeding

Mulch

Container-grown Plants

Natural Colonization

Irrigation and Natural Precipitation

Water Demand

Irrigation and Supplemental Watering

Natural Precipitation Approach

Rainwater Capture Methods

Maintenance Guidelines

Habitat restoration actions that involve maintenance would address the following factors, as appropriate.

Weed Management

Watering Systems

Pest Control

Herbivory and Granivory

Pest Exclusion

Pest Management and Control

Site Protection

Monitoring Guidelines

Habitat restoration actions that involve monitoring would address the following factors, as appropriate.

Restoration Goals

Revegetation Site Management

Field Monitoring and Data Collection

Data Analysis

Data Presentation

Interim Performance Criteria

Recordkeeping and Reporting

H.2.3 Wildlife Linkages and Connectivity

The following figures depict the wildlife linkages where Covered Activities will be configured to avoid and minimize adverse effects to wildlife connectivity and the function of the wildlife linkage. These areas are referenced in the Section II.3.1.2.5.3, Landscape-Level Avoidance and Minimization CMAs, under the CMA **AM-LL-1**.

Figure H-1, depicts the wildlife linkages in the Eastern Riverside SEZ that would require implementation of the CMA **AM-LL-1**.

In addition to the wildlife linkages for the Eastern Riverside SEZ, the wildlife linkages and corridors referenced in the CMA **AM-LL-1** are shown in Figure H-2 below.

H.2.4 Aeolian and Sand Transport Areas

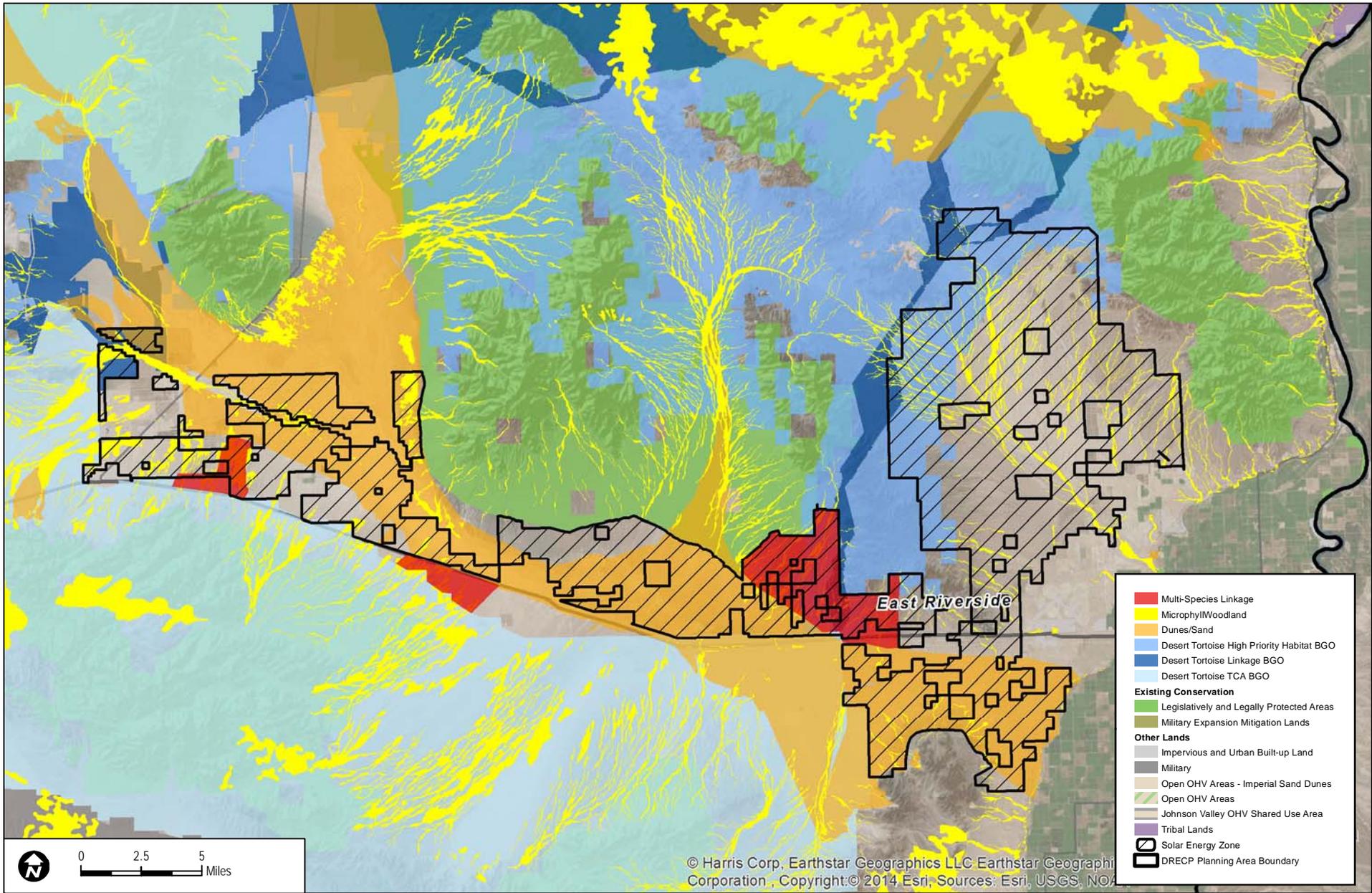
The Aeolian and sand transport areas shown in Figure H-3 are referenced in the Section II.3.1.2.5.3, Landscape-Level Avoidance and Minimization CMAs, under the CMA **AM-LL-3**, for configuring Covered Activities to maintain the function of these areas.

H.2.5 Memorandum of Understanding between BLM and USFWS to Promote the Conservation of Migratory Birds

As described in the Landscape-level Avoidance and Minimization CMA **AM-LL-5** (Project-specific Bird and Bat Conservation Strategy for Non-Covered Species) in Section II.3.1.2.5.3, proponents for Covered Activities under the LUPA that will likely impact bird and bat non-covered species during construction, operations, and maintenance will develop and implement actions consistent with the Memorandum of Understanding (MOU) between BLM and USFWS to promote the conservation of migratory birds (BLM and USFWS 2010). The purpose of the MOU is to strengthen migratory bird conservation by identifying and implementing strategies that promote conservation and avoid or minimize adverse impacts to migratory birds through enhanced collaboration between the BLM and USFWS, in coordination with state, tribal, and local governments. The MOU contains specific measures for both BLM and USFWS including the development of migratory bird conservation measures such as the measures in the USFWS Bald Eagle Management Guidelines.

H.2.6 Avoidance and Minimization for Agricultural Lands

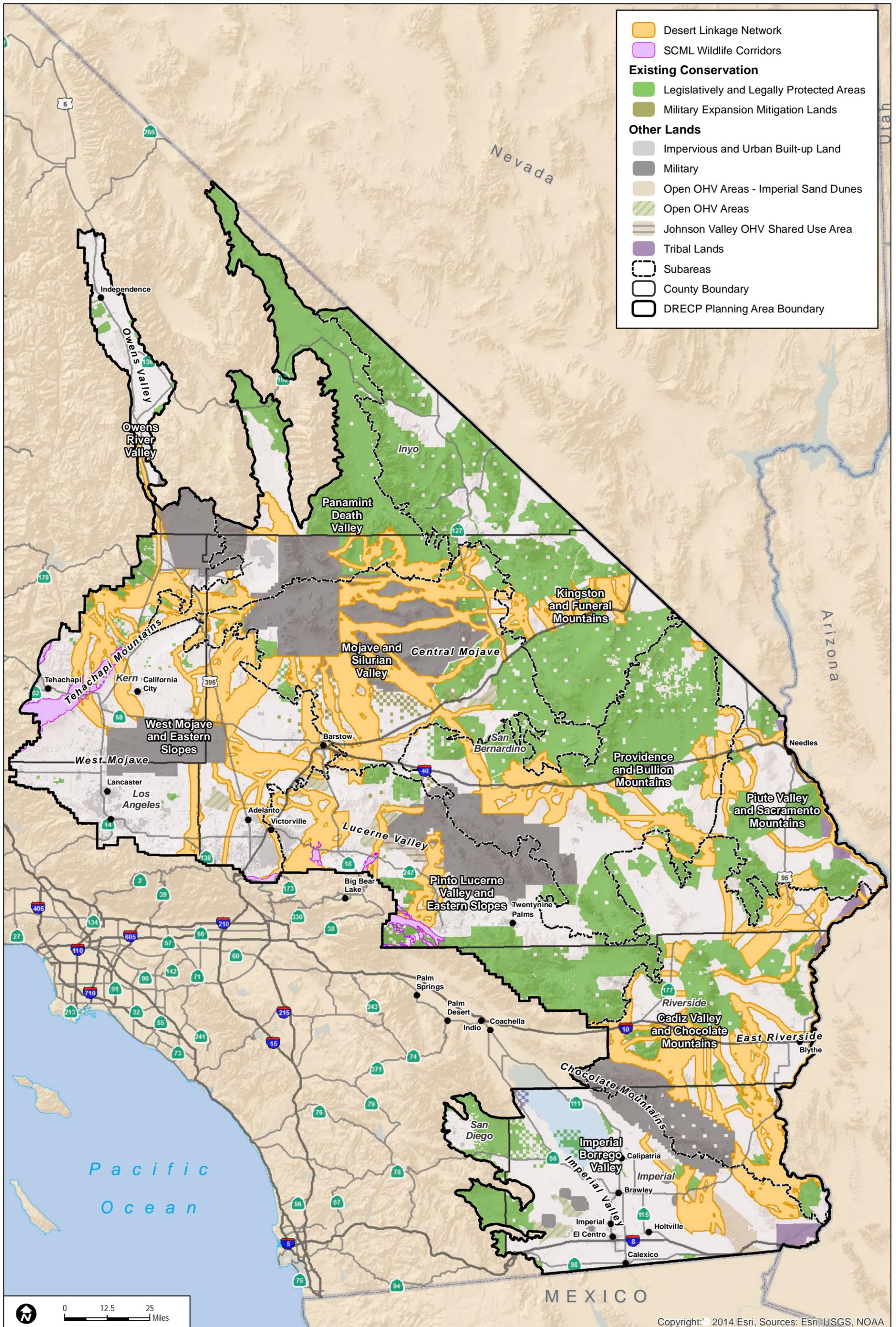
The conservation strategy for Covered Species supported by agricultural land habitat, which includes burrowing owl, greater sandhill crane, mountain plover, and desert pupfish, includes avoidance and minimization elements (as described in the CMAs in Volume II) as well as compensation for lost habitat (described further in Section H.3 below). In terms of avoidance and minimization, riparian and wetland habitats within the agricultural matrix, including for example the New and Alamo Rivers and managed wetlands in the Imperial Valley, would be fully avoided including a ¼-mile setback. Additionally, all agricultural canals and drains would be avoided, as described in Section II.3.1.2.5.4. These avoidance measures, in addition to the species-specific avoidance and minimization measures specified in the CMAs, would reduce impacts to Covered Species using agricultural lands. Figure H-4 shows the areas that are the focus of the agricultural lands conservation strategy.



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

FIGURE H-1
Eastern Riverside SEZ Linkages

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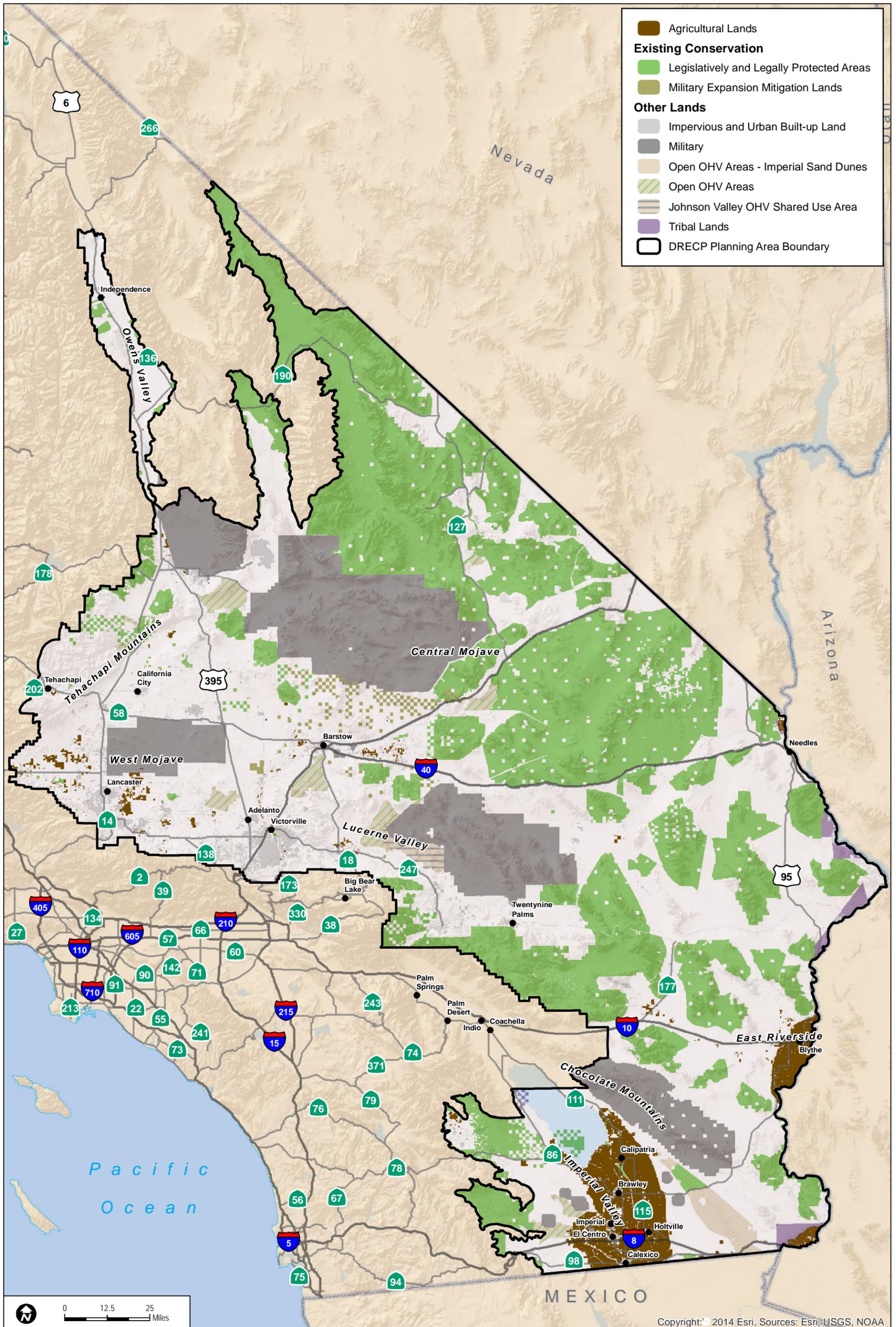
Sources: ESRI (2014); CEC (2013); BLM (2013); CDFW (2013); USFWS (2013)

FIGURE H-2

Landscape-level Linkage CMA

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

FIGURE H-4
Agricultural Lands Strategy Focus Areas

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In addition to these other avoidance and minimization CMAs that benefit agricultural lands Covered Species, the following conservation strategy in combination with the Agricultural Lands Covered Species Avoidance and Minimization CMAs described in Section II.3.1.2.5.4 and Section II.3.1.2.5.5 will contribute to the short and long-term conservation of Covered Species that depend on agricultural lands:

1. Apply avoidance measures on project sites to help maintain the size and distribution of extant species populations and allow for population fluctuations.
2. Compensate for impacts of agricultural habitat with a combination of measures that protect a matrix of key agricultural habitat forage areas, and also provide protection, management, and/or acquisition of native desert lands that provide habitat value for the species. Compensation ratio of 1:1 to offset foraging and/or wintering habitat loss. Compensation approach is to conserve, manage, and/or acquire a combination of native desert habitat and key agricultural habitat areas as biologically appropriate for Covered Species, as outlined below. Prioritize conservation of natural desert habitat and provide conservation of key agricultural areas (agricultural areas may comprise up to 50% of the conservation requirement).
 - Emphasizing compensation in native desert lands will protect burrowing owl habitat where it exists or where it can be enhanced.
3. Employ management actions on protected natural desert habitats to enhance the habitat value for species where possible and biologically appropriate.
 - Emphasizing enhancement of native desert habitat will help increase the size of existing populations using these native habitats and contribute to establishing populations that may be more stable for the long-term even though population densities may be less than are artificially supported on agricultural lands.
4. Protect and manage self-sustaining ecosystems or natural communities which can support at a landscape scale, and which will require minimal long-term management.
 - Landscape scale conservation that includes both minimizing impacts to agricultural lands and protection and management of natural desert habitats will contribute to restoring and maintaining the natural dynamics of populations including movement and genetic exchange among populations.

H.2.7 Swainson's Hawk Active Nests Setback Areas

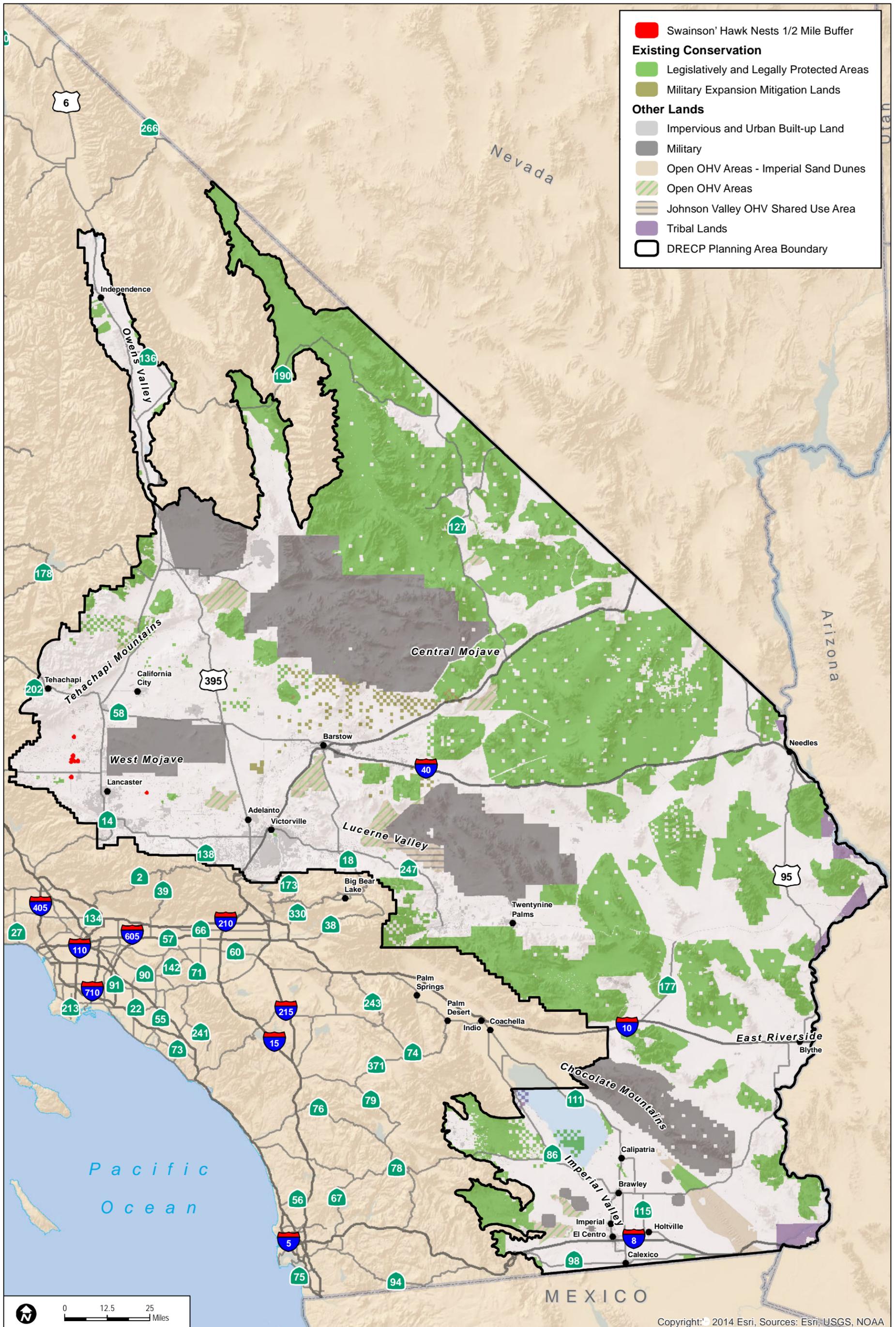
Figure H-5 shown below details the areas of known Swainson's Hawk active nests and displays their associated ½-mile setback specified in Section II.3.1.2.5.4 under the CMA **AM-DFA-AG-1**.

H.2.8 Burrowing Owl Recommended Verification and Exclusion Methods

The follow provides recommended methods and details for Burrowing Owl exclusion and verification referenced under Section II.3.1.2.5.4 in the CMA **AM-DFA-AG-4**.

Burrow Exclusion

- Ideally, exclusion and burrow closure is employed only where adjacent natural alternative burrows and non-impacted, sufficient habitat for burrowing owls to occupy or occupy in a higher density with permanent protection mechanisms in place. Monitoring should follow the CDFW Staff Report on Burrowing Owl (2012) and prior to any burrow exclusions or excavations, confirmation that the burrow is not currently supporting nesting or fledgling activities is required. Burrowing owls are not to be excluded from burrows unless or until:
 - Biological monitoring is conducted prior to, during, and after exclusion of burrowing owls from their burrows sufficiently to ensure that take is avoided. If the exclusion will occur immediately after the end of the breeding season, conduct daily monitoring for one week to confirm young of the year have fledged.
- Before burrow excavation, there must be verification that burrows are empty. This will be achieved through biological monitoring and burrow scoping. After implementing the avoidance CMAs if burrowing owl burrow excavation is deemed necessary, the following burrow closure actions will be implemented for burrows to be impacted/excavated:
 - Confirm by biological monitoring that the burrow(s) is empty of burrowing owls and other species preceding burrow scoping.
 - Use appropriate type of scope and appropriate timing of scoping to avoid impacts to burrowing owls.
 - Occupancy factors to look for and methods to employ to guide determination of vacancy and excavation timing:
 - Leaving one-way doors in place for a minimum of 48 hours to ensure burrowing owls have left the burrow before excavation, visited twice daily and monitored for evidence that owls are inside and can't escape (i.e., look for sign immediately inside the door).
 - Verify that the sides of the one-way doors have not been excavated thereby bypassing the one-way door exclusion by the burrowing owl.
- Excavation using hand tools and backfilling to prevent reoccupation is preferable whenever possible. This practice may include using piping to stabilize the burrow to prevent collapsing until the entire burrow has been excavated and it can be determined that no owls reside inside the burrow.
- Photograph the excavation and closure of the burrow to demonstrate success and sufficiency.
- As practicable, render the site inhospitable to burrowing owls and fossorial mammals to avoid re-colonization until construction is complete through measures that could include allowing vegetation to grow tall, heavy disking, or immediate, continuous grading and removal of other potential owl burrow surrogates or refugia on the site.
- Monitor the site to evaluate success and, if needed, to implement remedial measures to prevent subsequent owl use and to avoid take.



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

FIGURE H-5

Swainson's Hawk Nest Setback

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H.2.9 Individual Covered Species

In addition to the Individual Species Survey Requirements shown in **AM-DFA-ICS-1** in Section II.3.1.2.5.4, the following notes regarding these survey requirements are applicable:

- Desert Tortoise: Exemption from desert tortoise survey requirements can be obtained from the DRECP Coordination Group, CDFW, and USFWS on a case-by-case basis if the site does not contain the elements of desert tortoise habitat. Surveys are only to be performed by a Designated Biologist, and in accordance with protocols in the Desert Tortoise Field Manual (USFWS 2009) or the most up-to-date USFWS protocol. The protocol surveys described in **AM-DFA-ICS-3** are required in the areas shown in Figure H-6, Desert Tortoise Protocol Survey Areas. Clearance surveys will occur following fencing of project sites with desert tortoise exclusion fencing in DFAs as described in **AM-DFA-ICS-11**.
- Flat-tailed Horned Lizard: The Rangewide Management Strategy (RMS) and other information from associated research and monitoring will be used to determine the appropriate project evaluation protocol and avoidance and minimization requirements.
- Mohave Ground Squirrel: Use the most current survey protocol approved by the appropriate DRECP Coordination Group (e.g., CDFW Mohave Ground Squirrel Survey Guidelines Rev. July 2010). The Designated Biologist must have a current Memorandum of Understanding (MOU) with CDFW for handling Mohave Ground Squirrel. Protocol surveys will not be required in sites determined by the Designated Biologist to be unviable for occupancy, in habitat that is isolated from other blocks of suitable habitat, or if baseline studies inferred absence during the current or previous active season.

H.2.10 Desert Tortoise Conservation Areas and Linkages

In Section II.3.1.2.5.4 and II.3.1.2.5.5 the CMAs **AM-DFA-ICS-5** through **AM-DFA-ICS-8**, **AM-BLM-RES-ICS-3** through **AM-RES-BLM-ICS-4**, and **AM-RES-RL-ICS-3** refer to desert tortoise conservation areas (TCAs), desert tortoise linkages, and/or other desert tortoise habitat. These areas are displayed below in Figure H-7, Desert Tortoise Conservation Areas.

H.2.11 Approach to Golden Eagle Coverage

Introduction

The Wildlife Agencies (U.S. Fish and Wildlife Service and California Department of Fish and Wildlife) are evaluating authorizing incidental take of golden eagles in the DRECP through the NCCPA, ESA, and the Bald and Golden Eagle Protection Act (Eagle Act), as appropriate.

In the short term, the DRECP will be the primary permitting and conservation framework for golden eagles in the area. In the long term, USFWS will craft a vision for conserving eagles in

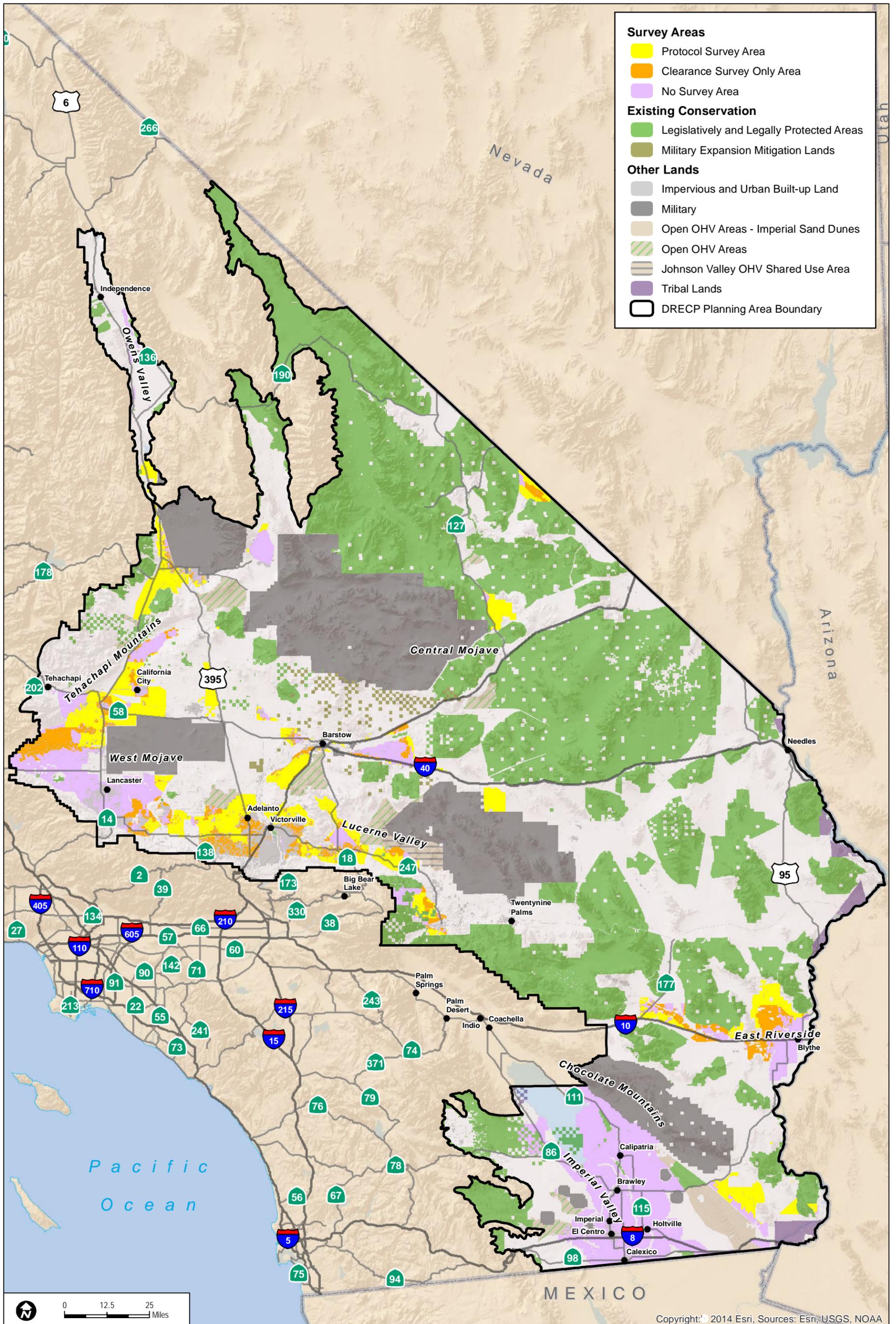
the desert at a broader, more meaningful scale based on what we are currently researching regarding golden eagle population dynamics. The DRECP, being a natural community-scale conservation plan under state law, provides a platform for initial conservation and management actions that will lead to population stability and recovery. This approach lends itself well to the broader conservation objectives and associated metrics needed for the longer-term effort by the USFWS.

The broad-scale desert conservation strategy is intended to maintain a stable golden eagle population and will allow more flexibility with conservation and management decisions. This strategy will focus on providing a broader conservation framework to coordinate efforts and resources across agencies and borders to manage golden eagles. At this time, additional research is needed to identify effective measures to offset impacts at a population level, and to articulate how the strategy might afford additional permitting flexibility. Because additional information is needed, the approach outlined in this document is an interim structure, pending additional research and study and development of the broader scale conservation strategy. As (1) the broader desert eagle conservation strategy is developed, (2) conservation measures are identified in detail and implemented, and (3) research that informs the conservation strategy is completed, the USFWS will likely be able to provide more flexibility and to identify areas on which to focus eagle conservation and areas most appropriate for development. We anticipate the broad scale planning effort to be consistent with and enhance the conservation and permitting strategy for eagles within the DRECP.

Approach to Golden Eagle Take Authorization

The USFWS Eagle Conservation Plan Guidance for Land Based Wind Energy (2013) identifies a process for evaluating impacts associated with individual projects. Over the long term, this approach to eagle permitting decisions may not be the most appropriate method, when addressing large-scale conservation planning efforts, such as the DRECP.

Under the DRECP, Covered Activities would occur in areas outside of Reserves. Under this proposal, the impact to eagles would be authorized up to a sustainable amount that would preserve a healthy, stable eagle population. Our analysis will take into account the cumulative effects of ongoing impacts to the local-area population of eagles. The USFWS has determined that it can authorize some take of golden eagles each year for activities in the DRECP area. Currently (2013), the number of golden eagles that could be taken in the DRECP area would be 15; however, the number is to be calculated annually and will go up or down depending on factors such as implementation of projects that take golden eagles inside or outside the DRECP area and the population status of golden eagles. The expected impacts to eagles would be mitigated using all available management measures (e.g. repowering, lead abatement) to ensure the Eagle Act conservation standard of stable or increasing populations is met. To meet the Eagle Act permit regulation standards of “no net loss,” for issuance of programmatic permits for golden eagles, mitigation outside the plan area may be required.

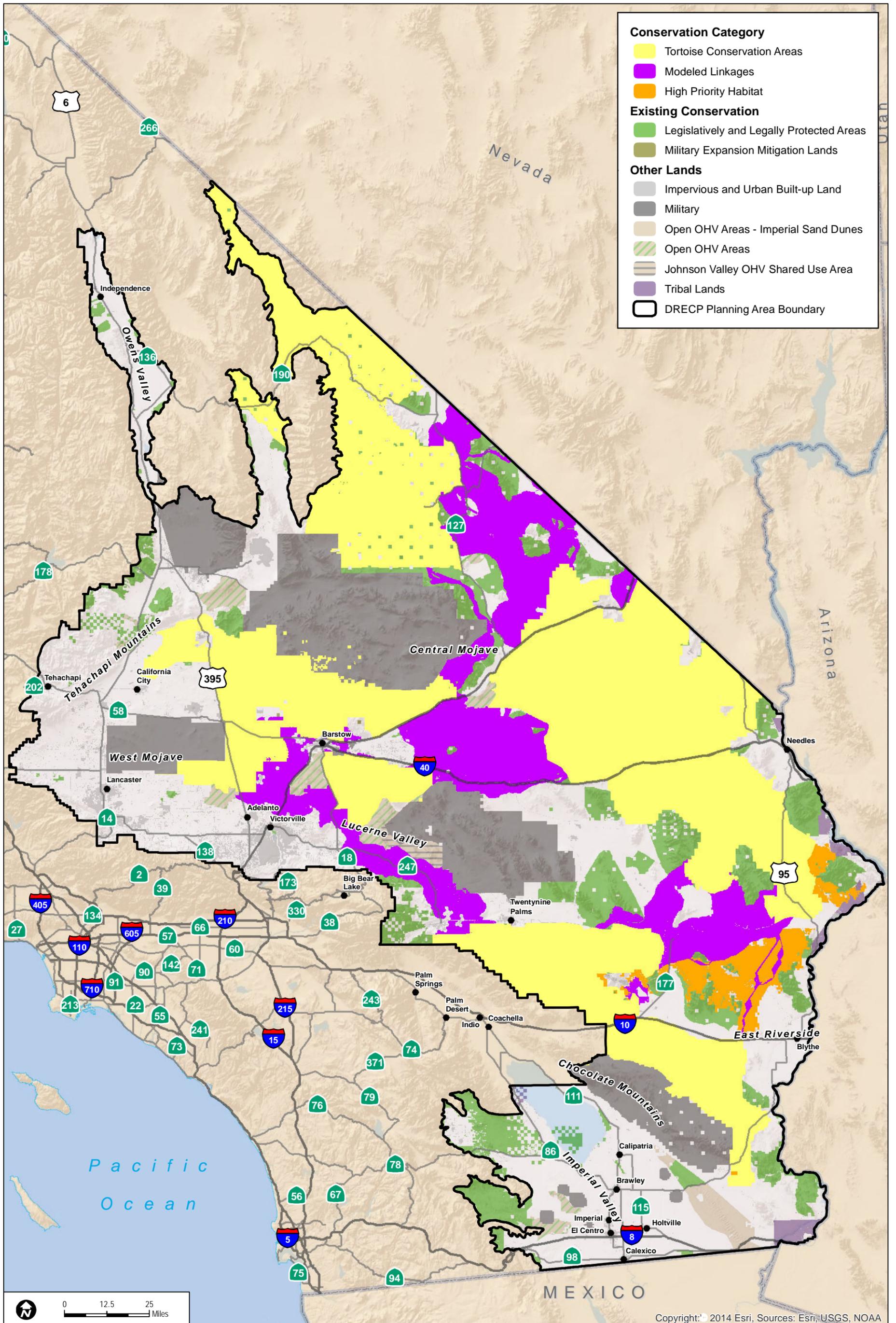


Sources: ESRI (2014); CEC (2013); BLM (2013); CDFW (2013); USFWS (2013)

FIGURE H-6

Desert Tortoise Survey Areas

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

FIGURE H-7

Desert Tortoise Conservation Areas

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Impacts from DRECP Covered Activities are anticipated to result in the loss of foraging habitat, breeding territories, and both breeding and non-breeding birds: the loss of each of these has different effects on the local golden eagle population. The loss of foraging habitat can reduce reproductive output and survival of eagles. The loss of non-breeding birds is relatively less important to population stability than breeding birds; however, these birds often fill a vacant territory when the resident breeder is lost, and thereby, help to maximize territory occupancy. The effective loss of breeding territories has a large proportional effect on the stability of eagle populations as it not only removes the breeding potential in that year, but also the breeding potential in future years. In an effort to take into account the biological implications associated with impacts such as the loss of annual reproduction versus the long-term loss of an eagle territory, we weighted the impacts based on their respective impacts to an eagle population. The take of an individual eagle is equivalent to 1 individual from the threshold for 1 year. The disturbance at 1 active nest for only 1 breeding season is equivalent to 0.79 individuals from the threshold for 1 year. Impacts that result in a permanent abandonment of a territory is equivalent to 0.79 individuals from the threshold the first year, and a reduction in 4.26 individuals from the annual threshold each year thereafter until data show the number of breeding pairs has returned to the original number of territories occupied in the DRECP, or until it can be demonstrated that the predicted loss of that territory has not occurred. The permanent loss of a nest territory or abandonment of a territory is equivalent to permitting the take of 4.26 individuals from the management population. This approach is consistent with the USFWS ECP Guidance (USFWS 2013a).

In the arid southwest desert, the availability of suitable breeding territories is thought to limit the size of eagle populations. Compensation for the loss of individuals and breeding territories must be sufficient to offset impacts and ensure the population is stable or increasing (Eagle Act standard).

A DRECP area-wide permitting approach enhances opportunities for both eagle conservation and renewable energy development. For example, the reserve system being proposed as part of the DRECP is expected to provide benefits to eagles by adding additional protection to large blocks of suitable habitat that may not have been possible otherwise.

Process to Calculate Available Take

As part of our decision process, we must evaluate cumulative effects on golden eagles as required by NEPA (CFR 1508.8) and the Eagle Act's permitting regulations. As part of its permit application review process (50 CFR 22.26 (f)(1); USFWS 2009), the USFWS is required to evaluate and consider effects of programmatic take permits on eagle populations at three scales: (1) the eagle management unit/BCR, (2) local-area, and (3) project area. Our evaluation also considers cumulative effects. We incorporated available

data on mortality, and additional information on population-limiting effects in preparation of this cumulative impact assessment.

The purpose of this cumulative effects evaluation is to identify situations where take, anticipated through the DRECP activities or in combination with other present or foreseeable future actions and other limiting factors at the local-area scale, may be approaching levels that are biologically problematic or that cannot reasonably be offset through compensatory mitigation. The scale of our analysis is the DRECP planning area and a 140-mile radius around the DRECP boundary.

To ensure that any authorized take of eagles does not exceed the Eagle Act's preservation standard, the USFWS has set Eagle Management Unit thresholds (i.e., upper limits) for take of each species of eagle, using methodology described in the FEA of the Eagle Permit Rule (USFWS 2009b). The USFWS used estimates of population levels of eagles in each Eagle Management Unit and set take thresholds based on estimates of sustainable take in published literature.

The USFWS analysis in the 2009 FEA, determined that golden eagle populations might not be able to sustain any additional unmitigated mortality, and therefore set the thresholds for this species at zero for BCR-level populations in all Eagle Management Units. This means that any new authorized take of golden eagles must be at least equally offset by compensatory mitigation (specific conservation actions to replace or otherwise make up for the loss of each eagle associated with a project).

In addition, the USFWS also put in place measures to ensure that eagle populations are not depleted by take at the local scale. The local-area population analysis is based on the median distance to which eagles disperse from the nest to where they settle to breed (140 miles). The USFWS specified that take rates must be carefully assessed, both for individual projects and for the cumulative effects of other activities causing take, at the scale of the local-area eagle population. The scale of our analysis is the DRECP planning area and a 140-mile radius around the DRECP boundary.

The USFWS identified take rates of between 1 and 5 percent of the total estimated local-area eagle population as benchmarks, with 5 percent being at the upper end of what might be appropriate under the Eagle Act's preservation standard. Appendix F of the Eagle Conservation Plan Module 1 (USFWS 2013a) provides a full description of take thresholds and benchmarks, and provides suggested tools for evaluating how these apply to individual projects. As described in ECP Guidance Appendix F (USFWS 2013a), the Service uses a top-down approach for this assessment as shown in the following steps:

For this analysis, past, present and reasonably foreseeable projects that have the potential to effect the local-area population within the DRECP and within 140 miles of the DRECP boundary were considered. These include a number of existing and approved wind energy

projects, Native American take associated with ceremonial use, and utility lines. We did not include other sources of fatalities, such as vehicle strikes, illegal hunting, and poisoning, because too few quantitative data were available for these sources. Using an assumption that the take benchmark of 5 percent of the local area population is sustainable, we extrapolated an acceptable level of data for each BCR within DRECPs local-area population (Table H-1). To evaluate cumulative impacts and determine the upper level of golden eagle take that should be allowed under the DRECP we followed the guidance provided in Appendix F of the ECP Guidance (USFWS 2013a). For existing projects with no eagle mortality data on record, we estimated annual mortality based on information from other wind facilities or utility lines in similar habitat types. The process is summarized in Exhibit H-1 below:

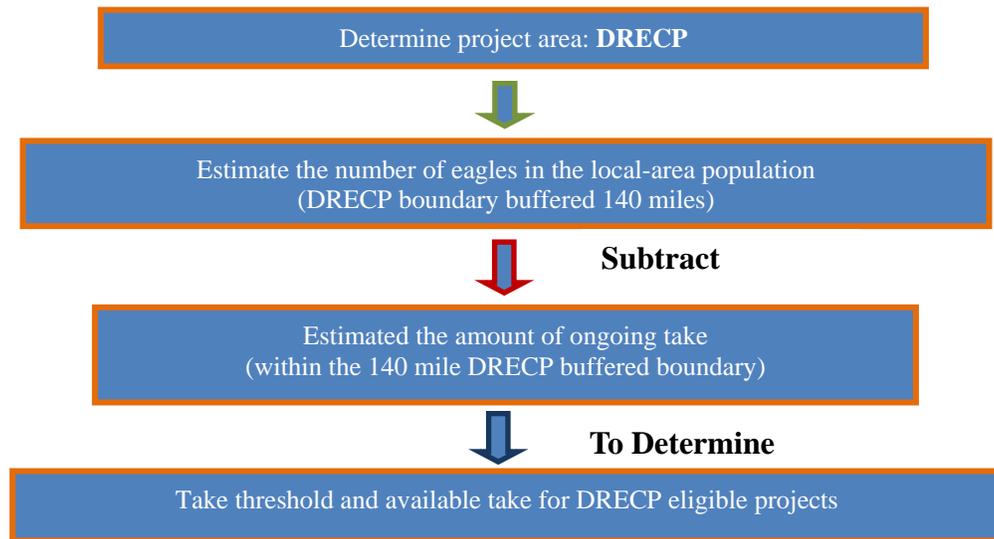


Exhibit H-1 Golden Eagle Take

Based on the best available information (USFWS 2009b) we have estimated the golden eagle population within the DRECP as well as the local-area population. We estimate there are 230 golden eagles within the DRECP and a total of 2,133 golden eagles within the local-area population. We will update these estimates as new information becomes available.

**Table H-1
Potential Available Golden Eagle Take**

DRECP population estimate (within the plan area)	230
Local area population estimate (140 mile buffer around plan boundary)	2,133
5% of local area population	107
Annual estimate of ongoing mortality (from all sources)*	91
Reserved for emergency health and human safety permits	1
Potential take allocated to DRECP	Up to 15 eagles/year

* This includes existing and approved wind energy projects, Native American take associated with ceremonial use, and utility lines.

Process to allocate available take

The USFWS has determined that it can authorize some take of golden eagles each year for activities in the DRECP area. The number is to be calculated annually; currently, the number of golden eagles that could be taken in the DRECP area would be 15. This number will go up or down depending on factors such as implementation of projects that take golden eagles inside or outside the DRECP area and the population status of golden eagles. The USFWS Migratory Bird program will send a letter annually in December to the DRECP executives to inform them of the amount of eagle take available for the following calendar year. The annual amount of eagle take applies to all new projects within DRECP area, including, but not limited to, those covered under DRECP. For projects where on-going take is anticipated (e.g. wind), take will be authorized for multiple years and will be subtracted from the available annual balance for the anticipated life of the project or permit (DRECP) term.

Existing projects with ongoing take of eagles that are within a DFA can seek take coverage for golden eagles under the DRECP. Since anticipated take from most existing and recently approved renewable energy projects were taken into consideration in the LAP cumulative effects analysis, these projects may not be subject to the DRECP take cap for eagles. When an existing project seeks coverage under the DRECP, we will evaluate whether our initial project level take estimate under the LAP analysis, would be exceeded. In the event that we underestimated the amount of ongoing take associated with the project, a portion of the projected take would be subject to the DRECP take cap for eagles.

To ensure the available take is distributed throughout the planning area, we have divided the planning area into 3 Eagle Take Regions. Take of eagles authorized under the DRECP, will be subject to caps established for each of these three Regions. In addition, to ensure that any single project does not consume all the available eagle take within a given Eagle Take Region, and result in the preclusion of other RE facilities that are likely to take eagles, there will also be a project-level take cap. The estimated (authorized) amount of take for any single project cannot exceed more than 40% of the total take cap in that Region.

Each permit issued will identify the number of eagles that are reasonably expected to be taken under that permit (expressed as #eagle/year).

In the event that multiple applications are submitted that collectively would exceed the amount of available take in any given Golden Eagle Take Region, the Approving Agencies will review all the applications, and prioritize application review based on two factors (a) a proposed project's risk of eagle take and (b) a proposed project's generation capacity. Projects that have a low risk of eagle take and a high generation capacity will be given the highest priority.

Golden Eagle Take Authorization under California State Laws

The NCCPA affords an opportunity to plan, implement, and otherwise effect conservation over a large geographic area in ways that lead to stabilizing populations and improving recovery potential. Section 3511 of the Fish and Game Code (F&G Code) designates golden eagle as a fully protected bird. Under this section, the California Department of Fish and Wildlife (CDFW) may authorize take of fully protected species only for necessary scientific research related to recovery efforts and relocation pursuant to a permit for livestock protection. Additionally, pursuant to F&G Code Section 2835 under the Natural Community Conservation Planning Act, CDFW may authorize take of a fully protected species that is a covered species under a natural community conservation plan (NCCP) approved by CDFW, whose conservation and management is provided for in such plan. This new authority allowing for the authorization of “take” of fully protected species within the context of an NCCP also will provide for conservation of golden eagles at a larger scale.

Golden Eagle Take Authorization under Federal Laws

A permit to take golden eagles can be issued under the Endangered Species Act (ESA) Section 10(a)(1)(A) or 10(a)(1)(B) when golden eagle is covered under an associated conservation plan such as a Habitat Conservation Plan as a covered, non-listed species. Such a permit confers take authority under the Eagle Act because 50 CFR § 22.11 extends Eagle Act take authorization to ESA permits that cover eagles. The provisions of 50 CFR § 22.11 are predicated on the premise that the Eagle Act standards for permitting take must be satisfied before the take can be permitted under an ESA permit. The USFWS recently revised the 2009 Eagle Act permit take rule to allow programmatic permits to be issued for up to 30 years (78 FR 73704). Permits authorizing take of eagles through either the ESA or the Eagle Act will require the USFWS and the permittee to evaluate if the terms and conditions of the permit are being met at least every 5 years.

On federal lands, golden eagle take authorization will be through take permits issued under the Eagle Act to renewable energy project owners that apply and meet the issuance criteria and comply with DRECP. On non-federal lands, golden eagle take authorization will be incorporated into the ESA 10(a)(1)(B) permit process for projects that comply with DRECP.

Actions to be Taken After the Study Period

Five years after DRECP permit issuance, the DRECP golden eagle conservation approach will be reevaluated. The DRECP has been developed with the capacity to incorporate new information to improve plan implementation. The reevaluation will rely on the best available science and information, including any new eagle population data from ongoing research, monitoring, and other compiled data and analyses conducted for the DRECP. The primary purposes of the golden eagle evaluation will be to 1) ensure the standards of the

Eagle Act and the DRECP biological goals and objectives are being met, 2) evaluate whether eagles associated with the DRECP are stable or increasing, and 3) provide feedback to the DRECP implementation program to improve the effectiveness of management actions.

As part of the 5-year evaluation of the DRECP golden eagle conservation program, the Wildlife Agencies in cooperation with other entities implementing the DRECP, will evaluate 1) new compensatory mitigation opportunities, 2) improvements to technologies that avoid or minimize take, 3) the effectiveness of the golden eagle conservation measures in maintaining the population, and; 4) refinement of the monitoring program. This 5-year evaluation should be considered a formal process to evaluate and incorporate new information; however, the Wildlife Agencies will be receptive to new information that will improve plan implementation throughout the life of the plan.

The Role of Research and Monitoring

Research and monitoring are important components of the DRECP conservation approach that will help ensure the DRECP golden eagle biological goals and objectives will be achieved while promoting compatible renewable energy development. Collaboration and pooling of agencies' and renewable energy developers' resources toward golden eagle-related research and monitoring is essential. The results of proposed research and monitoring will allow validation of the effectiveness of the DRECP conservation approach in achieving its golden eagle BGOs and the conservation of the golden eagle in the DRECP area. Completion of the research will allow the Wildlife Agencies to validate past decisions and will be crucial for considering future permit and conservation actions in the DRECP area.

The results of the research and monitoring will be directly applied to the review and evaluation of conservation measures including mitigation measures and applicable conservation actions.

The Wildlife Agencies are in the process of developing a research program that includes a prioritized research list, potential partners, schedule, related ongoing research, and budget estimates. The research program will guide resources expenditures and coordinate related efforts to efficiently meet goals. The agencies, renewable energy industry and other stakeholders, will work to secure adequate funds to implement the golden eagle research program.

Tiering off the research program, the REAT agencies and other cooperating entities will annually assess golden eagle research priorities, and help identify funding sources to implement these golden eagle research and monitoring priorities. To this end, the Wildlife Agencies in coordination with other state and federal agencies, non-government organizations and industry will consider convening an annual DRECP golden eagle research and monitoring workshop. The participants would devise and recommend golden eagle

research and monitoring projects, consistent with research program goals. Funding agencies would consider identified priorities and allocate funds as they deem appropriate to meet highest priority needs.

As part of the Monitoring and Adaptive Management Program (MAMP), if the local area population of golden eagles sustains a statistically significant declining trend for 1) 3 consecutive years- USFWS and CDFW will work with the DRECP Coordination group and permittees to evaluate cause of decline 2) 5 consecutive years, USFWS and CDFW will work with the DRECP Coordination group and permittees to develop and implement an action plan to reduce ongoing take in the DRECP area and enhance golden eagle populations in the plan area 3) 7 consecutive years, the USFWS and CDFW will notify the DRECP coordination group and will consider a moratorium on the authorization of additional golden eagle take in the DRECP area and the area of the local population. If take levels for golden eagles are exceeded by any permittee, the responsible permittee will notify USFWS, and USFWS will notify the DRECP Coordination Group of this situation. USFWS and the permittee will initiate the appropriate phase of the “Advanced Conservation Practices” process. The USFWS and DRECP Coordination Group will implement appropriate response measures through adaptive management strategies outlined in the MAMP.

Mitigation for Take

Unavoidable golden eagle mortality caused by the permitted activities must be offset by compensatory mitigation that reduces another, ongoing form of mortality by an equal or greater amount, or which leads to an increase in carrying capacity that allows the eagle population to grow by an equal or greater amount.

For renewable energy projects where ongoing take of eagles is anticipated, and take of eagles will be authorized under DRECP, federal regulations require that any authorized take must be unavoidable after the implementation of “Advanced Conservation Practices” (ACPs). ACPs are defined as “scientifically supportable measures” that are approved by the USFWS and represent the best available techniques to reduce eagle disturbance and ongoing mortalities to a level where remaining take is unavoidable” (50 CFR 22.3).

For wind energy and solar facilities where ongoing take is anticipated, conservation measures based on the best available scientific information will be applied as a condition on programmatic eagle take permits. The Service may require all such reasonable measures as conditions for any take permit whether or not those measures also qualify as ACPs.

The Wildlife Agencies will work with industry to develop ACPs for renewable energy projects as part of an adaptive-management regime and comprehensive research program tied to the DRECP implementation. New ACPs will be adaptively implemented at operating facilities with take authorization. This approach will provide the needed scientific and other

information to improve future ACPs, while enabling renewable energy facilities to move forward in the interim. A project developer or operator will be expected to implement any reasonable avoidance and minimization measures that may reduce take of eagles at a project.

The DRECP will incorporate an adaptive management approach to conservation measures and associated project-level monitoring. This type of monitoring will be tied directly to project operations and scaled to the level of risk associated with the project. See Table H-2 for an example of an adaptive approach that incorporates project-level monitoring. As new information becomes available on measures that are proven to be effective at minimizing ongoing take, they will be incorporated into the adaptive management process.

**Table H-2
Example of Advanced Conservation Practices Using an
Adaptive Management Approach**

Step	Advanced Conservation Practices	Threshold or Trigger
Step I	Mortality monitoring for eagles, using protocol approved by the Wildlife Agencies to validate mortality estimates. The duration of this monitoring will depend on the level of take estimated for the project.	Start of Project Operations
Step II	Implement eagle monitoring studies to define seasonal and diurnal use patterns within the project area to inform development and implementation of future ACPs. Initiate advanced conservation measures involving visual and/or auditory deterrence procedures in consultation with the Wildlife Agencies. Design a protocol to evaluate effectiveness of these methods. Conduct 3 additional years mortality monitoring to evaluate effectiveness of deterrence methods.	One eagle injured or killed
Step III	Establish and implement protocols designed to detect and minimize future take of eagles in consultation with the Wildlife Agencies. Options may include employing biological monitors on site during daylight hours with the ability to temporarily modify project operation when an eagle/large raptor approaches the project area and/or employment of experimental techniques such as radar detection systems. Initiate consultation with Wildlife Agencies to refine and evaluate the operations modification protocol utilizing data from monitoring efforts initiated in Step II. Conduct 3 years mortality monitoring to evaluate effectiveness of deterrence methods.	Trigger will be project specific and tied to estimate of project level take.

Table H-2
Example of Advanced Conservation Practices Using an Adaptive Management Approach

Step	Advanced Conservation Practices	Threshold or Trigger
Step IV	Initiate consultation with Wildlife Agencies to determine operational modification schedules based upon evaluation of data collected in previous phases. Options may include operational modification in appropriate season and time of day, or at identified problem turbines/strings or solar panels. Eagle movement monitoring and mortality monitoring will be extended for a 3-year period.	Trigger will be project specific and tied to estimate of project level take and effectiveness of measures implemented in Step III above
Step V	In consultation with the Wildlife Agencies, determine other appropriate actions necessary to minimize and compensate for additional impacts on eagle populations.	Trigger will be project specific and tied to estimate of project level take and effectiveness of measures implemented in Step IV above.

Definitions

- Active/occupied nest: A nest used for breeding (courting, building nests, laying eggs, raising young) in the current year by a pair of eagles. Evidence for use includes the addition of new sticks, whitewash, presence of adults, feathers, eggs, etc.
- Alternate nests: additional sites within a nesting territory that is available to be used and has been occupied or worked (e.g. repairing, adorning, or building), within the last 7 years by adult eagles.
- Abandoned nest: after 7 years of monitoring, if no adult eagles have been seen occupying a nest or working on a nest the nest can be declared abandoned.
- Territory: as defined in 50 CFR 22.3 as an area that contains, or historically contained, one or more nests within the home range of a mated pair of eagles. A territory is the area that is defended and a home range is considered the area traveled by the individual in its normal activities of food gathering, mating, and caring for the young. For golden eagles, territory and home range are the same.
- Active territory: a territory will be considered active, if any nest within that territory has been occupied by an adult eagle, or an adult eagle has been seen working on a nest within the last 7 years.

- Abandoned territories: after 7 years of monitoring, if no adult eagles have been seen occupying any part of a nest cluster (i.e. a presumed territory) or working on a nest (e.g. repairing, adorning, or building) the territory can be declared abandoned. All nests within the territory must be assessed as being inactive during that 7 year period, to declare the territory abandoned.
- Foraging habitat: is an area having a mosaic of native vegetation that supports an abundance of preferred prey species (e.g. small- to medium-sized mammals) within a vegetation structure that is accessible to eagles.

Approach to Compensation

The Wildlife Agencies will consider all options to mitigate the effects of the taking from Covered Activities. Below are mitigation options that have been considered through various literature sources and may represent opportunities to offset take of golden eagles associated with DRECP impacts. The list below represents potential options to consider for compensation and management, each should be fully evaluated and the list should be prioritized before implementation.

As part of the project level plans, the applicant shall provide golden eagle compensatory mitigation, in accordance with USFWS ECP Guidance, that are the most appropriate to offset impacts on a case-by-case basis. The process an applicant must follow to receive golden eagle take authorization is described below (Navigating the Eagle Permit Process).

The list below represents options to consider for compensation and management; each should be fully evaluated before inclusion in project level compensation and mitigation plans. Before being approved as a viable option for mitigating take, several pieces of information are needed for each option including: expected benefit to the eagle population, quantifying the amount of the activity needed to offset expected take, how effectiveness will be substantiated (through monitoring), a description of how the action will be implemented, longevity of the mitigation (how many years will the action be effective in offsetting existing take or enhancing conditions?), identify whether there is a timeframe that specific actions are needed to reduce take or improve conditions, life stage of eagles that will benefit (adult, chicks, etc.) from the action, cost to implement. Currently the only one of these options where we have all the necessary information is power line retrofitting (see the example below). As the other options are fully evaluated, the Wildlife Agencies will incorporate them into the suite of options for mitigating the effects of Covered Activities in the DRECP.

Reduce existing threats:

1. Wind turbines
 - a. Summary: Wind turbines are known to affect many species of birds, including golden eagles. Aging, inefficient wind power generation facilities that take golden eagles may present an opportunity to repower/re-site or remove them to reduce the amount of ongoing take. As part of the repowering process, the efficacy of repowering should be studied by project developers.
 - b. Potential: Mortality caused by operation at existing wind energy facilities within DRECP and 140 miles surrounding the Plan Area (local-area population of eagles) has been estimated at a minimum of 69 birds annually. Some proportion of these facilities that take eagles may have reached their operational lifespan, and could be removed or re-sited to areas with fewer avian impacts to reduce the amount of ongoing take occurring within the local- area population of golden eagles. Any reduction in ongoing take of golden eagles could facilitate opportunities for addition projects within the DRECP.
 - c. Information needs: Additional information concerning annual fatality and injury rates at existing facilities as well as facility operator's interest in reducing impacts at these facilities will be needed. Issues such as cost to repower or resite facilities will also indicate whether this type of effort is likely to be utilized.
 - d. Sources: USFWS, unpublished data
2. Power line electrocution
 - a. Summary: Utility structures can pose a threat to eagles and other birds through electrocutions and collisions. Records of electrocutions and collisions date back as early as the late 19th century. USFWS, utility industry and the National Audubon Society formed the Avian Power Line Interaction Committee (APLIC) to reduce and avoid avian mortality associated with electrocutions and collisions from utility lines and structures. The APLIC guidelines include both construction and retrofitting methodologies to improve conditions for birds.
 - b. Potential: Power line electrocutions are estimated to cause between 6 and 10 golden eagle mortalities in the DRECP area each year. Power line retrofitting following APLIC standards in the plan area could reduce the risk of future electrocutions. Currently the extent of eagles' injury and mortality associated with collision with power lines is not well understood in the DRECP area.
 - c. Information needs: A more accurate estimate of golden eagle electrocutions in the plan area, collisions events and degree of injury to eagles in the DRECP area are needed. In addition, a geo-spatial analysis of power line density and habitat quality would provide additional information on risk. Currently the primary

- source of information on power line electrocutions of golden eagles within the DRECP is collected when power spikes or outages indicate the lines need to be checked. This method likely underestimates injury and mortality of eagles, since not all eagle fatalities result in power spikes and outages.
- d. Sources: Southern California Edison
3. Disturbance that results in reduced productivity, nest abandonment, potential loss of territory
 - a. Summary: Golden eagles are sensitive to human activities, particularly during the breeding season. Recreational activities, including rock climbing, off highway vehicles, recreational shooting, and others are thought to reduce productivity of golden eagles in the plan area. These types of activities can cause nest abandonment and keep eagles from using nest sites. Disturbance at nest sites can reduce or eliminate productivity during a single year or chronic disturbance can result in long-term reduced productivity.
 - b. Potential: BLM estimates there are approximately 10 active nest sites per year that are disturbed by recreationists in the DRECP area. Appropriate closures (seasonal/permanent) near nesting sites could eliminate this threat. In other areas, studies on golden eagles found that 46-85 percent of nesting failures were due to human-caused nesting disturbance (Boeker and Ray 1971, Camenzind 1969, D'Ostilio 1954).
 - c. Information needs: identification of nest sites with ongoing human disturbance conflicts, and the effects of disturbance on nesting.
 - d. Sources: Pers. comms: Larry LaPre (BLM),
Boeker , E.L., and T. D. Ray. 1971. Golden Eagle population studies in the Southwest. *Condor* 73:463-467.
Camenzind F.J., 1969. Nesting ecology and behavior of the golden eagle. *Brigham Young Univ. Science Bulletin Biology Ser.1* 0(4):4-15.
D'Ostilio, D. O. 1954. Nesting status and food of the Golden Eagle in northern Colorado. Master's thesis, University of Colorado, Boulder 48 pp.
 4. Toxins
 - a. Lead
 - i. Summary: Exposure to lead is known to affect all species of wildlife at levels that span the range of exposure levels. Golden eagles are generally thought to be exposed to lead in two ways: direct consumption of lead by scavenging on prey that has been exposed to lead (shot with lead bullets) or by consuming prey that has bioaccumulated lead.

- ii. Potential: Effects to golden eagles from lead exposure include direct mortality and impaired function leading to decreased survivorship and productivity. Information on lead levels in golden eagles residing within the plan area is currently being collected. However, the degree to which lead is negatively affecting the local area population of golden eagles is unknown. If we assume the exposure levels in the DRECP area are consistent with those found in a recent study from Montana we can estimate the number of golden eagles exposed to various levels of lead. The Montana study found of all birds sampled: 29% had elevated levels (0.2–0.5 ppm), 13% had chronic levels (0.51–1.0 ppm), and 3% had acute levels (>1.0 ppm) in blood. Hunt et al. 2009 analyzed samples from golden eagles captured in southern California from 1985 to 1986 and found 36% had been exposed to lead. A program to reduce eagle exposure to lead within the DRECP and associated biologically relevant eagle management could be effective in reducing mortality of eagle from this source.
 - iii. Information needs: effects of “elevated” and “chronic” levels of lead exposure on golden eagles, lead sampling of golden eagles in the DRECP area, and cost estimates to implement a lead reduction program.
 - iv. Sources: Alan R. Harmata, and Marco Restani J. of wildlife diseases 49(1), 2013, pp. 114–124.

Hunt G. 2002. Golden eagles in a perilous landscape: predicting the effects of mitigation for wind turbine blade-strike mortality. Predatory Bird Research Group, University of California, Santa Cruz. Retrieved from: http://www.energy.ca.gov/reports/2002-11-04_500-02-043F.PDF
5. Poisoning
- a. Summary: Poisoning of golden eagles has been documented in the United States. Most cases were thought to be accidental poisoning, when eagles ingested bait meant for other wildlife. Eagles have also been poisoned at landfills by ingestion of carcasses tainted with euthanasia drugs.
 - b. Potential: According to Kockert and Steenholf, in Idaho 9 of 16 dead Golden Eagles necropsied were poisoned from agricultural pesticides, and by consuming other animals that were poisoned or by consuming baits placed to kill other wildlife. While it is unknown how significant this threat is to golden eagles in the DRECP area, an education and outreach effort could lead to local ordinances or voluntary reduction or elimination of poisons in DRECP.
 - c. Information needs: an assessment of poisoning of eagles in the DRECP area, and cost to implement and information/outreach effort. Information on risks posed by open landfills within or near the DRECP.
 - d. Sources: Kockert and Steenholf- *J. Raptor Res.* 36(1 Supplement):32-40

6. Habitat destruction

- a. **Summary:** Habitat destruction is one of the most commonly cited sources of threat to wildlife. Bittner and Oakley (1999) reported a population of golden eagles in southern California showed declines after “significant urbanization” from an estimated 85 pairs in 1900 to 40 in 1999.
- b. **Potential:** The effects of habitat destruction are both direct and indirect and may include nesting at suboptimal sites, increased disturbance, and elimination of foraging habitat forcing increased foraging distance, elimination of nest sites, and reduced prey availability. The potential for management actions to reduce the impacts of habitat destruction (leading to increased productivity) will be site specific, but maybe a good avenue to pursue.
- c. **Information needs:** productivity of nest sites near fragmented habitat, nest site disturbance information, and foraging distance of nesting pairs near fragmented habitat.
- d. **Sources:** Bittner, J.D. and J. Oakley. 1999. Status of Golden Eagles in Southern California. Raptor Research Foundation Conference. Golden Eagle Symposium. November 2. La Paz, Baja California.

7. Disease

- a. **Summary:** Golden eagles are affected by numerous diseases that can reduce their ability to forage, feed, breed, and avoid threats. Diseases that have been documented in golden eagles include West Nile Virus, avian tuberculosis, avian cholera, the protozoan *Trichomonas*, and avian pox.
- b. **Potential:** It is unknown what the potential is for management to alleviate or reduce this threat, however; in general healthy individuals of any species are more resistant to disease than ones that are not.
- c. **Information needs:** prevalence of disease in the local eagle population, management actions to alleviate this threat (and their effectiveness), and costs to implement appropriate management actions.
- d. **Sources:** Nemeth et al. 2006, Gale 1971, Redig 1981, Rosen et al. 1973, Beecham & Kochert 1975, Mikaelian et al. 1998, Shrubsole-Cockwill et al. 2010

8. Predation

- a. **Summary:** Accounts have been given of grizzly bears (extirpated from California) and wolverines predating golden eagles. However, there appears to be little in the literature to support this threat as significant. Watson (1997) postulated that nestling mortality by other avian predators is rare, but that it could be possible during food scarce periods when nestlings were left unprotected.

- b. Potential: It is unknown how significant this threat is in the DRECP area.
 - c. Information needs: assessment of this threat, and management options to reduce the threat.
 - d. Sources: Watson 1997, Kochert, M., K. Steenhof, C. McIntyre, E. Craig. 2002. Golden Eagle (*Aquila chrysaetos*). Pp. 1-44 in A Poole, F Gill, eds. *The Birds of North America*, Vol. 684. Philadelphia: The Birds of North America
9. Illegal shooting
- a. Summary: Illegal shooting of golden eagles has been documented in the United States. Golden eagles infrequently prey on livestock, leading to conflict with ranchers looking to protect their animals.
 - b. Potential: Kochert et al.'s (2002) literature review on eagle populations and mortalities found that 15% of golden eagle deaths found were from shooting. It is unknown how significant this threat is in the DRECP area. If shooting is determined to be a source of mortality in the DRECP area, an outreach and education campaign along with an increased law enforcement presence could reduce or eliminate this threat from the plan area.
 - c. Information needs: illegal shooting of golden eagles in the plan area, costs to implement an outreach program, and costs to increase law enforcement.
 - d. Sources: *Kockert and Steenhof- J. Raptor Res.* 36(1 Supplement): 32-40, 2002
10. Collisions with vehicles
- a. Summary: Mortality associated with golden eagles scavenging on roadside carcasses has been documented in both peer-reviewed and grey literature. A program to systematically remove roadside carcasses away from highways could reduce the risk of future car collisions with golden eagles.
 - b. Potential: According to Tetra Tech, vehicle strikes account for approximately seven percent of anthropogenic caused golden eagle deaths in California. Management actions to reduce or eliminate this threat of mortality should be considered further.
 - c. Information needs: costs of implementing a systematic roadside carcass removal program, research on association between vehicle collisions of golden eagles scavenging vs. vehicle collisions of golden eagles exhibiting other behaviors, number of vehicle strikes in the DRECP area, and identification of roadways with high roadkill rates.
 - d. Sources: Tetra Tech draft CalWEA Eagle Mitigation Options: Roadside Carcass Removal, June 13, 2012

Habitat enhancement:

1. Nest Site Enhancement

- a. Summary: In desert habitats, Golden Eagles typically build nests on cliffs or in the largest trees of forested stands that often afford an unobstructed view of the surrounding habitat. Their nests are usually sticks and soft material added to existing nests or new nests that are constructed to create strong, flat or bowl shaped platforms. The purpose of a nest is to provide shelter from adverse weather conditions as well as limit access of predators. Ambient temperatures during the nesting season within the DRECP can be extremely hot, leading to heat stress of nestling birds and mortality. A study conducted in Idaho (Steenhof et al. 1997) found: “The variables most useful in predicting percentage of laying pairs successful were rabbit abundance and the number of extremely hot days during brood-rearing. The number of hot days and rabbit abundance were also significant in a model predicting eagle brood size at fledging. Both success and brood size were positively related to jackrabbit abundance and inversely related to the frequency of hot days in spring.”
- b. Potential: Mosher and White (1976) postulated nestling mortality could occur from exposure to extreme temperatures, especially too much heat. Similarly, nest sites that lack appropriate shade structure are thought to reduce nesting success relative to sites with adequate shade cover. In the DRECP area, it is likely that there are sites where eagles are nesting in suboptimal sites and producing limited offspring. Enhancement of nesting sites with low productivity could be an effective means to increase eagle productivity.
- c. Information needs: Identification of existing eagle territories with lower than average productivity and limited sites for nest construction, methods to enhance nesting sites, and site specific raptor expert evaluation of improvement methods.
- d. Sources: Mosher, J. A., and C. M. White. 1976. Directional exposure of Golden Eagle nests. *Canadian Field-Naturalist* 90:356-359.

Steenhof, K., M. N. Kochert, and T.L. McDonald. 1997. Interactive effects of prey and weather on Golden Eagle reproduction. *Journal of Animal Ecology* 66:350-362.

2. Nest Site Creation

- a. Summary: Golden eagle population size in the Mojave Desert is likely limited by both availability and distribution of suitable nesting sites and abundance of prey species proximal to suitable nest sites. The creation of new nesting sites in proximity to abundant food sources has the potential to increase carrying capacity of eagles in the DRECP area, especially during wet years when prey species may be more abundant.

- b. Potential: Strategic creation of new nest sites including creation of cliff ledges, cultivation and protection of large trees, and creation of artificial nest sites (e.g. nest platforms) could all be considered for management of eagles in the DRECP area.
 - c. Information needs: areas of low nest density, nest- less cliff faces that could be enhanced, methods to create nests, locations of areas that could harbor large trees
 - d. Sources:
3. Prey base enhancement
- a. Summary: Golden eagle population size in the Mojave Desert is likely limited by both availability and distribution of suitable nesting sites and abundance of prey species proximal to suitable nest sites. Primary prey species, such as rabbits and squirrels, are affected by habitat loss, degradation and fragmentation. These types of impacts can reduce the carrying capacity of the land base upon which these species depend, while threats like hunting and exposure to toxins (poisoning) reduce the number of individuals.
 - b. Potential: Management actions to reduce threats to the prey base (hunting, toxins), and habitat enhancement for the eagle prey base (rangeland management, artificial water, habitat restoration) could be considered for DRECP. While it has been theorized by many experts that prey base enhancement could increase carrying capacity of eagles, it is unknown if the scale at which it would need to be implemented would make this a feasible approach for compensatory mitigation for eagles.
 - c. Information needs: methods to enhance prey base, prey densities in proximity to eagle occurrences, and cost to enhance prey base.

An Example of Compensation for Take of Golden Eagles

The USFWS developed a Resource Equivalency Analysis (REA) (see ECP Guidance, Appendix G) as one method that can be used to quantify the amount of compensatory mitigation needed to offset the take of golden eagles.

The USFWS's REA for retrofitting power poles incorporates the *current* understanding of eagle life history inputs, effectiveness of retrofitting high-risk electric power poles, the expected annual take, and the timing of both the eagle take permit and implementation of compensatory mitigation. As would be expected, the estimated number of eagle fatalities and the permit renewal period affect the overall number of poles that would need to be retrofitted to offset impacts. Delays in implementation of pole retrofitting would lead to more poles retrofits being required.

Currently, the USFWS commonly recommends utility pole retrofits to offset impacts to eagles because:

- high-risk power poles cause quantifiable adverse impacts to eagles;
- the ‘per eagle’ effects of high-risk power pole retrofitting are quantifiable and verifiable through accepted practices, best available science;
- success of and subsequent maintenance of retrofitting can be monitored; and
- electrocution from high-risk power poles is known to cause eagle mortality and this can be corrected

Below is an example of how we would estimate the cost of compensation for eagles in the form of power pole retrofitting, using an average cost of implementing of the various types of retrofits needed to minimize the potential for electrocution. Costs can vary depending on the configuration of equipment on each pole, spacing of electrical lines, etc.

Example: A 5-year permit for a project predicted to take 1 golden eagle per year/5 eagles over 5-years.

REA calculations include:

- Relative productivity (effectiveness) of mitigation owed (0.0036/electrocutions/pole/year) derived from literature
- Years of avoided loss per retrofitted pole (assumes 10 years)
- Permit renewal evaluation period (5 years) & life of project (30 years)
- Retrofit Cost/Payment (\$7,500/pole)
- Mitigation Owed (credit) = total debit divided by relative productivity (effectiveness) of retrofits

The REA generates an eagle impact calculation (debit), expressed in bird-years lost, and an estimate of the quantity of compensatory mitigation (credit) (*e.g.*, power pole retrofits) necessary to offset this impact (see Table H-3).

Table H-3
Mitigation Owed: With Foregone Reproduction*
Credit Owed for a 5-Year Permitted Take of GOEA
(assuming 10 years of avoided loss from retrofitted poles)

Total Debit	55.46	Present Value Bird-Years**
÷ Relative Productivity of Lethal Electric Pole Retrofitting	0.42	Avoided loss of PV bird-years/pole
= Credit owed	132.73	Poles to be retrofitted to achieve no net loss of GOEA

* Results differ slightly from ECP Guidance example due to refinements to our REA spreadsheet tool.

** Present Value Bird Years includes the eagle lost, its offspring and subsequent generations not produced.

The example above is a practical application of the mitigation approach for golden eagles. Costs borne by the applicant will be assured by payment of mitigation requirements occurring before project impacts can begin.

Other forms of potential compensation are needed, and the USFWS encourages further development of other measures such as reducing ongoing impacts from existing wind energy facilities, reducing ongoing mortality associated with vehicle collisions, and habitat enhancements and restoration that result in an increase in carrying capacity for eagles.

Navigating the Eagle Permit Process

To meet Federal requirements: on federal lands, golden eagle take authorization will be through Eagle Act permits authorized to individual renewable energy projects that apply and meet the issuance criteria and comply with DRECP. On non-federal lands, golden eagle take authorization will be incorporated into the ESA 10(a)(1)(B) permit process for projects that comply with DRECP and will occur through the GCP.

To meet State requirements: the applicant must apply and meet the DRECP NCCP issuance criteria, which for the State are the same on both Federal and Nonfederal lands.

Eagle Take Authorization Process Steps:

Assumptions:

- Project wants to be part of DRECP
 - Project will be constructed within a DFA
 - Project is for renewable energy
 - Project will comply with all CMAs in the DRECP
1. If Approving Agencies (Coordination Group) determine that take of golden eagles is reasonably foreseeable, conduct 2 years of pre-project golden eagle surveys (Pagel et al. 2010).
 2. For wind and solar power tower projects, conduct 2 years of pre-construction risk assessment surveys (USFWS ECP Guidance) in addition to measure 1 above. These different survey methodologies can be implemented concurrently.
 3. Conduct risk assessment per the USFWS ECP Guidance using data collected in measures 1 and 2 above, and other available information.
 4. If take will be ongoing, develop Advanced Conservation Practices (USFWS ECP Guidance).
 5. Implement site specific eagle mortality monitoring to support measure 4 above.
 6. Provide specific golden eagle compensatory mitigation in accordance with USFWS ECP Guidance and this Appendix.

7. If Approving Agencies determine a permit for eagle take is needed, submit the information gathered in the Eagle CMAs together as an application.
8. In addition to measure 5 above, the applicant will be required to contribute to a DRECP-wide golden eagle monitoring program.

We recommend that Applicants work with USFWS and CDFW, following published guidance, to develop a comprehensive application package that includes: an assessment of potential risk based on a minimum of 2 years of pre project level surveys and other available eagle data and project specific eagle use data (see Pagel et al. 2010, and USFWS ECP guidance 2012), demonstrates consistency with CMAs, a mitigation plan, a project specific Advanced Conservation Practices framework, a site level monitoring plan, a funding plan, a description of “5 year Check- in Plan” which will evaluate how successful implementation of the described eagle plan was in the previous 5 years.

- a. The applicant should indicate if money will be contributed to the appropriate conservation fund to carry out the compensation measures or if the applicant will implement conservation actions directly.
 - b. The 5-Year Check-in Plan should include an evaluation of the effectiveness of CMAs, validation of accuracy of risk assessment (under or exceeding anticipated level of eagle take), and demonstration of mitigation effectiveness if implemented directly.
9. Applicant should submit the application package directly to USFWS or to the Approving Agencies, as appropriate.
 - a. State authorization: will occur through the NCCP
 - b. Federal take authorization on non-federal lands: the application process on non-federal lands will occur through a **GCP application**
 - c. Federal take authorization on federal lands: the application process on federal lands will occur through an individual **Eagle Act** permit process with the USFWS. To the extent possible, USFWS will conduct joint NEPA analyses with BLM on a project level, as appropriate, to further streamline the process. The USFWS will authorize plans that meet issuance criteria, demonstrate compliance with the DRECP, consistent with the programmatic DRECP BO, and where take is within the bounds that was analyzed for DRECP and if sufficient balance is available to accommodate the effects of the proposed project. To the extent possible, USFWS will conduct joint NEPA analyses with BLM on a project level, as appropriate, to further streamline the process.
 10. Mitigation and Monitoring costs: per the permit terms and conditions, the applicant will be required to: 1) pay fees that contribute to the DRECP wide monitoring program, 2) either pay fees for or directly implement mitigation actions to offset expected impacts and 3) pay fees for a share of the costs to administer the plan and implement the Adaptive Management Program. These fees and/or actions will be implemented per the project level plan developed as part of the permit application package (approved by the

Wildlife Agencies). Fees will be paid to the appropriate DRECP conservation fund and will be utilized by the Coordination Group to implement conservation actions (e.g. monitoring, mitigation, adaptive management, etc.).

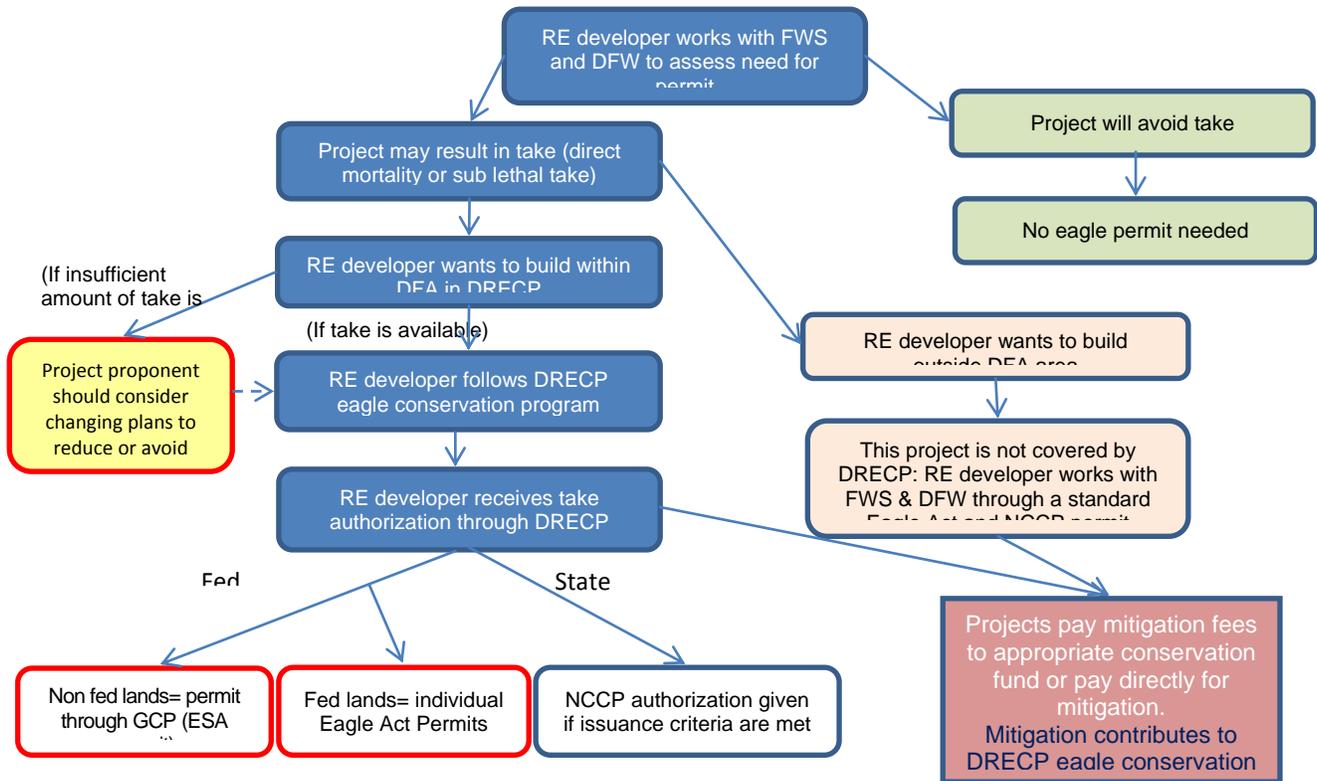


Exhibit H-2 Conceptual Eagle Take Authorization Process

Research and monitoring are important components of golden eagle coverage in the DRECP and are designed to promote effective golden eagle conservation and compatible renewable energy development. Collaboration and pooling of agencies’ and renewable energy developers’ resources toward golden eagle-related research and monitoring is essential to achieving the goals of the DRECP. The results of proposed research and monitoring will enable: 1) validation of the effectiveness of the DRECP conservation measures in achieving the golden eagle BGOs and the conservation of the golden eagle in the DRECP area, 2) confirmation that regulatory requirements are being met, and 3) more effective adaptive management of biological resources. Completion of the research will allow the Wildlife Agencies (US Fish and Wildlife Service and the California Department of Fish and Wildlife) to validate past decisions and will be crucial for considering future permit and preservation actions in the DRECP area.

Monitoring

For monitoring of golden eagles in the DRECP, we focus on two types of monitoring that need to be considered: population trend monitoring and project-level monitoring. Every 5

years, for the duration of the permit(s), USFWS will evaluate the success of the measures implemented under the DRECP and Eagle Act permits to ensure the conservation standards of the Eagle Act are being met. The USFWS will evaluate effectiveness of CMAs, validation of accuracy of project level risk assessment, and demonstration of mitigation effectiveness if implemented directly.

Population Trend Monitoring: Plan-Wide

Population monitoring will provide managers with information to assess whether population estimates to meeting the goals and objectives for golden eagle conservation are being achieved. The Eagle Act permit regulations require that take permits can only be issued if golden eagles maintain stable or increasing populations. This requirement necessitates that DRECP track the local area golden eagle population to ensure the effects of the plan are compliant with the preservation standard in the Eagle Act.

The California Energy Commission has contracted the U.S. Geological Survey to lead the development of a plan-wide monitoring protocol to be used in estimating golden eagle population size and tracking population trends over time. The Wildlife Agencies and BLM will assist USGS in developing the monitoring protocol for DRECP. The USGS-led effort will begin in June 2013 and will end in early 2015. While the details of the monitoring protocol are not available, below are approaches that have been utilized for monitoring eagle populations for other purposes and that will be considered for the DRECP.

Goal of DRECP golden eagle population monitoring: develop a reliable estimate of population size of the local area population, and monitor the population to detect statistically significant changes in golden eagle abundance over time. Specifically, the results of population monitoring will be used by managers to:

1. Evaluate whether regulatory requirements are being met- is the population stable or increasing?
2. Evaluate whether the Plan's biological goals and objectives are being met: is the population robust and resilient with capacity to adapt to changing conditions?
3. Evaluate whether the compensation measures to offset take of eagles are effective in maintaining the eagle population.

The DRECP golden eagle population trend monitoring program will be developed between draft and final versions of the HCP/NCCP/LUPA.

Summary of Potential Methods

Aerial transect surveys: In 2003, the USFWS contracted with Western EcoSystems Technology, Inc. (WEST) to design and conduct an aerial line transect survey for Golden

Eagles across the western U.S. The goal of the 2003 survey was to develop and test methods for estimating abundance and monitoring trends across much of the western U.S. (not including the majority of California). The surveys involve flying broad swaths of the landscape at low altitude and relatively low speeds from a fixed wing aircraft. During the flight, nests and golden eagles are counted. Like other transect based survey techniques, the results are to be a representative sample and are extrapolated across a broader area to estimate population size. This methodology is thought to have relatively low precision, but it could be useful as a far ranging index of population size. The California Energy Commission has contracted Western Ecosystems Technology, Inc. to conduct a modified aerial transect survey in the DRECP area in the next two years.

Nielson, R. M., L. McManus, T. Rintz, and L. L. McDonald. 2012. A survey of golden eagles.

(*Aquila chrysaetos*) in the western U.S.: 2012 Annual Report. A report for the U.S. Fish & Wildlife Service. WEST, Inc., Laramie, Wyoming.

Genetic mark and recapture surveys: an emerging technique in conservation biology is the use of genetic analysis for population monitoring. Collection of feathers for genetic analysis can be used to monitor the population and estimate population size. Unique genetic markers are used to identify individual birds (like a fingerprint) and identify the gene pool of the resident population. In addition to identifying individuals, this information may also be used to track the components of the population such as floaters, juveniles, and sub-adults that are difficult to track with other monitoring methods. The genome for the golden eagle has been sequenced, and work continues to develop a single nucleotide polymorphism assay that would provide data to determine population genetic diversity across the genome and genes associated with migration, determine effective population size, and monitor demographic turnover. The assays are expected to be available for use by the end of 2015 (pers. comm. DeWoody).

Rudnick, J. A., Katzner, T. E., et al. 2008. A non-invasive genetic evaluation of population size, natal philopatry, and roosting behavior of non-breeding eastern imperial eagles in central Asia. *Conservation Genetics*. 9:667-676.

Rudnick, J. A., Katzner, T. E., and Dewoody, J. A. 2009. Genetic analyses of non-invasively collected feathers can provide new insights into avian demography and behavior. *Handbook of Nature Conservation*. Chapter 6.

Doyle, J.M., Katzner, et al. 2014. The Genome Sequence of a Widespread Apex Predator, the Golden Eagle (*Aquila chrysaetos*). *PLoS ONE* 9(4): e95599.

Nest surveys: can be used to assess eagle nest productivity and nest occupancy. Known nesting sites are identified and a subset is generally selected to be surveyed. Methodologies

can include different observation utilizing spotting scope and/or binoculars, climbing into the nests, or helicopter surveys. Generally, nest visits occur late in the breeding season, before chicks are able to fly but are old enough that they are considered likely to survive fledging. Nest surveys are an effective means to sample specific nesting sites, but they are labor and cost intensive.

Katzner et al. 2012. Interim report: Golden eagle home range, habitat use, demography and renewable energy development in the California desert. Submitted to the Bureau of Land Management, California State Office.

Other methods

Stable isotope analysis: using mass spectrometry isotope ratios are measured, which identifies the composition and distribution of certain stable isotopes and chemical elements to create an isotopic signature. Each area has a unique stable isotope signature that allows scientists to create a “map” of isotope signatures that when coupled with appropriate samples can identify the location origin of the sample. The use of this approach can help identify the origin of birds (where they hatched), which may be useful when trying to understand the population dynamics of a wide-ranging species with migration habits that vary both across its range and by the individual.

Proportion of area occupied: pioneered by Darryl MacKenzie and James D. Nicols, this technique takes a random sample of the total sites and occupancy/no occupancy is determined. The occupancy status of each site is used to calculate the proportion of total sites that are occupied to estimate population size. This technique could be a cost effective method to estimate population size in the DRECP.

Combination of methods: the best approach to population monitoring may actually be some combination of methods discussed above. The combination of methods could increase confidence in the estimates, validate the estimates; expand our understanding of population dynamics, etc.

Project-Level Monitoring

Projects covered under the DRECP that are likely to take golden eagles will be required to conduct pre-project level avian surveys to inform site-specific impacts, as well as monitoring in association with project construction and operation to validate the amount of take anticipated and determine whether the anticipated level of take has been exceeded. Until such time as the population level monitoring indicates the eagle population is stable or increasing, and can accommodate ongoing take from Covered Activities as well as other non-covered activities, monitoring of project level impacts will be needed.

Initially, a minimum of three years of project level monitoring will be required for wind, solar, and some transmission projects to validate the amount of take estimated for each project. If renewable energy projects take eagles, their monitoring requirements will increase according to the schedule laid out in the project specific eagle monitoring plan. Implementation of Advanced Conservation Practices will be required for projects where ongoing take of eagles is anticipated and will be tied to project level effectiveness monitoring. Technologies with more uncertainty about their effects on eagles may be required to implement additional monitoring until their true effects to eagles are understood. For example, solar projects using concentrating solar technology may have the potential to injure or kill golden eagles that fly through the solar flux field. Take of golden eagles will vary between renewable energy projects based on project-specific information such as project technology and size, project siting, topography, habitat type and quality, availability of prey base, wind patterns, etc. The type and duration of project level monitoring will vary by renewable energy technology type, and will be focused on validating the impacts analysis for the projects (direct injury and mortality, as well as effects to site occupancy and nest productivity).

Monitoring of site occupancy and nest productivity in the early years of DRECP will be required to inform the range of non-lethal impacts to the eagle population that are associated with Covered Activities. Monitoring of site occupancy and nest productivity may be combined with population level monitoring efforts where feasible.

Huso (2010) and Smallwood (2013) developed methodologies to assess direct injury and mortality associated with wind turbines that may be useful for DRECP. These mortality assessment methods take into account a number of factors such as topography, size and height of turbines, site-specific variation in season use, and adjustments to account for site-specific searcher efficiency and scavenging of carcasses. Methodologies to assess injury and mortality will be required in project specific plans for DRECP. The Wildlife Agencies will provide additional guidance in the final version of DRECP on how to most efficiently assess injury and mortality associated with renewable energy projects. Mortality of avian species has been documented at solar and transmission projects, as well as at wind projects.

Avian collisions with transmission lines as well as electrocutions at power poles have been documented. The Avian Power Line Interaction Committee (APLIC) has developed guidelines to minimize these types of impacts. Transmission projects covered under the DRECP are expected to follow all of the APLIC guidelines, which are available on their website (<http://www.aplic.org>). As more monitoring of transmissions lines and electrocution rates are conducted, certain methods may prove to work better than others. For example, the use of perch deterrents on power poles can increase electrocution risk to raptors (Liguori 2013). Little information is available on the extent of golden eagle mortality from electrocution and collisions with power structures in the DRECP plan area. Construction of power lines in the

plan area is a covered activity and its effects need to be documented. Development of an appropriate monitoring program to validate our assumptions of impacts to eagles from power lines will be developed for the final DRECP documents. Monitoring will assess the effectiveness of applying the APLIC Guidelines and mortality monitoring.

Monitoring protocols are currently being developed to assess impacts associated with photovoltaic and concentrated solar technologies, and implementation of monitoring will be required for solar projects in the DRECP. These monitoring protocols will be focused on both collision with solar panels and impacts from solar flux. The Wildlife Agencies will provide additional guidance in the final version of DRECP of how to most efficiently assess injury and mortality associated with solar energy projects in the DRECP.

Research

The relative paucity of detailed information regarding golden eagle populations, behaviors and habitat requirements in the DRECP and adjoining areas necessitates that an intensive research effort be undertaken to support the regulatory framework and reduce the level of uncertainty associated with management decisions. The Wildlife Agencies, with input from their partners, will develop a research program to achieve the following objectives:

- Refine the golden eagle local area population estimate
- Monitor changes in golden eagle population status over time
- Identify and analyze effectiveness of compensation measures to offset authorized take
- Develop and/or refine risk models by renewable technology type
- Evaluate ongoing mortality sources and the opportunities to reduce them as mitigation for project impacts
- Develop and/or refine avoidance and minimization measures for each renewable technology type
- Evaluate the effectiveness of avoidance and minimization measures
- Characterize the spatial and temporal variation in golden eagle use of habitats
- Assess the relationships between the golden eagle population in the DRECP area and other populations west of the Rocky Mountains and in neighboring Bird Conservation Regions
- Develop models linking prey availability / abundance to eagle productivity and survival, taking into account vegetation changes anticipated from climate change

As with the regulatory and management frameworks, the approach to research will be adaptive in nature with regular assessments taking place to ensure that research efforts remain closely focused on improving management decisions. The results of the research and monitoring will be directly applied to the review and evaluation of conservation measures including allowable take limits, avoidance, minimization and mitigation measures, and applicable rule sets (explained below) in accordance with Eagle Act and NCCPA requirements.

Collaboration between the agencies and renewable energy interests on research and monitoring could lead to more renewable energy development in the DRECP area and improved golden eagle conservation. Research on methods to avoid, reduce, or effectively mitigate take of golden eagles by clarifying siting criteria based on an increased understanding of the golden eagle population as well as individual movements and habitat utilization could increase the areas designated for wind energy development (e.g., new or expanded DFAs). Investigations of how to reduce golden eagle mortality both within and outside the renewable energy development sector could provide more flexibility for future renewable energy projects to meet regulatory requirements.

The Approving Agencies are drafting a research program that lays out a specific agenda with a prioritized research list, potential partners, needed start time, related ongoing research, and cost estimates. The research program will guide resource expenditures and coordinate related efforts to efficiently meet goals. The Approving Agencies, working with industry, foundations and others, will work to secure adequate funds to implement the golden eagle research program.

Tiering off the research program, the REAT agencies and other cooperating entities will annually assess golden eagle research priorities, including those presented above and help identify funding sources to implement these golden eagle research and monitoring priorities. To this end, the Wildlife Agencies in coordination with other state and federal agencies, non-government organizations and industry will consider convening an annual DRECP golden eagle research and monitoring workshop. Individual participants would recommend golden eagle research and monitoring projects, consistent with research program goals, and would help identify/allocate funds to implement them.

Adaptive Management

The USFWS Eagle Act permit regulations require programmatic take permit holders to avoid and minimize the ongoing take of eagles, and to compensate for take that is unavoidable. Therefore, the DRECP will incorporate an adaptive management approach to conservation measures and associated project-level monitoring to minimize the impacts at this scale. This type of monitoring will be tied directly to

project operations and scaled to the level of risk associated with the project. See Table H-2 for an example of an adaptive approach that incorporates project-level monitoring. As new information becomes available on measures that are proven to be effective at minimizing ongoing take, they will be incorporated into the adaptive management process.

H.2.12 Mohave Ground Squirrel Important Areas

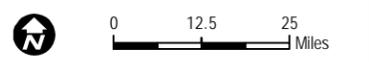
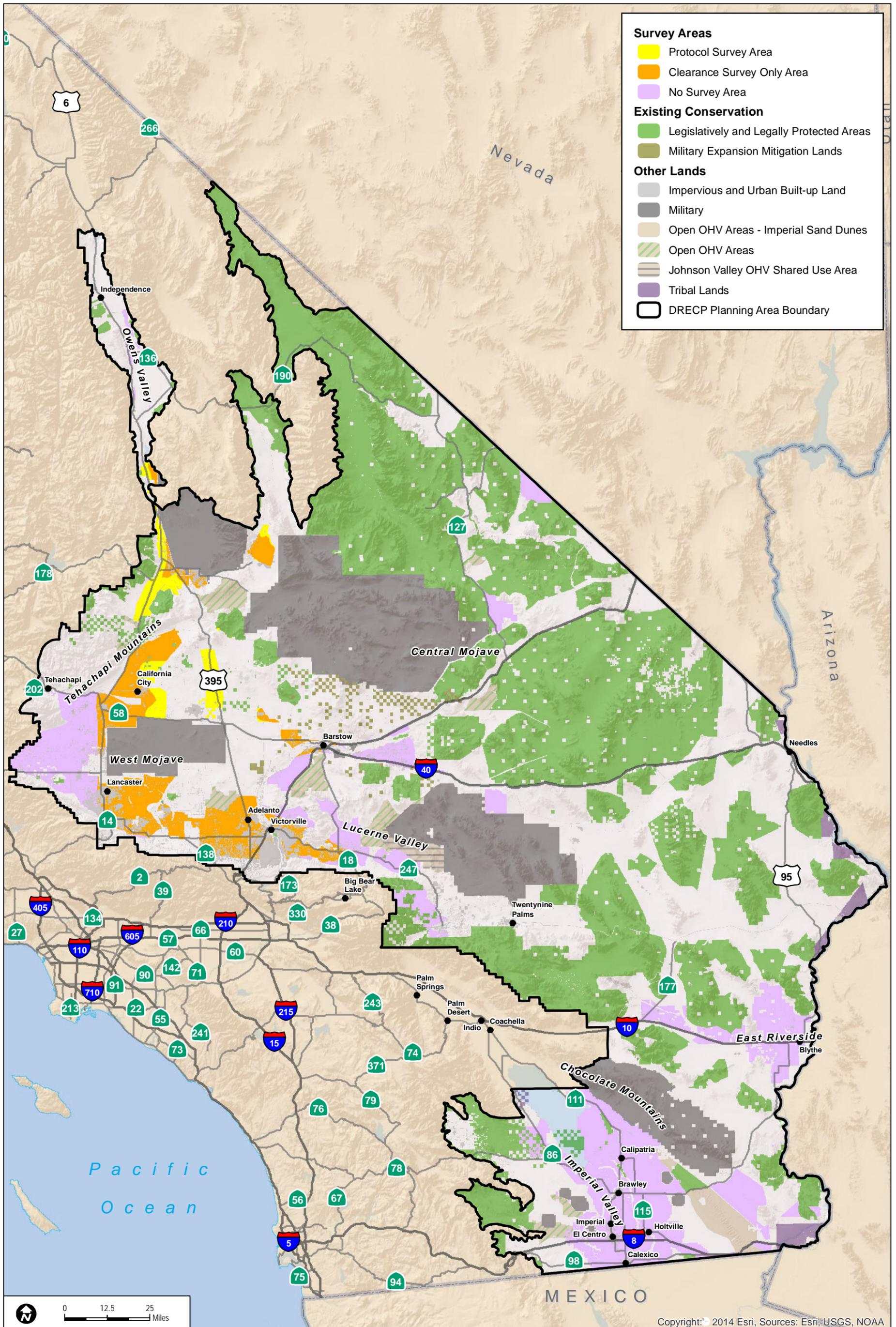
The areas referenced in Section II.3.1.2.5.4 are shown below in Figure H-8, Mohave Ground Survey Requirement Areas.

H.3 Approach to Determining Compensation

The DRECP biological conservation strategy, developed through the process described in Volume I, Section I.3.4, and as expressed through each alternative described in Volume II, is the proposed approach for conserving¹ Covered Species and natural communities—and the landscape processes that support them—within the Plan Area. Compensation generated from the impacts of Covered Activities is a component of the DRECP's contribution to Plan-wide conservation and toward achieving the Plan-wide Biological Goals and Objectives (BGOs).

As part of the conservation strategy, compensation would be required for the impacts of siting, construction, and decommissioning of Covered Activities and for the impacts of operations of Covered Activities.

¹ The term “conserve” (or “conservation”) as used in the Plan-wide BGOs includes land acquisition (e.g., fee title purchase from willing sellers); other forms of land protection (e.g., recording a conservation easement on lands with willing landowners); BLM Land Use Plan Amendment (LUPA) conservation designations (i.e., National Landscape Conservation System [NLCS], Areas of Critical Environmental Concern [ACEC], and Wildlife Allocations); restoration and enhancement activities; management actions identified for natural communities and Covered Species; and securing funding for land management and monitoring for Covered Species, natural communities and ecological processes. For purposes of the Natural Community Conservation Planning Act (NCCPA) and California Department of Fish and Wildlife (CDFW) approval of the DRECP as a Natural Community Conservation Plan (NCCP), to conserve Covered Species and natural communities means to use, and the use of, methods and procedures within the Plan Area that are necessary to bring any Covered Species to the point at which the conservation measures are not necessary, and for Covered Species that are not listed, to maintain or enhance the condition of the species so that Covered Activities do not contribute to the potential need for future listing by the State of California.



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

Copyright: © 2014 Esri, Sources: Esri, USGS, NOAA

FIGURE H-8
Mohave Ground Squirrel Survey Areas

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For the impacts of Covered Activities (excluding the operational impacts on bird and bat Covered Species), the DRECP compensation requirements are expressed as compensation ratios, which are used to calculate how much compensation acreage would be required to offset the impacts. Compensation criteria (e.g., the types of allowable compensation [acquisition or non-acquisition], the “kind” of compensation required [resource-specific compensation specifications], and any geographic requirements) would be determined through implementation on a project-specific basis as described by the DRECP Biological Conservation and Mitigation Program in Section II.3.1.5.3. The compensation ratios are “acquisition-calibrated,” meaning that they represent the ratio of acres that would need to be conserved for each acre of impact. These acquisition-calibrated ratios would be the basis for converting acquisition compensation into corresponding non-acquisition compensation or a corresponding compensation fee. These compensation ratios for impacts within DFAs are summarized in Table H-4a, and the compensation ratios for impacts of transmission Covered Activities in the DRECP Plan-Wide Reserve Design Envelope are summarized in Table H-4b, and the approach to developing these ratios is described in Section H.3.1 and H.3.2.

For the impacts of operations of bird and bat Covered Species, additional compensation would be required as is described in Section H.3.3.

The approach to compensating for the impacts (excluding operational impacts on birds and bats) of Covered Activities uses a “standard” compensation ratio and compensation ratio “exceptions”. The standard compensation ratios and compensation ratio exceptions for each alternative are summarized below and in Table H-4a and Table H-4b. Following Tables H-4a and H-4b, the approach to developing these compensation ratios is described in Section H.3.1 and Section H.3.2.

- **Standard Compensation Ratio:** The standard compensation ratio would apply to the impacts from Covered Activities, except for impacts where the compensation ratio exceptions would apply. Compensation for impacts would be used for the acquisition of land for inclusion in the reserve and for non-acquisition actions, as directed by the DRECP Coordination Group(s). For the Preferred Alternative and Alternatives 1, 3, and 4, the standard compensation ratio would be 1:1. For Alternative 2, the standard compensation ratio would be 2:1.
- **Compensation Ratio Exceptions:** Compensation ratio exceptions would apply to impacts from Covered Activities to specific resources or in specific geographic locations. The portion of the impacts from the Covered Activities within the exception area would be subject to the compensation ratio exceptions, and the portion of the impacts from the Covered Activities outside the exception area would be compensated at the standard compensation ratio. Compensation for impacts would be used for the acquisition of land for inclusion in the reserve and for non-acquisition actions, as directed by the DRECP Coordination Group(s).

- For the Preferred Alternative and Alternatives 1, 3, and 4, the following compensation ratio exceptions would apply to the impacts from Covered Activities:
 - Impacts in DFAs within the desert tortoise compensation exception areas identified in Table H-4a would be compensated at 2:1. Transmission impacts in the DRECP Plan-Wide Reserve Design Envelope within the desert tortoise compensation exception areas are identified in Table H-4b and would be compensated at 5:1. Compensation fees collected for transmission Covered Activities within desert tortoise critical habitat will be used for management of critical habitat in the same recovery unit as the impact.
 - Impacts in DFAs and transmission impacts in the DRECP Plan-Wide Reserve Design Envelope within the Mohave ground squirrel compensation exception areas identified in Tables H-4a and H-4b would be compensated at 2:1
 - Impacts in DFAs and transmission impacts in the DRECP Plan-Wide Reserve Design Envelope in the flat-tailed horned lizard management areas identified in Tables H-4a and H-4b would be compensated according to the Flat-tailed Horned Lizard Rangelwide Management Strategy
 - Impacts in DFAs and transmission impacts in the DRECP Plan-Wide Reserve Design Envelope to the wetland natural communities identified in Tables H-4a and H-4b would be compensated through (1) the acquisition of wetlands at the standard compensation ratio (1:1) and (2) the restoration/ enhancement of wetlands at a minimum of a 1:1 ratio in order to provide for no net loss of wetlands.
- For Alternative 2, the following compensation ratio exceptions would apply to the impacts from Covered Activities:
 - Impacts in DFAs in the desert tortoise compensation exception areas identified in Table H-4a would be compensated at 3:1. Transmission impacts in the DRECP Plan-Wide Reserve Design Envelope within the desert tortoise compensation exception areas identified in Table H-4b would be compensated at 5:1. Compensation fees collected for transmission Covered Activities within desert tortoise critical habitat and linkages will be used for management of critical habitat and linkages in the same recovery unit as the impact.
 - Impacts in DFAs and transmission impacts in the DRECP Plan-Wide Reserve Design Envelope in the Mohave ground squirrel compensation exception areas identified in Tables H-4a and H-4b would be compensated at 5:1
 - Impacts in DFAs and transmission impacts in the DRECP Plan-Wide Reserve Design Envelope in flat-tailed horned lizard management areas identified in Tables H-4a and H-4b would be compensated according to the Flat-tailed Horned Lizard Rangelwide Management Strategy

- Impacts in DFAs and transmission impacts in the DRECP Plan-Wide Reserve Design Envelope to the wetland natural communities identified in Tables H-4a and H-4b would be compensated through (1) the acquisition of wetlands at the standard compensation ratio (1:1) and (2) the restoration/enhancement of wetlands at a minimum of a 1:1 ratio in order to provide for no net loss of wetlands.
- Impacts in DFAs and transmission impacts in the DRECP Plan-Wide Reserve Design Envelope in Silurian Valley would be compensated at 3:1
- Impacts in agricultural lands or other highly disturbed areas would be compensated at a 1:1 ratio.

**Table H-4a
Compensation Ratios for the Impacts¹ of DRECP Covered Activities in DFAs**

Alternative	Standard Compensation Ratio ²	Compensation Ratio Exceptions ³	
Preferred Alternative Alternative 1 Alternative 3 Alternative 4	1:1	Desert tortoise ⁴ : Intact linkage habitat surrounding the Ord-Rodman critical habitat unit	2:1
		Mohave ground squirrel ⁵ : Key population centers	2:1
		Flat-tailed horned lizard ⁶ : FTHL Management Areas	RMS
		Wetlands ⁷	1:1 (preserve) 1:1 (restore or enhance)
Alternative 2	2:1	Desert tortoise ⁴ : Any critical habitat unit or Desert Tortoise Research Natural Area	3:1
		Mohave ground squirrel ⁵ : Key population centers and expansion areas	5:1
		Flat-tailed horned lizard ⁶ : FTHL Management Areas	RMS
		Wetlands ⁷	1:1 (preserve) 1:1 (restore or enhance)
		Silurian Valley ⁸	3:1
		Agriculture and disturbed lands ⁹	1:1

¹ The compensation ratios in Table H-4a would apply to the extent of ground disturbance related impacts from DRECP Covered Activities (i.e., siting, construction, decommissioning, and terrestrial operational impacts) in DFAs. Any compensation associated with the impacts of Covered Activities operations on bird and bat Covered Species would be in addition to the compensation summarized here and as described in Section H.3.3.

² The standard compensation ratio would apply to the impacts from Covered Activities, except for any portion of the impacts where compensation ratio exceptions would apply.

³ The compensation ratio exceptions would apply to the portion of the impacts from Covered Activities that occurs within the specific exceptions areas listed in Table H-4a. In cases where more than one compensation ratio exception would apply, the highest compensation ratio would apply to the overlapping impact acreage.

⁴ Under the Preferred Alternative, Alternative 1, Alternative 3, and Alternative 4, a 2:1 compensation ratio would apply to the impacts of Covered Activities that occur in the specific intact desert tortoise linkage habitat areas surrounding the Ord-Rodman desert tortoise critical habitat unit (i.e., the Fremont-Kramer to Ord-Rodman linkage and the Ord-Rodman to Joshua Tree National Park linkage identified in the desert tortoise BGOs). Under Alternative 2, a 3:1 compensation ratio would apply to impacts of Covered Activities that occur in any desert tortoise critical habitat unit or in the Desert Tortoise Research Natural Area.

⁵ Under the Preferred Alternative, Alternative 1, Alternative 3, and Alternative 4, a 2:1 compensation ratio would apply to the impacts of Covered Activities that occur in Mohave ground squirrel key population centers as identified in the Mohave ground squirrel BGOs. Under Alternative 2, a 5:1 compensation ratio would apply to the impacts of Covered Activities that occur in Mohave ground squirrel key population centers or Mohave ground squirrel expansion areas as identified in the Mohave ground squirrel BGOs.

- ⁶ Under any alternative, impacts from Covered Activities that occur within flat-tailed horned lizard (FTHL) Management Areas, as identified in the interagency Flat-tailed Horned Lizard Rangewide Management Strategy (RMS), would be compensated according to the compensation requirements of the RMS.
- ⁷ Impacts to wetlands would be avoided to the maximum extent feasible through the avoidance and minimization CMAs described in Volume II. Unavoidable impacts to Arid West freshwater emergent marsh (AWEM) or Californian warm temperate marsh/seep (WATS) wetlands would require a 1:1 compensation ratio of wetland preservation and a minimum of a 1:1 compensation ratio of wetland restoration and/or enhancement in order to meet the no net loss standard for wetlands.
- ⁸ Under Alternative 2, a 3:1 compensation ratio would apply to the impacts of Covered Activities that occur in the Silurian Valley in the central Mojave Desert.
- ⁹ Under Alternative 2, a 1:1 compensation ratio would apply to the impacts of Covered Activities that occur in agriculture (anywhere in the Plan Area) or disturbed lands with low terrestrial intactness in the West Mojave.

Table H-4b
Compensation Ratios for the Impacts¹ of Transmission Covered Activities in the DRECP Plan-Wide Reserve Design Envelope

Alternative	Standard Compensation Ratio ²	Compensation Ratio Exceptions ³	
Preferred Alternative Alternative 1 Alternative 3 Alternative 4	1:1	Desert tortoise designated critical habitat	5:1
		Mohave ground squirrel ⁵ : Key population centers	2:1
		Flat-tailed horned lizard ⁶ : FTHL Management Areas	RMS
		Wetlands ⁷	1:1 (preserve) 1:1 (restore or enhance)
Alternative 2	2:1	Desert tortoise designated critical habitat and TCA linkages	5:1
		Mohave ground squirrel ⁵ : Key population centers and expansion areas	5:1
		Flat-tailed horned lizard ⁶ : FTHL Management Areas	RMS
		Wetlands ⁷	1:1 (preserve) 1:1 (restore or enhance)
		Silurian Valley ⁸	3:1
		Agriculture and disturbed lands ⁹	1:1

¹ The compensation ratios in Table H-4b would apply to the extent of ground disturbance related impacts from Transmission Covered Activities in the DRECP Plan-Wide Reserve Design Envelope. Any compensation associated with the impacts of Covered Activities operations on bird and bat Covered Species would be in addition to the compensation summarized here and as described in Section H.3.3.

² The standard compensation ratio would apply to the impacts of transmission, except for any portion of the impacts where compensation ratio exceptions would apply.

- ³ The compensation ratio exceptions would apply to the portion of the impacts from transmission that occurs within the specific exceptions areas listed in Table H-4b. In cases where more than one compensation ratio exception would apply, the highest compensation ratio would apply to the overlapping impact acreage.
- ⁴ Under the Preferred Alternative, Alternative 1, Alternative 3, and Alternative 4, a 5:1 compensation ratio would apply to the impacts of transmission that occur in any desert tortoise designated critical habitat unit. Under Alternative 2, a 5:1 compensation ratio would apply to impacts of transmission that occur in any desert tortoise critical habitat unit or in any desert tortoise TCA linkage.
- ⁵ Under the Preferred Alternative, Alternative 1, Alternative 3, and Alternative 4, a 2:1 compensation ratio would apply to the impacts of transmission that occur in Mohave ground squirrel key population centers as identified in the Mohave ground squirrel BGOs. Under Alternative 2, a 5:1 compensation ratio would apply to the impacts of transmission that occur in Mohave ground squirrel key population centers or Mohave ground squirrel expansion areas as identified in the Mohave ground squirrel BGOs.
- ⁶ Under any alternative, impacts from transmission that occur within flat-tailed horned lizard (FTHL) Management Areas, as identified in the interagency Flat-tailed Horned Lizard Rangeland Management Strategy (RMS), would be compensated according to the compensation requirements of the RMS.
- ⁷ Impacts to wetlands would be avoided to the maximum extent feasible through the avoidance and minimization CMAs described in Volume II. Unavoidable impacts from transmission to Arid West freshwater emergent marsh (AWEM) or Californian warm temperate marsh/seep (WATS) wetlands would require a 1:1 compensation ratio of wetland preservation and a minimum of a 1:1 compensation ratio of wetland restoration and/or enhancement in order to meet the no net loss standard for wetlands.
- ⁸ Under Alternative 2, a 3:1 compensation ratio would apply to the impacts of transmission that occur in the DRECP Plan-Wide Reserve Design Envelope necessary for renewable development in the Silurian Valley in the central Mojave Desert.
- ⁹ Under Alternative 2, a 1:1 compensation ratio would apply to the impacts of transmission that occur in agriculture or disturbed lands with low terrestrial intactness in the West Mojave.

H.3.1 Standard Compensation Ratio

The standard compensation ratios were developed using the approach described below that included the following two elements:

- Generation of “conservation-scaled” and “impact acreage-weighted” compensation ratios for each ecoregion subarea
- REAT Agency establishment of the standard compensation ratio applicable to each alternative based on an evaluation of the generated conservation-scaled and impact acreage-weighted compensation ratios and consideration of the compensation ratio exceptions.

The following describes the approach for developing the standard compensation ratios.

H.3.1.1 Conservation-Scaled Base Compensation Ratios

Conceptually, resources that are well conserved by the Plan-wide reserve design would require less compensation for impacts within Development Focus Areas (DFAs) to meet their Plan-wide Biological Goals and Objectives (BGOs) than less well-conserved resources. To incorporate this concept of conservation lift into the development of the standard compensation ratios, the conservation level for all Covered Species habitat, by ecoregion subarea and by alternative, was used to scale the base compensation ratio (unweighted) using the ratios in Table H-5. For the purposes of conservation scaling, Covered Species habitat was considered conserved if it occurred within Legislatively and Legally Protected Areas (LLPAs), Military Expansion Mitigation Lands (MEMLs), and BLM LUPA Conservation Designations. Covered Species habitat within Conservation Planning Areas included in this calculation.

By way of example, Bendire’s thrasher habitat would be 78% conserved in the Cadiz Valley and Chocolate Mountains ecoregion subarea under the Preferred Alternative; therefore, the unweighted, conservation-scaled base compensation ratio for Bendire’s thrasher habitat would be 1:1 according to Table H-5. In Imperial Borrego Valley ecoregion subarea, however, Bendire’s thrasher habitat would be 23% conserve under the Preferred Alternative resulting in an unweighted, conservation-scaled compensation ratio of 2:1 for Bendire’s thrasher habitat in this ecoregion subarea. These calculations were done for all Covered Species in each ecoregion subarea for each alternative. The conservation-scaled base compensation ratios developed through this process were used as the inputs for the impact weighting described in Section H.3.1.2.

**Table H-5
Base Compensation Ratio Scaled by Plan-Wide Species Habitat Conservation**

Conservation ¹ of Covered Species Habitat	Base Compensation Ratio
More than 50% conserved	1:1
Less than 50% conserved	2:1

¹ For the purposes of determining conservation of Covered Species Habitat for this application, Covered Species habitat within Legislatively and Legally Protected Areas (LLPAs), Military Expansion Mitigation Lands (MEMLs), and BLM LUPA Conservation Designations was considered conserved. Covered Species habitat within Conservation Planning Areas was not included this calculation.

H.3.1.2 Impact Acreage Weighting

Covered Species habitat with greater impacts within DFAs should have a greater influence on the ecoregion subarea-based compensation ratios, and vice versa. To incorporate impact acreage weighting, the impact acreages to the Covered Species habitat were used to weight the ecoregion subarea-based compensation ratio. Species with few impacts in a DFA ecoregion subarea would have little influence (weight) on the calculated ratio for that ecoregion subarea, whereas species with higher estimated impacts would have a greater influence on the calculated ratio. The within-subarea sum of the conservation-scaled, acreage-weighted, within-subarea impacts for the species habitat divided by the within-subarea sum of the raw within-subarea impacts for the species habitat produces a single, subarea-based, conservation-scaled, impact acreage-weighted, compensation ratio for impacts in each ecoregion subarea.

As an example in the Cadiz Valley and Chocolate Mountains ecoregion subarea for the Preferred Alternative, there would be an estimated 1,900 acres of impact to desert tortoise habitat, and desert tortoise has a high conservation level so the scaled base compensation ratio (Table H-5) would be 1:1. Also in the Cadiz Valley and Chocolate Mountains ecoregion subarea for the Preferred Alternative, there would be an estimated 19 acres of impact to California black rail habitat, and California black rail habitat has a lower conservation level so the scaled base compensation ratio would be 2:1. In the above example, the lower compensation ratios reflecting the high overall desert tortoise conservation levels would influence (weight) the compensation ratio toward a lower overall weighted ratio since the estimated impacts to desert tortoise are greater than the estimated impacts to California black rail (i.e., the weighted ratio would be closer to 1:1 than 2:1). This calculation was made for all DFA ecoregion subareas for all alternatives as summarized in Table H-6.

Table H-6
Summary of Ecoregion Subarea-Based, Conservation-Scaled, Impact Acreage-Weighted Compensation Ratios by Alternative and Averaged Across Alternatives

Ecoregion Subarea	Preferred Alternative	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Average of Alternatives
Cadiz Valley and Chocolate Mountains	1.1	1.3	1.1	1.0	1.1	1.1
Imperial Borrego Valley	1.7	1.9	1.7	1.7	1.9	1.8
Kingston and Funeral Mountains	1.0	-	1.0	-	1.0	1.0
Mojave and Silurian Valley	1.0	1.0	1.0	1.0	1.0	1.0
Owens River Valley	1.9	2.0	2.0	1.9	2.0	2.0
Panamint Death Valley	-	-	1.0	1.0	1.0	1.0
Pinto Lucerne Valley and Eastern Slopes	1.2	1.2	1.2	1.2	1.2	1.2
Piute Valley and Sacramento Mountains	-	-	-	-	-	-
Providence and Bullion Mountains	1.0	1.0	1.0	1.0	1.0	1.0
West Mojave and Eastern Slopes	2.0	2.0	1.9	2.0	2.0	2.0

H.3.1.3 Establishment of the Standard Compensation Ratios

Using the information from the conservation-scaled, impact acreage-weighted compensation ratio approach described above, the REAT Agencies established the standard compensation ratios that would apply under the DRECP alternatives. Establishment of the standard compensation ratios also informed the development of the compensation ratio exceptions described in Section H.3.2.

Under the approach described above in Section H.3.1.1 and H.3.1.2, the compensation ratio could vary between a low of 1:1 and a high of 2:1. Based on the average of the alternatives as shown in Table H-6, the majority of the ecoregion subareas would have a compensation ratio of approximately 1:1, with the exception of Imperial Borrego Valley, Owens River Valley, and the West Mojave and Eastern Slopes ecoregion subareas. In these ecoregion

subareas where the ratio calculated is between 1.8:1 to 2:1, the higher compensation ratio is a result of (1) low conservation lift from LLPAs, MEMLs, and BLM LUPA Conservation Designations in these regions and/or (2) a high level of impact to agricultural species that are poorly represented in the reserve design. In the West Mojave and Eastern Slopes and Owens River ecoregion subareas, compensation ratio exceptions were established for desert tortoise and Mohave ground squirrel that would require higher compensation ratios for these key resources in these key regions. In the Imperial Borrego Valley ecoregion subarea, the interagency Flat-tailed Horned Lizard Rangelwide Management Strategy would be used in the FTHL Management Areas, which cover the areas where Covered Activities would be allowable outside of the agricultural lands. By creating these compensation ratio exceptions as described in Section H.3.2, the standard compensation ratio for the Preferred Alternative and Alternatives 1, 3, and 4 was established at 1:1.

Under Alternative 2, the DFAs are more extensive and would allow the development of Covered Activities in sensitive, remote, and intact areas across the Plan Area; therefore, the impact of the taking on species is anticipated to be greater. To partially address this, the compensation ratio exceptions were expanded, including higher ratios for desert tortoise, Mohave ground squirrel, and for impacts in the Silurian Valley. To address the anticipated higher impact of the taking, the standard compensation ratio for Alternative 2 was established at 2:1. So that a 2:1 compensation ratio was not applied to impacts in agricultural lands or highly disturbed lands under Alternative 2, an additional compensation ratio exception was added to lower the compensation ratio for those lands to 1:1.

H.3.2 Compensation Ratio Exceptions

Compensation ratio exceptions would apply to the portion of the impacts from Covered Activities to specific resources or in specific geographic locations. The following compensation ratio exceptions have been developed:

- **Desert tortoise compensation ratio exceptions:** Under the Preferred Alternative, Alternative 1, Alternative 3, and Alternative 4, a 2:1 compensation ratio would apply to the impacts of Covered Activities in DFAs that occur in the specific intact desert tortoise linkage habitat areas surrounding the Ord-Rodman desert tortoise critical habitat unit (i.e., the Fremont-Kramer to Ord-Rodman linkage and the Ord-Rodman to Joshua Tree National Park linkage identified in the desert tortoise BGOs). Under the Preferred Alternative, Alternative 1, Alternative 3, and Alternative 4, a 5:1 compensation ratio would apply to the impacts of transmission Covered Activities in the DRECP Plan-Wide Reserve Design Envelope that occur in USFWS-designated critical habitat for desert tortoise. Under Alternative 2, a 3:1 compensation ratio would apply to impacts of Covered Activities in DFAs that occur in any desert tortoise critical habitat unit or in the Desert Tortoise Research Natural Area. Under Alternative 2, a 5:1 compensation ratio would apply to the impacts of transmission

Covered Activities in the DRECP Plan-Wide Reserve Design Envelope that occur in USFWS-designated critical habitat for desert tortoise or desert tortoise habitat linkages to TCAs.

- **Mohave ground squirrel compensation ratio exceptions:** Under the Preferred Alternative, Alternative 1, Alternative 3, and Alternative 4, a 2:1 compensation ratio would apply to the impacts of Covered Activities (within DFAs and transmission Covered Activities in the DRECP Plan-Wide Reserve Design Envelope) that occur in Mohave ground squirrel key population centers as identified in the Mohave ground squirrel BGOs. Under Alternative 2, a 5:1 compensation ratio would apply to the impacts of Covered Activities that occur in Mohave ground squirrel key population centers or Mohave ground squirrel expansion areas as identified in the Mohave ground squirrel BGOs.
- **Flat-tailed horned lizard compensation ratio exceptions:** Under any alternative, impacts from Covered Activities (within DFAs and transmission Covered Activities in the DRECP Plan-Wide Reserve Design Envelope) that occur within flat-tailed horned lizard (FTHL) Management Areas, as identified in the interagency Flat-tailed Horned Lizard Rangelwide Management Strategy (RMS) and described in the FTHL BGOs, would be compensated according to the compensation requirements of the RMS.
- **Wetland compensation ratio exceptions:** Impacts to wetlands would be avoided to the maximum extent feasible through the avoidance and minimization CMAAs described in Volume II. Unavoidable impacts (within DFAs and transmission Covered Activities in the DRECP Plan-Wide Reserve Design Envelope) to Arid West freshwater emergent marsh (AWEM) or Californian warm temperate marsh/seep (WATS) wetlands would require a 1:1 compensation ratio of wetland preservation and a minimum of a 1:1 compensation ratio of wetland restoration and/or enhancement in order to meet the no net loss standard for wetlands.
- **Silurian Valley compensation ratio exception:** Under Alternative 2, a 3:1 compensation ratio would apply to the impacts of Covered Activities that occur in the DFAs located in the Silurian Valley, which are situated in an intact landscape of the central Mojave Desert considered important for Covered Species and wildlife movement. A 3:1 compensation ratio would also apply to the impacts of transmission Covered Activities that occur in the DRECP Plan-Wide Reserve Design Envelope surrounding the DFAs located in the Silurian Valley.
- **Agriculture and disturbed lands compensation ratio exception:** Under Alternative 2, a 1:1 compensation ratio would apply to the impacts of Covered Activities that occur in agriculture (anywhere in the Plan Area) or disturbed lands with low terrestrial intactness in the West Mojave and Eastern Slopes ecoregion subarea.

In cases where more than one compensation ratio exception would apply, the highest compensation ratio would apply to the overlapping impact acreage.

H.3.3 Compensation for the Impacts of Covered Activities Operations on Covered Birds and Bats

As part of the CMAs related to the operations of Covered Activities, the compensation for the impacts to bird and bat Covered Species from operations would be determined based on annual monitoring. Compensation would be fee based, assessed every 5 years to fund compensatory mitigation, and the biological basis for the fee would be determined by mortality effects that would be reassessed annually. Initial compensation fee for operational bird and bat Covered Species impacts would be based on pre-project monitoring of bird use and estimated Covered bird and bat species take of the project.

Each project shall include a monitoring program to provide project-specific information on annual operational effects on bird and bat Covered Species. Annual monitoring data will be collected using methodologies and reporting formatting which allows for scientifically robust cross-comparisons. The bird and bat Covered Species mortality for each project-would dictate the amount and type of compensation required to offset the effects of the project. It is anticipated that the compensation would be provided on an ongoing or annual basis.

To determine the required compensation the following section describes a generalized compensatory framework for operational impacts on bird and bat Covered Species. The compensatory framework for operational impacts to bird and bat Covered Species is based on Resource Equivalency Analysis (REA), which measures the total replacement cost for a given resource. REA relies on an understanding of a) the relative loss to a population (debt) resulting from an operational activity i.e., the life-time and generational loss of productivity of an individual and b) the productivity gain (credit) to a population from the implementation of compensation actions. It is important to recognize that both sides of the balance sheet estimate the debt and credit in the same currency, to clearly and transparently estimate the degree of compensation necessary. In this case, the currency is the number of bird/bat-years gained or lost because of operational impacts and the resulting compensation.

The accuracy with which the debt/credit of bird/bat-years can be estimated is dependent upon the extent to which the life history, demographics, reproductive rate, and susceptibility to operational impacts are known. The ability to estimate the relative debt varies. For example, the method developed for the REA for golden eagle and wind turbine collisions is relatively sophisticated; the age-specific susceptibility to collisions turbines is known and provides an age-specific estimate of future loss of productivity, which allows a multi-generational estimate of resource debt in bird-years (USFWS 2013b). Simplification of the model is necessary where parameters are unknown, for example, the use of average age rather than age classes for estimating loss of productivity of sea eagles in Norway to wind turbines (Cole 2011). Similarly, the ability

to estimate the credit given as a consequence of a compensation action is also based in an understanding of the life history of a given species, except in this case it is the overall credit in terms of increased productivity and increased bird-years that is the measure of the effectiveness of compensation.

Estimating Loss Due to Operations of Covered Activities

Using the method described in Cole (2011) the direct (individual loss) and indirect (life-time productivity) cost of losing an average aged individual to a population were estimated. Life tables for each species were developed based on published life history parameters. Given the uncertainty of the age-specific mortality rates for Covered Species, high and low estimates for the loss of individuals were estimated to set upper and lower boundaries on the size of the loss. The low estimate assumed an initially high juvenile mortality rate with a constant age-specific mortality rate for adults (typical of many bird populations); while the high estimate assumes the same high initial mortality rate for juveniles, with most of the remaining mortality occurring in old age, i.e., the last 2-4 years of published maximum lifespan. Table H-7 presents bird/bat-years lost for the loss of an average aged individual due to operations of Covered Activities; this is the measure against which any compensation would be measured. The estimates given in Table H-7 are based on published lifespan data and generalized age-specific mortality rates. This method compensates for the direct “injury” to the population (Zafonte & Hampton 2005), no compensation for the time delay between the original loss and the successful compensation is explicitly built into the calculation.

**Table H-7
Population Debt in Comparison to Compensatory Restoration Credits for Covered Birds**

Functional Group	Species	Population debt per Whole Bird Loss (bird-years) ¹	Restored Nesting Habitat Compensation Acreage per Whole Bird Loss	Population credit per Whole Bird Gain (bird-years) ²
		A	B	C
Riparian Woodland	SW Willow Flycatcher ³	5.5-6.5	5	5.0-7.0
	Least Bell’s Vireo ⁴	5.0-6.5	2	4.0-5.5
	Western yellow billed cuckoo ⁵	2.5-3.0	Minimum 20	2.5-3.0
	Gila woodpecker ⁶	4.5-8.0	24	5.5-6.0
Wetland	Yuma clapper rail ⁷	5.5-6.5	2	5.0-7.0
	California black rail ⁸	5.0-6.5	2	4.0-5.5

**Table H-7
 Population Debt in Comparison to Compensatory Restoration Credits for Covered Birds**

Functional Group	Species	Population debt per Whole Bird Loss (bird-years) ¹	Restored Nesting Habitat Compensation Acreage per Whole Bird Loss	Population credit per Whole Bird Gain (bird-years) ²
		A	B	C
Scrub/desert	Bendire's thrasher ⁹	4.5-8.0	N/A ¹⁶	5.5-6.0
Agricultural	Mountain plover ¹⁰	4.5-8.0	N/A ¹⁷	5.5-6.0
	Burrowing owl ¹¹	5.5-6.5	Per additional burrow ¹⁸	5.0-7.0
	Swainson's hawk ¹²	10.0-25.0	N/A ¹⁹	7.5-9.0
	Tri-colored blackbird ¹³	7.0-15.0	N/A ²⁰	5.0-7.5
	Sandhill crane ¹⁴	19.0-52.0	N/A ²¹	10.0-18.0
Bats ¹⁴	Pallid	4.5-8.0	N/A ²²	5.5-6.0
	California leaf-nosed	4.5-8.0	N/A ²²	5.5-6.0
	Townsend's big eared ²³	unknown	unknown	unknown

¹ Bird/bat-years lost per average aged bird/bat lost, including future productivity, assuming 0.5 offspring per individual per year.

² bird-years per additional individual contributed to population

³ Sedgwick 2000; USGS 2014

⁴ Kus et al 2010

⁵ Janice 1999; USGS 2014

⁶ Edwards & Schnell 2000

⁷ Scott et al. 2012

⁸ Edelman et al 2004

⁹ England and Laudenslayer 1993

¹⁰ Fritz & Wunder, 2006

¹¹ Poulin et al., 2011; USGS 2014

¹² Bechard et al., 2010

¹³ Beedy et al. 1999

¹⁴ Tacha et al. 1992; USGS 2014

¹⁵ Wilkinson & South 2002

¹⁶ Insufficient information to estimate nesting habitat compensation.

¹⁷ Only winter foraging habitat occurs within Plan Area. Therefore, threat reduction actions

¹⁸ Artificial burrow creation, or supplementation

¹⁹ Foraging habitat protection and threat reduction actions only.

²⁰ There is limited nesting habitat known in Plan area near Harpers Dry Lake. It is likely that only foraging habitat protection actions are feasible.

²¹ Only winter foraging habitat occurs within Plan Area.

²² Only threat reduction management actions such as roost protection available.

²³ Insufficient Life history information to estimate credits and debts.

Estimating Habitat Restoration and Enhancement Compensation for Operational Impacts on Bird and Bat Covered Species

The compensation framework emphasizes compensation through in-kind ecological restoration and/or management activities that aim to increase population level productivity, or reduce mortality factors (avoided cost) (see Table H-10). To implement these programs effectively, the population productivity gains are evaluated so that credits can be accurately calculated (Column C Table H-7). Under this framework, it is infeasible to evaluate fully the benefits of compensatory programs *a priori*. Therefore, the MAMP

includes a bird and bat Covered Species operational impacts and compensation effectiveness monitoring (see Section II.3.1.3.4.2).

The productivity of breeding habitat provides an example of how the effectiveness of compensation can be measured using REA. Table H-7 lays out the population credits (bird-years) resulting from a given acreage of successfully restored or managed breeding habitat for covered bird species. The measure of success, for a successfully restored or managed breeding territory (Column B Table H-7) is the expected bird-years per bird fledging (Column C of Table H-7). This method assumes that each fledging bird would live to an average age. For example, the loss of a single Yuma clapper rail due to operational activities would result in the loss of 3.0-4.0 bird-years (both direct and indirect) from a population (Column A Table H-7). The restoration or improved management of a breeding territory of about 2-25 acres (Column B Table H-7) would, if successful, offset the loss of a single individual with the successful fledging of 1 individual from that habitat (Column C Table H-7)². The implication of this approach is that one successfully restored and managed breeding territory, could generate multiple population credits over the lifetime of the Plan or project. The compensation for the impacts to bird and bat Covered Species from operational Covered Activities would be determined based on annual monitoring of bird and bat mortality and a fee for assessed every 5 years to fund compensatory mitigation. Initial compensation fee for operational bird and bat impacts would be based on pre-project monitoring of bird use and estimated Covered bird and bat species take of the project.

For species that do not breed within the DRECP (e.g., mountain plover and greater sandhill crane), restoration or improved management of breeding habitat is not feasible. However, restoration and maintenance of foraging habitat, with the aim of increasing winter survival may be possible. A greater understanding of the relationship between restoration of foraging habitat and winter survival is needed to determine the degree of compensation necessary to offset impacts. For Bendire's thrasher, too little is understood about the nesting behavior to establish an acreage restoration requirement; again further research is required. Swainson's hawk are not territorial, except to defend the nest, therefore, compensatory restoration of nesting habitat would an inappropriate measure. For Swainson's hawk population stressors include changes in farming practices that reduce foraging opportunities, therefore habitat management and maintenance that enhance foraging success is needed for successful compensation.

For bats, it is possible to establish both the population debt and compensatory credit for successful compensatory actions, However, since bat compensation would rely on threat reduction compensation a restoration acreage is not a relevant measure for restoration.

² The subsequent productivity of the fledgling is not included in the calculation because this is an estimate of breeding habitat contribution to the population not the future productivity of an individual.

Threat Reduction Compensation

Compensation management actions identified in Table H-10, for bird and bat Covered Species offer a wide variety of potential compensation actions that could reduce mortality factors. Actions that result in avoided cost to the population (i.e., avoided mortality) would use the framework described above if avoided cost to the population can be quantified. Assessment of these compensation actions relies on understanding the relative success of a population prior to the implementation of compensation actions (i.e., an understanding of baseline conditions), in order to evaluate and subsequent gains. For avoided cost mitigation actions, population monitoring is critical so that the effectiveness of compensation can be attributed accurately.

Threat-reduction compensation actions that benefit the populations of impacted bird and bat Covered Species include the following:

- Nest site and roost protections.
- Retrofitting or undergrounding transmission lines - Power line retrofitting following current Avian Power Line Interaction Committee (APLIC) standards in the Plan Area could reduce the risk of future electrocutions and undergrounding transmission lines would remove the threat. As a compensation action, power line retrofitting must be in addition to existing, ongoing retrofitting programs being conducted by the utilities.
- Repowering existing wind facilities – Aging, inefficient wind power generation facilities that take birds and bats may present an opportunity to repower or re-site or remove them to reduce the amount of ongoing take.
- Predator control and management programs, such as cowbird control for least Bell's vireo. Again, the effectiveness of these compensation actions require an understanding of both the lifetime contribution of an individual and the gains to the population in terms of avoided losses. It is unknown if the scale at which it would need to be implemented would make this a feasible approach for compensation.
- For bats, compensation would almost entirely consist of management actions designed to reduce threats from encroachment of human activity on significant roosts. For example, human access to mines may be restricted by funding gating and/or fencing that does not block bat access at abandoned mine features.

At present insufficient information is available to estimate the linkage between avoided losses and threat reduction actions for Townsend's big-eared bat, pallid bat, and California leaf-nosed bat.

H.4 Application of the Compensation Approach to the DRECP Alternatives

H.4.1 Impact Quantification

The compensation ratios in Table H-4a and Table H-4b would apply to the extent of ground disturbance related impacts from DRECP Covered Activities (i.e., siting, construction, decommissioning, and terrestrial operational impacts). Using the methods described in Volume IV, Section IV.7.1, the impacts associated with the siting, construction, decommissioning, and operations (on terrestrial resources) of Covered Activities have been estimated by renewable energy technology and for transmission. These impact estimates assume the application of avoidance and minimization CMAs (Section II.3.1.1.5).

Compensation associated with the impacts of operational Covered Activities on bird and bat Covered Species would be based on the monitored impacts to birds and bats during operations. To enable estimation of compensation under each alternative, the estimated compensation for each covered species is described in Section H.3.3.

H.4.2 Estimated Biological Compensation for each DRECP Alternative

H.4.2.1 Estimated Compensation for Siting, Construction, Decommissioning, and Terrestrial Operational Impacts

The compensation ratios in Table H-4a and Table H-4b were used to estimate the biological compensation for the impacts of the Covered Activities under each alternative. Table H-8 provides the estimated compensation (acquisition-based) for siting, construction, decommissioning, and terrestrial operational impacts for the DRECP Alternatives by ecoregion subarea using the compensation approach described in H.3.1 and H.3.2. These acquisition-based compensation estimates would be the basis for converting the compensation into eligible non-acquisition compensation actions and for converting to a fee-based compensation system.

Table H-8
Estimated Compensation for Siting, Construction, Decommissioning, and Terrestrial Operational Impacts

Alternative	Ecoregion Subarea	Siting, Construction, Decommissioning and Terrestrial Operational Impacts	Estimated Compensation for Impacts Subject to the Standard Compensation Ratio	Estimated Compensation for Impacts Subject to the Compensation Ratio Exceptions	Total Estimated Compensation
Preferred Alternative	Cadiz Valley and Chocolate Mountains	55,940	49,704	31,179	80,884
	Imperial Borrego Valley	70,998	64,589	19,229	83,817
	Kingston and Funeral Mountains	3,064	3,064	0	3,064
	Mojave and Silurian Valley	4,442	2,510	6,596	9,107
	Owens River Valley	1,909	1,592	635	2,227
	Panamint Death Valley	0	0	0	0
	Pinto Lucerne Valley and Eastern Slopes	24,598	10,091	29,640	39,731
	Providence and Bullion Mountains	1,414	905	1,093	1,998
	West Mojave and Eastern Slopes	57,078	51,083	12,226	63,309
Preferred Alternative Total		219,445	183,538	100,599	284,136
Alternative 1	Cadiz Valley and Chocolate Mountains	29,933	26,196	18,685	44,882
	Imperial Borrego Valley	80,136	72,735	22,205	94,940
	Kingston and Funeral Mountains	0	0	0	0
	Mojave and Silurian Valley	6,738	4,704	8,418	13,122
	Owens River Valley	7,988	6,792	2,392	9,184
	Panamint Death Valley	0	0	0	0
	Pinto Lucerne Valley and Eastern Slopes	20,079	14,103	12,540	26,644
	Providence and Bullion Mountains	2,544	1,665	1,890	3,555
	West Mojave and Eastern Slopes	43,987	43,050	1,875	44,925
Alternative 1 Total		191,407	169,245	68,006	237,251
Alternative 2	Cadiz Valley and Chocolate Mountains	44,267	63,730	28,591	92,322
	Imperial Borrego Valley	77,812	56,662	64,317	120,980

Table H-8
Estimated Compensation for Siting, Construction, Decommissioning, and Terrestrial Operational Impacts

Alternative	Ecoregion Subarea	Siting, Construction, Decommissioning and Terrestrial Operational Impacts	Estimated Compensation for Impacts Subject to the Standard Compensation Ratio	Estimated Compensation for Impacts Subject to the Compensation Ratio Exceptions	Total Estimated Compensation
	Kingston and Funeral Mountains	3,804	4,484	5,766	10,250
	Mojave and Silurian Valley	7,980	3,827	19,256	23,083
	Owens River Valley	3,855	5,799	4,592	10,391
	Panamint Death Valley	1,160	596	1,565	2,161
	Pinto Lucerne Valley and Eastern Slopes	36,200	66,047	9,395	75,443
	Providence and Bullion Mountains	6,579	11,652	3,625	15,278
	West Mojave and Eastern Slopes	57,049	81,927	67,205	149,132
Alternative 2 Total		238,705	294,725	204,314	499,039
Alternative 3	Cadiz Valley and Chocolate Mountains	31,357	27,674	18,413	46,087
	Imperial Borrego Valley	76,129	66,793	28,006	94,799
	Kingston and Funeral Mountains	0	0	0	0
	Mojave and Silurian Valley	5,111	3,451	5,850	9,301
	Owens River Valley	3,970	3,446	1,048	4,494
	Panamint Death Valley	2,364	2,203	322	2,525
	Pinto Lucerne Valley and Eastern Slopes	24,906	13,057	24,368	37,425
	Providence and Bullion Mountains	2,784	1,786	2,143	3,929
	West Mojave and Eastern Slopes	55,740	51,356	8,769	60,125
Alternative 3 Total		202,360	169,766	88,919	258,685
Alternative 4	Cadiz Valley and Chocolate Mountains	70,638	61,604	45,168	106,772
	Imperial Borrego Valley	53,747	48,412	16,003	64,415
	Kingston and Funeral Mountains	603	603	0	603
	Mojave and Silurian Valley	3,528	2,687	3,050	5,736

Table H-8
Estimated Compensation for Siting, Construction, Decommissioning, and Terrestrial Operational Impacts

Alternative	Ecoregion Subarea	Siting, Construction, Decommissioning and Terrestrial Operational Impacts	Estimated Compensation for Impacts Subject to the Standard Compensation Ratio	Estimated Compensation for Impacts Subject to the Compensation Ratio Exceptions	Total Estimated Compensation
	Owens River Valley	3,903	3,358	1,089	4,448
	Panamint Death Valley	1,086	382	1,409	1,791
	Pinto Lucerne Valley and Eastern Slopes	17,853	8,274	19,511	27,785
	Providence and Bullion Mountains	1,396	935	990	1,925
	West Mojave and Eastern Slopes	58,093	54,609	7,155	61,764
	Alternative 4 Total	210,846	180,865	94,374	275,239

Notes: There are no impacts in the Piute Valley and Sacramento Mountains ecoregion subarea in any alternative.

H.4.2.2 *Estimated Compensation for Bird and Bat Covered Species Operational Impacts*

The compensation for operational impacts described in Table H-9 was used to estimate the biological compensation for the impacts of operational activities under each alternative. Table H-9 provides the estimated compensation (Acquisition and Restoration) for operational impacts to bird Covered Species in the DRECP.

**Table H-9
Estimated Compensation for Bird Operational Impacts**

Functional Group	Species	Debt per collision mid value (bird-years)	Credit per replacement bird mid-value (bird-years)	Compensation ratio (bird replacement ratio)	Acres new nesting habitat equivalents	Burrow equivalents
Riparian Woodland	SW Willow Flycatcher	6	6	1	5	N/A
	Least Bell's Vireo	5.75	4.75	1.3	2.6	N/A
	Western yellow billed cuckoo	2.75	2.75	1	20	N/A
	Gila woodpecker	6.25	5.75	1.1	26.4	N/A
Wetland	Yuma clapper rail	6	6	1	2	N/A
	California black rail	5.75	4.75	1.3	2.6	N/A
Scrub/desert	Bendire's thrasher	6.25	5.75	1.1	N/A	N/A
Agricultural	Mountain plover	6.25	5.75	1.1	N/A	N/A
	Burrowing owl	6	6	1	1	1
	Swainson's hawk	17.5	8.25	2.2	N/A	N/A
	Tri-colored blackbird	11	6.25	2	N/A	N/A
	Sandhill crane	35.5	14	3.1	N/A	N/A

H.4.3 Identification of Compensation Priorities

For each alternative, interagency Plan-wide Conservation Priority Areas have been identified as part of the reserve design process. Compensation would be implemented primarily within the interagency Plan-wide Conservation Priority Areas. It should be noted that the compensation priorities will be reevaluated throughout DRECP implementation and may change these priorities. New information and tools (e.g., new inventory data, new models, etc.) developed through the Monitoring and Adaptive Management Program and through outside research will be used to inform the compensation priorities as the DRECP is implemented. Additionally, the amount and location of impacts to natural communities and Covered Species may differ as Covered Activities are implemented from that estimated here, and the identification of compensation priority areas will be flexible to allow for this variability. The DRECP Coordination Group(s) would use the following specifications and criteria through plan implementation to prioritize reserve acquisitions and non-acquisition compensation actions.

Table H-10 provides a list of compensation priorities and eligible compensation actions for all Covered Species. Acquisition compensation is the assumed compensation priority for the impacts from Covered Species in the Plan Area. Under the DRECP conservation strategy, acquisition according to the compensation ratios provided in Table H-4a and Table H-4b would contribute toward building the DRECP reserve and thereby contribute to meeting the BGOs for the DRECP. Non-acquisition compensation actions have been identified species-by-species based on known stressors and threats to Covered Species. During project-level review and approval for Covered Activities, non-acquisition compensation actions may be determined to be biologically preferred over acquisition compensation to offset the impacts of the specific project. The DRECP Coordination Group(s) must approve non-acquisition compensation. It is anticipated that the compensation “package” for most projects would include a combination of acquisition and non-acquisition actions that meet the compensation requirements of Table H-4a and Table H-4b using eligible actions for the impacts as shown in Table H-10. For each species, the proportion of the compensation type (shown as a percent for acquisition and non-acquisition) represents the relative compensation mix over the course of the entire permit term. These compensation type percentages do not reflect prioritization of one type of compensation over the other on a project-specific basis.

Table H-10
Eligible Compensation Actions for Impacts to DRECP Covered Species

Common Name Scientific Name	Documented Stressors and Threats	Acquisition Compensation	Non-Acquisition Compensation
<i>Amphibian/Reptile</i>			
Agassiz's desert tortoise <i>Gopherus agassizii</i>	<ol style="list-style-type: none"> 1. Habitat loss/modification or range curtailment 2. Collecting 3. Disease or predation 4. Climate change and drought 5. Recreational and nonrecreation land uses 6. Fire <p>(Source: USFWS 2011)</p>	<p>Yes; priority acquisition targets within Tortoise Conservation Areas (TCAs), tortoise linkage areas, and high value tortoise habitat areas (collectively, Desert Tortoise Important Areas) within the same Recovery Unit as the impact.</p> <p><u>Area-Specific Priorities</u> Brisbane, Johnson, and Lucerne Valleys (50%)</p> <p>Priority 1 mitigation would be land acquisition in the following order of priority: Ord-Rodman ACEC; Daggett Ridge, Monkeyflower, and Bendire's Thrasher ACECs. Priority 3 mitigation (behind Priority 2 non-acquisition actions): If all available "primary area" lands have been acquired and the Priority 2 conservation actions have been implemented, compensation should focus on acquisition of inholdings (privately owned land) in the Old Woman Springs and Brisbane</p>	<p>Yes; eligible actions include (also see Table H-9):</p> <ul style="list-style-type: none"> • Reduction of threats through more intensive land management • Tortoise-exclusion fencing • Habitat restoration • Predator reduction • Purchase BLM of Grazing allotments for retirement <p><u>Area-Specific Priorities</u> Brisbane, Johnson, and Lucerne Valleys (50%)</p> <p>Priority 2 (behind Priority 1 land acquisition) would be the following: Law enforcement – specifically for Ord-Rodman, Brisbane Valley Monkeyflower, Daggett Ridge Monkeyflower, Old Woman Springs ACECs. Tortoise-exclusion fencing: (1) fencing and signing boundaries of Ord-Rodman, Brisbane Valley Monkeyflower, Daggett Ridge Monkeyflower, Old Woman Springs ACECs; and (2) installation</p>

Table H-10
Eligible Compensation Actions for Impacts to DRECP Covered Species

Common Name Scientific Name	Documented Stressors and Threats	Acquisition Compensation	Non-Acquisition Compensation
		Valley Monkeyflower ACECs. In addition, acquisition could occur in the Conservation Planning Area immediately west of the Old Woman Springs ACEC. Pahrump Valley (30%) West Mojave (60%) Colorado Desert (80%)	of desert tortoise exclusion fencing and culverts along Highway 247 between Barstow and Lucerne lakebed and between Camprock Road and Reche Road, where feasible. Pahrump Valley (70%) West Mojave (40%) Colorado Desert (20%)
Flat-tailed horned lizard <i>Phrynosoma mcallii</i>	<ol style="list-style-type: none"> 1. Habitat loss and fragmentation due to urban development and agriculture. 2. Bird predators (as a result of trees and poles for perching). 3. Non-native ants. 4. Non-native plants. 5. Illegal off-highway vehicle (OHV) use. <p>(Source: Thomson et al. 2013)</p>	Yes; Consistent with the compensation requirements and ratios listed in the FTHL RMS, which is an interagency cooperative management agreement.	Yes, if coordinated with the RMS's Interagency Coordinating Committee (ICC) and approved by the management oversight group (MOG). Eligible actions may include: <ul style="list-style-type: none"> • Modification of roadside barriers and crossing structures to allow for ease in crossing. • Enhance or restore habitat corridors as per the Interagency Cooperative Management Agreement. • Restore and/or enhance degraded habitats (manipulate soil properties, remove or control non-native plants, replant native species that provide food for harvester ants and open habitat for species).

Table H-10
Eligible Compensation Actions for Impacts to DRECP Covered Species

Common Name Scientific Name	Documented Stressors and Threats	Acquisition Compensation	Non-Acquisition Compensation
Mojave fringe-toed lizard <i>Uma scoparia</i>	<ol style="list-style-type: none"> 1. Habitat loss and fragmentation due to human activities and OHV use, including the development of solar farms. 2. Activities that impact windblown sand and habitat patches. 3. Stabilization of loose sand habitat. 4. Direct mortality, destruction of vegetation, tail loss, and hearing loss due to OHV use. 5. Increased predators associated with garbage dumps. 6. Climate change. <p>(Source: Thomson et al. 2013)</p>	Yes (90%); Specifically acquiring lands containing dune and sand transport systems that support MFTL within the reserve.	Yes (10%); eligible actions include: <ul style="list-style-type: none"> • Rectify obstructions to sand transport in Aeolian corridors and primary sand source areas. • Enhance or restore degraded habitat.
Tehachapi slender salamander <i>Batrachoseps stebbinsi</i>	<ol style="list-style-type: none"> 1. Residential and commercial development (current planned development – Tejon Ranch) is not expected to impact existing species occurrences but will impact potential habitat). 2. Flood control projects that alter mesic environment upon which species depends. 3. Livestock grazing (currently limited because cattle on existing allotments are limited in number and free range). 	Yes (90%); species is largely an avoidance species but acquisition for unavoidable impacts would be prioritized in locations in the Tehachapi area of the West Mojave and Eastern Slopes ecoregion subarea.	Yes (10%); eligible actions include: <ul style="list-style-type: none"> • Enhance or restore habitat by purchasing grazing rights and/or BLM grazing allotments and removing livestock. • Develop and implement an education program for landowners and visitors to prevent direct impacts to species and habitat.

Table H-10
Eligible Compensation Actions for Impacts to DRECP Covered Species

Common Name Scientific Name	Documented Stressors and Threats	Acquisition Compensation	Non-Acquisition Compensation
	4. Erosion from road runoff. 5. Mining. 6. Degradation of habitat from wild turkeys and pigs through scraping and rooting. 7. Increased human and predator presence as a result of development (reduced by nocturnal and subfossorial behavior). 8. Climate change. <i>(Source: 76 FR 62900–62926)</i>		
<i>Bird</i>			
Bendire’s thrasher <i>Toxostoma bendirei</i>	1. Housing and agricultural development of natural lands. 2. Periodic military operations in suitable habitat on military lands that destroy or degrade thrasher habitat. 3. Removal of habitat elements such as yucca and cholla. 4. Off-road vehicle use during the breeding season. 5. Stochastic events that can affect isolated populations. <i>(Source: Sterling 2008)</i>	Yes (90%); Bendire's thrasher is a wide-ranging species that occurs in scattered occurrences on both public and private lands throughout the Plan Area. Because loss of habitat due to development and agricultural development is the biggest threat to this species, acquisition or conservation easements to prevent that development would need to be the focus of compensation.	Yes (10%): eligible actions include: <ul style="list-style-type: none"> • Habitat enhancement

Table H-10
Eligible Compensation Actions for Impacts to DRECP Covered Species

Common Name Scientific Name	Documented Stressors and Threats	Acquisition Compensation	Non-Acquisition Compensation
Burrowing owl <i>Athene cunicularia</i>	<ol style="list-style-type: none"> 1. Urbanization of agricultural areas. 2. Changes in agricultural practices, including changes from low row-crops to vineyards and orchards, and fallowing fields. 3. Development of habitat. 4. Extermination of ground squirrels, especially California ground squirrel. 5. Deleterious farming practices, included disking, road and ditch maintenance, and lining earthen ditches. 6. Collisions with wind turbines and associated structures. Also collisions with solar power infrastructure. 7. Roads and car collisions. 8. Electric fences. 9. Pesticide use. 10. Disease, especially West Nile virus. <p>(Source: Gervais et al. 2008)</p>	<ul style="list-style-type: none"> • Yes (90%); acquire habitat through purchase or conservation easement and/or agricultural easements in agricultural lands and native habitat lands. 	Yes (10%); eligible actions include: <ul style="list-style-type: none"> • Develop and enter into easements and agreements with farmers to maintain owl populations through best management practices (BMPs). BMPs may include: <ul style="list-style-type: none"> ○ Eliminate the extermination of ground squirrels. ○ Secure water rights for agricultural areas. ○ Create owl-safe water conveyance structures, roadsides, and field margins. ○ Control vegetation structure through mowing, grazing, etc. ○ Install artificial burrows in burrow-deprived areas.
California black rail <i>Laterallus jamaicensis coturniculus</i>	<ol style="list-style-type: none"> 1. Habitat loss and degradation. 2. Changes in water regimes and flood control measures. 3. Canal lining. 	Yes (80%); species is largely an avoidance species but acquisition for unavoidable impacts would be prioritized within modeled suitable habitat.	Yes (20%); eligible actions include: <ul style="list-style-type: none"> • Habitat restoration and enhancement: <ul style="list-style-type: none"> ○ Construct additional habitat in proximity to an existing

Table H-10
Eligible Compensation Actions for Impacts to DRECP Covered Species

Common Name Scientific Name	Documented Stressors and Threats	Acquisition Compensation	Non-Acquisition Compensation
	4. Predation from mammals and other birds. 5. Chemical contamination. 6. Fires, controlled or not, during the prebasic molt period. <i>(Source: LCRMSCP 2013)</i>		federal or state wildlife refuge. Constructed habitat will be donated (with a management endowment) to the applicable wildlife refuge.
California condor <i>Gymnogyps californianus</i>	1. Lead poisoning. 2. Microtrash. 3. Collisions with power lines. 4. Poisoning, especially the residual effects of DDT. 5. Loss of habitat. 6. Illegal poaching and shooting. 7. Drowning. 8. Turbine strikes/collisions. 9. Nest and roost site disturbance. <i>(Source: USFWS 2013a; CDFW 2013a; Ventana Wildlife Society 2013)</i>	Yes (90%) acquire habitat through purchase or conservation easement in areas that are currently or expected to become high-use areas for condors.	Yes (10%); eligible actions include: <ul style="list-style-type: none"> • Funding condor recovery programs.
Gila woodpecker <i>Melanerpes uropygialis</i>	1. Loss of thick-trunked trees and snags in riparian forests and microphyll woodlands and agricultural/urban environments. 2. Competition for scarce nest cavities from non-native European starlings.	Yes (70%)	Yes (30%); eligible actions include: <ul style="list-style-type: none"> • Restore cottonwood-willow riparian habitat and microphyll woodlands. • Invasive species control in riparian habitat. • Purchase grazing rights and/or

Table H-10
Eligible Compensation Actions for Impacts to DRECP Covered Species

Common Name Scientific Name	Documented Stressors and Threats	Acquisition Compensation	Non-Acquisition Compensation
	<i>(Source: CDFG 1987; McCreedy 2008)</i>		BLM grazing allotments to manage grazing regimes to avoid overgrazing of riparian habitats or retire the areas. <ul style="list-style-type: none"> • Implement starling control programs where starling monitoring has shown nest competition impacting Gila woodpecker reproduction, similar to cowbird control programs. • Placement of “artificial” nesting snags in riparian woodlands and microphyll woodlands. • Outplanting of thick-boled native trees optimal for excavating nest cavities (<i>Washingtonia filifera</i> and <i>Brahea armata</i>) in riparian woodlands and rural and suburban hedgerows and parks. • Cowbird control programs.
Golden eagle <i>Aquila chrysaetos</i>	<ol style="list-style-type: none"> 1. Electrocution from power lines. 2. Degradation and loss of foraging and nesting habitat. 3. Lead poisoning. 4. Poisoning from pesticides, particularly rodenticides. 5. Collisions with man-made structures, 	Yes (30%); acquire habitat through purchase or conservation easement.	Yes (70%); eligible actions include: <ul style="list-style-type: none"> • Retrofitting power poles, beyond that already required, to make them eagle-safe. • Nesting and foraging habitat restoration and enhancement. • Roadside carcass removal to

Table H-10
Eligible Compensation Actions for Impacts to DRECP Covered Species

Common Name Scientific Name	Documented Stressors and Threats	Acquisition Compensation	Non-Acquisition Compensation
	particularly, wind turbines. <i>(Source: CDFW 2013b; USFWS 2009b)</i>		reduce vehicle collisions. • Reduce or eliminate mortality from existing wind facilities with ongoing take. • Reduce or eliminate activities that disturb breeding eagles at nest sites.
Greater sandhill crane <i>Grus canadensis tabida</i>	1. Loss of foraging and roosting habitat through unsound water management practices. 2. Roost site destruction through dredging, channelization, and other activities. <i>(Source: Brown et al. 1995)</i>	Yes (90%)	Yes (10%); eligible actions include: • Construct or enhance roosting areas in suitable locations. • Enhance foraging habitat through planting milo, corn and/or wheat as foraging crops on agricultural land reserves.
Least Bell's vireo <i>Vireo bellii pusillus</i>	1. Habitat loss and degradation due to: • Changes in water regimes and flood control measures due to damming of the Colorado River. • Reduction of normal small and moderate flooding events that create habitat. • Diversions and groundwater pumping. • Bank stabilization and channelization. • Removal or management of native riparian vegetation.	Yes (80%); species is largely an avoidance species but acquisition for unavoidable impacts would be prioritized within modeled suitable habitat.	Yes (20%); eligible actions include: • Fund non-native plant species removal (e.g., salt cedar, arundo, etc.) in conjunction with active riparian restoration efforts. • Fund brown-headed cowbird control programs. <i>(Source: USFWS 1998; LCRMSCP 2013)</i>

Table H-10
Eligible Compensation Actions for Impacts to DRECP Covered Species

Common Name Scientific Name	Documented Stressors and Threats	Acquisition Compensation	Non-Acquisition Compensation
	<ul style="list-style-type: none"> • Livestock grazing. • Alteration of habitat for recreation purposes. • Fires in already diminished habitat. • Agricultural development and replacement of native habitat on floodplains. • Urbanization, specifically: water control infrastructure, roads, increase of non-native species (including cats), water pollutants, and other waste. • Land use changes to agriculture and other human-dominated activities. <p>2. Habitat fragmentation and its effects:</p> <ul style="list-style-type: none"> • Loss of area-sensitive species reliant on large habitat patches. • Loss of larger species that previously occurred at low densities. • Increase of non-native or already common species. • Inbreeding depression. <p>3. Changes in predator-prey relationships.</p> <p>4. Exotic species, including:</p> <ul style="list-style-type: none"> • Non-native plants. • Brood parasitism from brown 		

Table H-10
Eligible Compensation Actions for Impacts to DRECP Covered Species

Common Name Scientific Name	Documented Stressors and Threats	Acquisition Compensation	Non-Acquisition Compensation
	headed cowbirds – species has increased with development. <ul style="list-style-type: none"> • Vulnerability of small populations in the form of demographic effects and genetic effects. 		
Mountain plover <i>Charadrius montanus</i>	<ol style="list-style-type: none"> 1. Conversion of high-quality habitat to lesser habitat, e.g., from native grasslands to wheat production. 2. Pesticide use. 3. Grassland management systems (tall grasses are not ideal habitat). 4. Changes in water conveyance, especially in the Imperial Valley. <p>(Source: <i>Hunting and Edson 2008</i>)</p>	Yes (90%); acquire habitat through purchase or conservation easement.	Yes (10%); eligible actions include: <ul style="list-style-type: none"> • Manage irrigated agriculture to maintain suitable habitat.
Swainson’s hawk <i>Buteo swainsoni</i>	<ol style="list-style-type: none"> 1. Loss of their native foraging and breeding grounds. 2. Loss of nesting and foraging grounds in agricultural lands through development or changes in agricultural practices. 3. Infrastructure placement. 4. Disease. 5. Pesticide poisoning. 6. Electrocutation. <p>(Source: <i>CDFW 2013c</i>)</p>	Yes (90%); acquire habitat through purchase or conservation easement and/or agricultural easements.	Yes (10%); eligible actions include: <ul style="list-style-type: none"> • Develop and enter into cooperative agreements with farmers to maintain hawk populations through BMPs. • Secure water rights for agricultural reserve areas to grow crops compatible with Swainson’s hawk. • Restore and enhance natural habitat, including Joshua tree habitat.

Table H-10
Eligible Compensation Actions for Impacts to DRECP Covered Species

Common Name Scientific Name	Documented Stressors and Threats	Acquisition Compensation	Non-Acquisition Compensation
Tricolored blackbird <i>Agelaius tricolor</i>	<ol style="list-style-type: none"> 1. Direct loss and degradation of habitat from human activities. 2. Urbanization of grasslands and pastures. 3. Change of agricultural practices from grains, silage, and grazing to row crops, orchards, and vineyards. 4. Destruction of colonies by harvesting and plowing of agricultural lands. 5. Colony predation by predators. 6. Water management and drawdown. 7. Poisons, contaminants, pesticides, and herbicides. <p>(Source: Beedy 2008)</p>	Yes (50%); species is largely an avoidance species but acquisition for unavoidable impacts would be prioritized within modeled suitable habitat.	Yes (50%); eligible actions include: <ul style="list-style-type: none"> • Enhance and restore nesting habitat near productive and protected foraging habitat, including promoting the growth of nesting substrate (armored plants) on protected lands. • Develop and enter into cooperative agreements with landowners to maintain/enhance suitable habitat.
Western yellow-billed cuckoo <i>Coccyzus americanus occidentalis</i>	<ol style="list-style-type: none"> 1. Habitat destruction, modification, and degradation from: <ul style="list-style-type: none"> • Dam construction and operations. • Surface and groundwater diversions. • Riverflow management. • Stream channelization and stabilization. • Replacement of native riparian deciduous trees by invasive Eurasian 	Yes (70%); species is largely an avoidance species but acquisition for unavoidable impacts would be prioritized within modeled suitable habitat; acquire habitat through purchase or conservation easement.	Yes (30%); eligible actions include: <ul style="list-style-type: none"> • Habitat restoration and enhancement, including: <ul style="list-style-type: none"> ○ Providing or restoring natural seasonal water flows. ○ Funding non-native plant species removal (e.g., salt cedar, arundo, etc.) in conjunction with active riparian restoration efforts.

Table H-10
Eligible Compensation Actions for Impacts to DRECP Covered Species

Common Name Scientific Name	Documented Stressors and Threats	Acquisition Compensation	Non-Acquisition Compensation
	<p>salt-cedar (tamarisk) trees.</p> <ul style="list-style-type: none"> • Conversion to agricultural uses, such as crops and livestock grazing. • Urban and transportation infrastructure. • Gravel mining. • Increased incidence of wildfire. • Habitat loss and degradation due to conversion to non-native vegetation. • Habitat fragmentation. <p><i>(Source: 78 FR 78321–78322)</i></p>		<p>Recovery actions from: Species Accounts for the Lower Colorado River Multi-Species Conservation Program.</p>
<p>Willow flycatcher (including southwestern) <i>Empidonax traillii</i> (including <i>extimus</i>)</p>	<p>1. Habitat loss and degradation due to:</p> <ul style="list-style-type: none"> • Changes in water regimes and flood control measures due to damming of the Colorado River. • Reduction of normal small and moderate flooding events that create habitat. • Diversions and groundwater pumping. • Bank stabilization and channelization. • Removal or management of native riparian vegetation. • Livestock grazing. 	<p>Yes (80%); species is largely an avoidance species but acquisition for unavoidable impacts would be prioritized within modeled suitable habitat; protect and manage breeding sites and occupied habitat.</p>	<p>Yes (20%); eligible actions include:</p> <ul style="list-style-type: none"> • Funding non-native plant species removal (e.g., salt cedar, arundo, etc.) in conjunction with active riparian restoration efforts. • Funding brown-headed cowbird control programs.

Table H-10
Eligible Compensation Actions for Impacts to DRECP Covered Species

Common Name Scientific Name	Documented Stressors and Threats	Acquisition Compensation	Non-Acquisition Compensation
	<ul style="list-style-type: none"> • Alteration of habitat for recreation purposes. • Fires in already diminished habitat. • Agricultural development and replacement of native habitat on floodplains. • Urbanization, specifically: water control infrastructure, roads, increase of non-native species (including cats), water pollutants, and other waste. • Land use changes to agriculture and other human-dominated activities. <p>2. Exotic species, including:</p> <ul style="list-style-type: none"> • Non-native plants. • Brood parasitism from brown headed cowbirds – species has increased with development. <p>3. Vulnerability of small populations in the form of demographic effects and genetic effects.</p> <p>4. Migration and winter range stress.</p> <p><i>(Source: USFWS 2002; LCRMSCP 2013)</i></p>		
Yuma clapper rail <i>Rallus longirostris yumanensis</i>	<p>1. Habitat loss and degradation due to:</p> <ul style="list-style-type: none"> • Changes in water regimes and flood control measures due to damming of the Colorado River. 	Yes (50%); species is largely an avoidance species but acquisition for unavoidable impacts would be prioritized within modeled suitable habitat.	Yes (50%); eligible actions include: <ul style="list-style-type: none"> • Habitat restoration and enhancement: <ul style="list-style-type: none"> ○ Additional habitat could be constructed (cattail-

Table H-10
Eligible Compensation Actions for Impacts to DRECP Covered Species

Common Name Scientific Name	Documented Stressors and Threats	Acquisition Compensation	Non-Acquisition Compensation
	<ul style="list-style-type: none"> • Reduction of normal small and moderate flooding events that create habitat. • Canal lining and channelization. • Water availability at existing marshes. • Land use changes to agriculture and other human-dominated activities. <p>2. Human activities and disturbance, including:</p> <ul style="list-style-type: none"> • Noise from vehicles and human activity. • Artificial lights. • Residential, recreational, and commercial development. • Wildfires or timing of controlled burns. <p><i>(Source USFWS 2009c; LCRMSCP 2013)</i></p>		<p>dominated marsh shallows) in proximity to an existing federal or state wildlife refuge. Constructed habitat would be donated (with a management endowment) to the applicable wildlife refuge.</p> <ul style="list-style-type: none"> ○ Acquiring/securing water rights for Sony Bono Salton Sea National Wildlife Refuge and turning over to USFWS. ○ Acquiring/securing water rights for Imperial State Wildlife Area at Salton Sea and turning over to CDFW. <ul style="list-style-type: none"> • Priority 2 Non-Acquisition: management action to maintain rail habitat in suitable conditions.
<i>Fish</i>			
Desert pupfish <i>Cyprinodon macularius</i>	<ol style="list-style-type: none"> 1. Declining freshwater inflows to irrigation drains and the Salton Sea due to water transfer agreements. 2. Groundwater extraction resulting in higher concentrations of salts, toxic contaminants, and sediment and lower amounts of dissolved oxygen. 	Yes (30%)	Yes (70%); eligible actions include: <ul style="list-style-type: none"> • Contribute to the restoration pupfish habitat in San Felipe Creek and Salt Creek Watersheds. • Contribute to the creation of shallow saline habitats within the exposed playa around the

Table H-10
Eligible Compensation Actions for Impacts to DRECP Covered Species

Common Name Scientific Name	Documented Stressors and Threats	Acquisition Compensation	Non-Acquisition Compensation
	3. Environmental contaminants, such as heavy metals and organochlorines from irrigation ditches entering Salton Sea. 4. Parasites and predation and competition from non-native fish. 5. Control activities for the exotic weed <i>Hydrilla</i> . <i>(Source: USFWS 2010)</i>		Salton Sea. • Purchase BLM grazing allotments to manage the allotments for the benefit of the pupfish or retire the allotment. • Restoration of the Salton Sea ecosystems.
Mohave tui chub <i>Siphateles (Gila) bicolor mohavensis</i>	1. Loss of open water due to vegetation growth, especially cattails. 2. Loss of habitat due to damming and diversion of water flow and overdrafting of aquifers. 3. Predation by and competition with introduced aquatic species, especially mosquitofish. 4. Hybridization with introduced arroyo chub. 5. Genetic drift. <i>(Source: USFWS 2009d)</i>	No (known from refugia only); no take anticipated.	Yes; eligible actions include: • Create, restore, and enhance suitable refugia for species, controlling water quality and quantity.
Owens pupfish <i>Cyprinodon radiosus</i>	1. Water diversion projects (historic). 2. Emergent vegetation encroachment, especially cattails,	Yes (20%); species is largely an avoidance species but acquisition for unavoidable impacts would be prioritized within or adjacent to	Yes (80%); eligible actions include: • Restore and enhance habitat: ○ Restoration of aquatic habitat

Table H-10
Eligible Compensation Actions for Impacts to DRECP Covered Species

Common Name Scientific Name	Documented Stressors and Threats	Acquisition Compensation	Non-Acquisition Compensation
	<p>which eliminates breeding substrate, reduces water depth, elevates water temperature, and can result in severe anoxic conditions.</p> <ol style="list-style-type: none"> 3. Predation by non-native predators (often introduced by local residents as bait and sport fish). 4. Genetic drift. 5. Low population numbers. <p>(Source: USFWS 2009e)</p>	<p>occupied locations. Acquisitions and conservation easements should focus on those areas identified in the BGOs for this species.</p>	<p>and reintroduction of this species at the specific locations identified in the BGOs. Some of these sites are private lands and others are BLM, Los Angeles Department of Water and Power (LADWP), or other government entity lands.</p> <ul style="list-style-type: none"> ○ Remove cattails and other emergent vegetation from habitat. ○ Eradicate non-native predators from habitat. ○ Prevent introduction of non-native predators into existing habitat. ○ Install and maintain screens to prevent migration of non-native predators into habitat.
<p>Owens tui chub <i>Siphateles (Gila) bicolor snyderi</i></p>	<ol style="list-style-type: none"> 1. Habitat destruction and modification due to diversions and impoundments to surface water and diversion of groundwater, which feeds water to springs. 2. Excessive emergent vegetation, especially cattails, resulting in conversion of aquatic to upland 	<p>Yes (20%); species is largely an avoidance species but acquisition for unavoidable impacts would be prioritized within or adjacent to occupied locations. Acquisitions and conservation easements should focus on those areas identified in the BGOs for this species.</p>	<p>Yes (80%); eligible actions include:</p> <ul style="list-style-type: none"> ● Restore and enhance habitat: <ul style="list-style-type: none"> ○ Restoration of aquatic habitat and reintroduction of this species at the specific locations identified in the BGOs. Some of these sites are private lands and others are BLM, LADWP, or other

Table H-10
Eligible Compensation Actions for Impacts to DRECP Covered Species

Common Name Scientific Name	Documented Stressors and Threats	Acquisition Compensation	Non-Acquisition Compensation
	<p>habitat and protection of non-native predators such as bullfrogs and crayfish.</p> <p>3. Failure of structures supporting habitat (such as clogging of pipes delivering water to habitats and failure of a beaver dam).</p> <p>4. Predation by non-native aquatic predators.</p> <p>5. Hybridization with Lahontan tui chub.</p> <p>6. Stochasticity.</p> <p><i>(Source: USFWS 2009f)</i></p>		<p>government entity lands.</p> <ul style="list-style-type: none"> ○ Remove cattails and other emergent vegetation from habitat. ○ Eradicate non-native predators from habitat. ○ Prevent introduction of non-native predators into existing habitat. ○ Install and maintain screens to prevent migration of non-native predators into habitat.
<i>Mammals</i>			
<p>Desert Bighorn sheep <i>Ovis canadensis nelsoni</i></p>	<ol style="list-style-type: none"> 1. Exposure to disease brought about by contact with domestic sheep and other livestock. 2. Loss of lambing habitat, Inter Mountain and Mountain Habitats and habitat fragmentation resulting in loss of genetic diversity, which can reduce genetic variability and increase vulnerability to stressors. 3. Predation by mountain lions. 4. Droughts, which impact forage. 5. Competition for or loss of 	<p>Yes (20%); priority acquisition targets include inholdings within public lands of the reserve design known to support bighorn sheep or important to the movement of bighorn sheep.</p>	<p>Yes (80%); eligible actions include:</p> <ul style="list-style-type: none"> • On private land, purchase grazing rights to eliminate sheep from bighorn sheep population areas. • On BLM land, purchase grazing allotments for retirement or sheep-friendly management. • Fund, establish, and maintain guzzlers (aboveground water catchments) with escape routes. • Fund and implement education program to minimize

Table H-10
Eligible Compensation Actions for Impacts to DRECP Covered Species

Common Name Scientific Name	Documented Stressors and Threats	Acquisition Compensation	Non-Acquisition Compensation
	surface water. 6. Negative interactions with humans and pets. 7. Changes in habitat due to fire suppression. 8. Invasion of exotics such as tamarisk, which consumes surface water, and oleander and laurel cherry, which can poison sheep. <i>(Source: Wehausen 2005; Dudek 2014; Epps et al. 2005)</i>		interactions between humans and bighorn sheep. • Develop and implement cooperative agreements with private landowners to seasonally close bighorn sheep watering areas from human use. • Control invasive exotic trees/shrubs within bighorn sheep habitat. • Fund and construct wildlife crossings over highway infrastructure.
California leaf-nosed bat <i>Macrotus californicus</i>	1. Roosting habitat disturbance through new mining, mine closures, or military or recreational activities (species forms large but few roosting sites). 2. Suburban/urban expansion. 3. Destruction of foraging habitat, especially within 5 miles of known roosts. 4. Wind renewable energy projects (possible). <i>(Source: Pierson and Rainey 1998a; Dudek 2014; BLM 2005)</i>	Yes (70%)	Yes (30%); eligible actions include: • Protect significant roosts by restricting human access to mines by funding gating and/or fencing that does not block bat access around abandoned mine features.

Table H-10
Eligible Compensation Actions for Impacts to DRECP Covered Species

Common Name Scientific Name	Documented Stressors and Threats	Acquisition Compensation	Non-Acquisition Compensation
Mohave ground squirrel <i>Xerospermophilus mohavensis</i>	1. Habitat destruction, degradation, and fragmentation from development. 2. Land use disturbance to habitat (agriculture, OHV use, mining, grazing, and military operations). 3. Competition. 4. Direct mortality from vehicle strikes and human activities. 5. Predation. 6. Climate change impacts (drought, loss of habitat, species re-distribution, introduction of invasive species and/or disease vectors, and extreme climatic events). (Source: CDFW 2013d; 76 FR 62214–62258)	Yes (90%)	Yes (10%); eligible actions include: <ul style="list-style-type: none"> • Maintain and enhance habitat conditions and function in population centers and linkages through public education and outreach. • Invasive species control.
Pallid bat <i>Antrozous pallidus</i>	1. Eradication by pest control and vandals. 2. Loss of foraging habitat. 3. Mine closures. 4. Timber harvest. 5. Bridge replacements and improvements. 6. Cliff blasting for road construction. 7. Inundations for water	Yes (70%)	Yes (30%); eligible actions include: <ul style="list-style-type: none"> • Protect significant roosts by restricting human access to mines by funding gating and/or fencing that does not block bat access around abandoned mine features.

Table H-10
Eligible Compensation Actions for Impacts to DRECP Covered Species

Common Name Scientific Name	Documented Stressors and Threats	Acquisition Compensation	Non-Acquisition Compensation
	impoundment. 8. Rock climbing. 9. Pesticide spraying (possible). 10. Mortality at wind energy facilities and solar projects (possible). <i>(Source: Johnston et al. 2013; Dudek 2014)</i>		
Townsend's big-eared bat <i>Corynorhinus townsendii</i>	1. Roosting habitat disturbance through new mining, mine closures, or military or recreational activities (species forms large but few roosting sites and is very sensitive to disturbance). 2. Mining activities (such as cyanide ponds near roosts). 3. Destruction of foraging habitat. 4. Agricultural activities (such as spraying for pests and grazing, which reduce bat foraging opportunities). 5. Wind renewable energy projects and solar projects (possible). <i>(Source: Pierson and Rainey 1998b; Dudek 2014)</i>	Yes (70%)	Yes (30%); eligible actions include: <ul style="list-style-type: none"> • Protect significant roosts by restricting human access to mines by funding gating and/or fencing that does not block bat access at abandoned mine features.

Table H-10
Eligible Compensation Actions for Impacts to DRECP Covered Species

Common Name Scientific Name	Documented Stressors and Threats	Acquisition Compensation	Non-Acquisition Compensation
<p><i>Plants</i></p> <p><i>DRECP CMAs require surveys and avoidance of all plant Covered Species occurrences; therefore, compensation would be necessary only for unavoidable impacts where acquisition and non-acquisition actions must directly benefit the plant species.</i></p>			
Alkali mariposa lily <i>Calochortus striatus</i>	<ol style="list-style-type: none"> 1. Water diversions that result in lowering of the water table. 2. Grazing/trampling by cattle. 3. Urbanization. 4. Road construction. <p><i>(CNPS 2013; Green and Sanders 2006a)</i></p>	The conservation strategy for plant Covered Species is to protect, avoid, and restore known occupied sites. Avoidance and minimization CMAs require plant surveys for all Covered Activities to identify occupied sites and avoidance with setbacks of occupied sites. Compensation for unavoidable impacts to plant Covered Species would include acquisition or non-acquisition actions that directly benefit known occupied habitat for the species.	
Bakersfield cactus <i>Opuntia basilaris</i> var. <i>treleasei</i>	<ol style="list-style-type: none"> 1. Loss of habitat. 2. Degradation of habitat from land uses (such as OHV and mining). 3. High density of invasive grasses (which causes competition, fire, and insect or moisture damage). 4. Overgrazing. 5. Flooding. 6. Herbicidal agents (such as in dust palliatives) and pesticide drift. 7. Reduction of pollinators (such as excessive bee extirpation) and lack of genetic diversity. <p><i>(Source: CSU Stanislaus ESRP 2006)</i></p>	The conservation strategy for plant Covered Species is to protect, avoid, and restore known occupied sites. Avoidance and minimization CMAs require plant surveys for all Covered Activities to identify occupied sites and avoidance with setbacks of occupied sites. Compensation for unavoidable impacts to plant Covered Species would include acquisition or non-acquisition actions that directly benefit known occupied habitat for the species.	

Table H-10
Eligible Compensation Actions for Impacts to DRECP Covered Species

Common Name Scientific Name	Documented Stressors and Threats	Acquisition Compensation	Non-Acquisition Compensation
Barstow woolly sunflower <i>Eriophyllum mohavense</i>	<ol style="list-style-type: none"> 1. Habitat loss. 2. Grazing. 3. Energy development. 4. Road improvements. 5. OHV. 6. Mining. <p>(Source: BLM 2005; CNPS 2013)</p>	The conservation strategy for plant Covered Species is to protect, avoid, and restore known occupied sites. Avoidance and minimization CMAs require plant surveys for all Covered Activities to identify occupied sites and avoidance with setbacks of occupied sites. Compensation for unavoidable impacts to plant Covered Species would include acquisition or non-acquisition actions that directly benefit known occupied habitat for the species.	
Desert cymopterus <i>Cymopterus deserticola</i>	<ol style="list-style-type: none"> 1. Military activities. 2. Road improvements. 3. OHV usage. 4. Grazing. <p>(Source: 69 FR 64884–64889)</p>	The conservation strategy for plant Covered Species is to protect, avoid, and restore known occupied sites. Avoidance and minimization CMAs require plant surveys for all Covered Activities to identify occupied sites and avoidance with setbacks of occupied sites. Compensation for unavoidable impacts to plant Covered Species would include acquisition or non-acquisition actions that directly benefit known occupied habitat for the species.	
Little San Bernardino Mountains linanthus <i>Linanthus maculatus</i>	<ol style="list-style-type: none"> 1. Development. 2. OHV usage. 3. Flood control maintenance. <p>(Source: CVAG 2006; CNPS 2013)</p>	The conservation strategy for plant Covered Species is to protect, avoid, and restore known occupied sites. Avoidance and minimization CMAs require plant surveys for all Covered Activities to identify occupied sites and avoidance with setbacks of occupied sites. Compensation for unavoidable impacts to plant Covered Species would include acquisition or non-acquisition actions that directly benefit known occupied habitat for the species.	
Mojave monkeyflower <i>Mimulus mohavensis</i>	<ol style="list-style-type: none"> 1. Development (including solar and wind energy projects and urbanization). 2. OHV usage. 3. Road improvements. 	The conservation strategy for plant Covered Species is to protect, avoid, and restore known occupied sites. Avoidance and minimization CMAs require plant surveys for all Covered Activities to identify occupied sites and avoidance with setbacks of occupied sites. Compensation for unavoidable impacts to plant Covered Species would include acquisition or non-acquisition actions that directly benefit known occupied habitat for the species.	

Table H-10
Eligible Compensation Actions for Impacts to DRECP Covered Species

Common Name Scientific Name	Documented Stressors and Threats	Acquisition Compensation	Non-Acquisition Compensation
	4. Grazing. 5. Mining. <i>(Source: MacKay 2006a; CNPS 2013)</i>		
Mojave tarplant <i>Deinandra mohavensis</i>	1. Development. 2. OHV usage. 3. Grazing. 4. Hydrologic alterations. 5. Road maintenance. <i>(Source: Sanders 2006; CNPS 2013)</i>	The conservation strategy for plant Covered Species is to protect, avoid, and restore known occupied sites. Avoidance and minimization CMAs require plant surveys for all Covered Activities to identify occupied sites and avoidance with setbacks of occupied sites. Compensation for unavoidable impacts to plant Covered Species would include acquisition or non-acquisition actions that directly benefit known occupied habitat for the species.	
Owens Valley checkerbloom <i>Sidalcea covillei</i>	1. Groundwater pumping and diversion. 2. Low annual precipitation. 3. Improper timing and intensity of cattle grazing. 4. Increased competition by upland shrubs and rhizomatous grass species (meadow succession). <i>(Source: Halford 1994)</i>	The conservation strategy for plant Covered Species is to protect, avoid, and restore known occupied sites. Avoidance and minimization CMAs require plant surveys for all Covered Activities to identify occupied sites and avoidance with setbacks of occupied sites. Compensation for unavoidable impacts to plant Covered Species would include acquisition or non-acquisition actions that directly benefit known occupied habitat for the species.	
Parish's daisy <i>Erigeron parishii</i>	1. Mining, through removal of mined materials, disposal of overburden, and road construction, as well as creation of dust that can alter soil chemistry and light availability and limit seed germination.	The conservation strategy for plant Covered Species is to protect, avoid, and restore known occupied sites. Avoidance and minimization CMAs require plant surveys for all Covered Activities to identify occupied sites and avoidance with setbacks of occupied sites. Compensation for unavoidable impacts to plant Covered Species would include acquisition or non-acquisition actions that directly benefit known occupied habitat for the species.	

Table H-10
Eligible Compensation Actions for Impacts to DRECP Covered Species

Common Name Scientific Name	Documented Stressors and Threats	Acquisition Compensation	Non-Acquisition Compensation
	2. OHV usage. 3. Energy development activities (a 115 kV power line through Cushenbury Canyon). <i>(Source: USFWS 2009h; Olsen 2003)</i>		
Triple-ribbed milk-vetch <i>Astragalus tricarinatus</i>	1. Maintenance activities for a crude oil pipeline in Big Morongo Canyon. 2. Wildland fires and suppression activities. 3. Illegal OHV use in canyons. 4. Residential development. 5. Vulnerabilities of small populations, such as risk of loss of significant portion of population from pipeline break, climate change, or large flood events. <i>(Source: USFWS 2009i)</i>	The conservation strategy for plant Covered Species is to protect, avoid, and restore known occupied sites. Avoidance and minimization CMAs require plant surveys for all Covered Activities to identify occupied sites and avoidance with setbacks of occupied sites. Compensation for unavoidable impacts to plant Covered Species would include acquisition or non-acquisition actions that directly benefit known occupied habitat for the species.	

H.4.3.1 Acquisition

Land acquisition is a key element of the DRECP conservation strategy. Acquisitions should significantly contribute to the reserve design with regard to protecting existing important resources and managing the resources in perpetuity. The DRECP Coordination Group(s) will determine the lands most suitable for acquisition based on a variety of factors, including existing biological value, future value with management (including creation, restoration and enhancement), and practical considerations, such as availability (i.e., willing sellers) and cost, as described in the criteria for land acquisition in the implementation section of Volume II (Section II.3.1.5). All land acquisitions from private property owners will be from willing sellers and private property rights shall be fully respected. The following discusses these factors in more detail.

H.4.3.2 Non-Acquisition

Non-Acquisition Compensation for Desert Tortoise

Compensation within desert tortoise important areas would follow recommendations by Darst et al. (2013) based on a Spatial Decision Support System (SDSS). The SDSS would be used to calculate “acquisition-based” management action mitigation ratios that have equivalent conservation value to land acquisition in decreasing threats to desert tortoise, thus providing a menu of accepted non-acquisition compensation measures. The effects of threats are modeled as the contribution of the threat to population changes. The management action compensation ratios are based on the effectiveness of different recovery actions that were identified in the Recovery Plan (USFWS 2011) to reduce or suppress the threat(s). The effectiveness of a management action is quantified as an effectiveness weight, where an action with a weight of 1.0 would completely eliminate the threat mechanism (i.e., 100% effective), a weight of 0.5 would reduce the threat by 50%, etc. The effectiveness weights were estimated by expert assessments (see Darst et al. 2013 for greater detail on the weighting method). Additionally, the management action compensation ratios are calibrated for the three recovery units in the DRECP area, recognizing that the threats and the management actions that reduce the threats differ somewhat in the different recovery units.

The SDSS calculated compensation ratios for six actions:

1. Focus land acquisition in areas that would connect functional habitat or improve management capability of surrounding areas.
2. Install and maintain fencing and signs around tortoise conservation areas, marking boundaries of particularly sensitive or heavily impacted areas to regulate authorized use and discourage unauthorized use.

3. Install and maintain desert tortoise highway fencing to eliminate tortoise road mortality, with the installation of culverts to ensure connectivity where appropriate.
4. Restore desert tortoise habitat in areas previously damaged by grazing, fire, or off-highway vehicles.
5. Relinquish grazing allotments within desert tortoise habitat.
6. Increase law enforcement dedicated to reducing threats to the tortoise within Desert Wildlife Management Areas.

Compensation ratios were calculated separately for each of the three recovery units: (1) West Mojave Recovery Unit, (2) a small piece of the East Mojave Recovery Unit, and (3) Colorado Desert Recovery Unit (USFWS 2011). The compensation ratios for actions 1 through 5 are summarized in Table H-11 and expressed in the ratio to 100 acres of land acquisition. For example, in the West Mojave Recovery Unit, 1 mile of installation and maintenance of fencing of sensitive areas in a Desert Wildlife Management Area (DWMA) is equivalent to 100 acres of land acquisition. In the Colorado Desert Recovery Unit, 3 miles of fencing would be equivalent to 100 acres of acquisition. The ratios in Table H-11 assume that all compensation will take place in the same recovery unit as where the impacts occur. Because there is some uncertainty in the SDSS input factors, especially in relation to spatial variation in the recovery action's effectiveness, the ratios in Table H-11 reflect average effectiveness for the action across the entire recovery unit.

Table H-11
Compensation Ratio for Non-Acquisition Actions Compared to Acquisition for Desert Tortoise

Action	Action Area	Unit	Ratio to Land Acquisition (Variance Ratio)		
			West Mojave Recovery Unit	East Mojave Recovery Unit	Colorado Desert Recovery Unit
Land acquisition of tortoise habitat to facilitate recovery, focusing on particularly sensitive areas that would connect functional habitat or improve management capability of the surrounding area.	Any privately held lands within the DRECP reserve area.	Acres	100	100	100
Installation and maintenance of fencing and signs around tortoise conservation areas, marking boundaries of particularly sensitive or heavily impacted areas.	Around any BLM LUPA Conservation Designation, Joshua Tree National Park, or Mojave National Preserve.	Miles	1 (1-3)	3 (1-5)	3 (1-4)
Installation and maintenance of desert tortoise highway fencing with culverts where appropriate.	Along either side of any paved road within the DRECP reserve area.	Miles	10 (9-17)	7 (3-13)	2 (1-3)
Restoration of desert tortoise habitat in areas previously damaged by grazing, fire, or off-highway vehicles.	Within any closed grazing allotment, previously burned area, or any area damaged by motor vehicles off route within the DRECP reserve area on lands that are conserved.	Acres	395 (246-997)	798 (243-2,381)	335 (116-1,029)
Relinquishment of grazing allotments within desert tortoise habitat.	Within any BLM LUPA Conservation Designation within the DRECP reserve area.	Acres	560 (510-977)	662 (216-1,361)	121 (67-463)

To provide more spatial precision in effectiveness, Darst et al. (2013) categorizes areas where recovery actions could be implemented in the DRECP reserve into 10% intervals (i.e., 90%–100%, 80%–89%, etc.) based on 100-m² area cells and assumes that recovery actions would not be implemented in areas that score below the 50th percentile. Based on the top 50%, Darst et al. (2013) state a variance for each ratio within each recovery unit, shown in parentheses in Table H-11 and recommends that land managers locate recovery actions where they would have the highest possible effectiveness.

Non-Acquisition Compensation for Other Covered Species

Eligible non-acquisition compensation actions for other Covered Species are listed for each species in Table H-10. The conversion from the acquisition-based compensation requirements (Tables H-7) to the equivalent non-acquisition compensation would be determined on a project-by-project basis by the DRECP Coordination Group(s).

H.5 Literature Cited

- 69 FR 64884–64889. Notice of 12-month petition finding: “Endangered and Threatened Wildlife and Plants; 12-Month Finding for a Petition to List *Cymopterus deserticola* (Desert Cymopterus) as Endangered.” November 9, 2004.
- 76 FR 62214–62258. Notice of 12-month petition finding: “Endangered and Threatened Wildlife and Plants; 12-Month Finding on a Petition To List the Mohave Ground Squirrel as Endangered or Threatened.” October 6, 2011.
- 76 FR 62900–62926. Proposed rule: “Endangered and Threatened Wildlife and Plants; 12-Month Finding on a Petition To List the Tehachapi Slender Salamander as Endangered or Threatened.” October 11, 2011.
- 78 FR 78321–78322. Proposed rule: “Endangered and Threatened Wildlife and Plants; Proposed Threatened Status for the Western Distinct Population Segment of the Yellow-Billed Cuckoo (*Coccyzus americanus*).” December 26, 2013.
- Bechard, Marc J., C. Stuart Houston, Jose H. Sarasola and A. Sidney England. 2010. “Swainson's Hawk (*Buteo swainsoni*),” The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/265>.
- Beedy, Edward C. and William J. Hamilton, Iii. 1999. Tricolored Blackbird (*Agelaius tricolor*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/423>.

- Beedy, E. 2008. "Tricolored Blackbird (*Agelaius tricolor*)." In *California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California*, edited by W.D. Shuford and T. Gardali, 437–443. Studies of Western Birds, no. 1. California: Western Field Ornithologists (Camarillo), and California Department of Fish and Game (Sacramento).
- BLM. 2005. *Final Environmental Impact Report and Statement for the West Mojave Plan, A Habitat Conservation Plan and California Desert Conservation Area Plan Amendment*. Moreno Valley, California: U.S. Department of the Interior, Bureau of Land Management, California Desert District.
- BLM and USFWS. 2010. *Memorandum of Understanding between the U.S. Department of the Interior Bureau of Land Management and the U.S. Fish and Wildlife Service To Promote the Conservation of Migratory Birds*. April 12, 2010.
- Brown, D.E., D. Bunnell, G. Herron, C.D. Littlefield, D.L. Perkins, R.W. Schlorff, R. VanderBerge, P. Smith, T. Aldrich, R.W. Schlorff, P. Bradley, and G. Will. 1995. *Pacific Flyway Management Plan for the Greater Sandhill Crane Population Wintering along the Lower Colorado River Valley*. Prepared for the Pacific Flyway Council, U.S. Fish and Wildlife Service). March 1983; revised May 1989; revised March 1995. Accessed October 2013. http://pacificflyway.gov/Documents/Gsclcrv_plan.pdf.
- Cardiff, S.W. 1980. "Status and Distribution of Elf Owls in California, 1979." Sacramento, California: California Department of Fish and Game. Project E-W-3, Job IV-1.0. January 1980.
- CDFG (California Department of Fish and Game). 1987. California Endangered Species Act Petition.
- CDFW (California Department of Fish and Wildlife). 2013a. "California Condor." Threatened and Endangered Species. Accessed October 2013. http://www.dfg.ca.gov/wildlife/nongame/t_e_spp/condor/.
- CDFW. 2013b. "Golden Eagles in California." Accessed October 2013. <http://www.dfg.ca.gov/wildlife/nongame/raptors/goldeneagle/>.
- CDFW. 2013c. "Swainson's Hawks in California." Accessed October 2013. <http://www.dfg.ca.gov/wildlife/nongame/raptors/swha/>.
- CDFW. 2013d, in progress. *Draft Mohave Ground Squirrel Conservation Strategy*.

- Celentano, R.R., and J.R. Garcia. 1984. *Burro Deer Herd Management Plan*. California Department of Fish and Game. Accessed October 2013. <https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=45017>.
- Center for Biological Diversity. 2013. *A Petition to List the Desert Kit Fox (Vulpes macrotis arsipus) as Threatened under the California Endangered Species Act*. Submitted to the California Department of Fish and Wildlife. March 10, 2013. Accessed October 2013. http://www.biologicaldiversity.org/species/mammals/desert_kit_fox/pdfs/Desert-kit-fox-CESA-petition-3-10-13.pdf.
- Conroy and Lidicker. 2013, unpublished. *Terrestrial Mammal Species of Special Concern in California*, edited by W. Spencer and J.A. Stallcup. Draft. California Department of Fish and Wildlife.
- CNPS (California Native Plant Society). 2013. *Rare and Endangered Plant Inventory*. Accessed October 2013. <http://www.rareplants.cnps.org/detail/53.html>.
- CSU Stanislaus ESRP (California State University Stanislaus Endangered Species Recovery Program). 2006. "Bakersfield Cactus (*Opuntia basilaris* var. *treleasei*)." In *Recovery Plan for Upland Species of the San Joaquin Valley, California*. Portland, Oregon: Region 1, U.S. Fish and Wildlife Service.
- CVAG (Coachella Valley Association of Governments). 2006. *Final Coachella Valley Multiple Species Habitat Conservation Plan and Natural Communities Conservation Plan*. February 2006. Accessed October 2013. <http://www.cvmshcp.org/Plan Documents.htm>.
- Darst, C., P.J. Murphy, N.W. Strout, S.P. Campbell, K.J. Field, L. Allison, R.C. Averill-Murray. 2013. "A Strategy for Prioritizing Threats and Recovery Actions for At-Risk Species." *Environmental Management* 51:786–800. doi: 10.1007/s00267-012-0007-3.
- Dudek. 2014. *Desert Renewable Energy Conservation Plan (DRECP) Baseline Biology Report*. Prepared for the California Energy Commission, under contract to Aspen Environmental Group. Encinitas, California: Dudek. February 2014.
- Eddleman, W. R., R. E. Flores and M. Legare. 1994. Black Rail (*Laterallus jamaicensis*), *The Birds of North America Online* (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/123>.
- Edwards, Holly H. and Gary D. Schnell. 2000. Gila Woodpecker (*Melanerpes uropygialis*), *The Birds of North America Online* (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/532>.

- England, A. S. and W. F. Laudenslayer, Jr. 1993. Bendire's Thrasher (*Toxostoma bendirei*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/071>.
- Epps, C.W., V.C. Bleich, J.D. Wehausen, and S.G. Torres. 2005. "Status of Bighorn Sheep in California." *Desert Bighorn Council Transactions* 47:20–35.
- Gervais, J.A., D.K. Rosenberg, and L.A. Comrack. 2008. "Burrowing Owl (*Athene cunicularia*)." In *California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California*, edited by W.D. Shuford and T. Gardali, 311–315. Studies of Western Birds, no. 1. California: Western Field Ornithologists (Camarillo), and California Department of Fish and Game (Sacramento).
- Green, J.A., and A.C. Sanders. 2006a. "Alkali Mariposa Lily (*Calochortus striatus*)." Species account for the West Mojave Plan. Accessed October 2013. http://www.blm.gov/pgdata/etc/medialib/blm/ca/pdf/pdfs/cdd_pdfs.Par.9e181d28.File.pdf/alklily1.PDF.
- Green, J.A., and A.C. Sanders. 2006b. "Parish's Alkali Grass (*Puccinellia parishii*)." Species account for the West Mojave Plan. Accessed October 2013. http://www.blm.gov/pgdata/etc/medialib/blm/ca/pdf/pdfs/cdd_pdfs.Par.a91c678c.File.pdf/parishalkgrass1.PDF.
- Halford, A. 1994. *Preliminary Biological Monitoring Report for Sidalcea covillei*. August 15, 1994. Accessed October 2013. <https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=3180>.
- Hughes, Janice M. 1999. Yellow-billed Cuckoo (*Coccyzus americanus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/035>.
- Hunting, K., and L. Edson. 2008. "Mountain Plover (*Charadrius montanus*)." In *California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California*, edited by W.D. Shuford and T. Gardali, 180–186. Studies of Western Birds, no. 1. California: Western Field Ornithologists (Camarillo), and California Department of Fish and Game (Sacramento).
- Johnston et al. 2013, unpublished. *Terrestrial Mammal Species of Special Concern in California*, edited by W. Spencer and J.A. Stallcup. Draft. California Department of Fish and Wildlife.

- Knopf, Fritz L. and M. B. Wunder. 2006. Mountain Plover (*Charadrius montanus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/211>.
- Kus, Barbara, Steven L. Hopp, R. Roy Johnson and Bryan T. Brown. 2010. Bell's Vireo (*Vireo bellii*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/035>.
- Laabs, D. 2005. "Mojave River Vole (*Microtus californicus mohavensis*).” Species account for the West Mojave Plan. Accessed October 2013. http://www.blm.gov/pgdata/etc/medialib/blm/ca/pdf/pdfs/cdd_pdfs.Par.af470143.File.pdf/mvole1.PDF.
- LCRMSCP (Lower Colorado River Multi-Species Conservation Program). 2013. "LCR MSCP Species: Covered and Evaluation Species.” Accessed October 2013. http://www.lcrmSCP.gov/covered_species.html.
- Leitner, P. 2008. "Current Status of the Mohave Ground Squirrel.” *Transactions of the Western Section of the Wildlife Society* 44:11–29.
- Lutz, D.W. et al. 2013. *Energy Development Guidelines for Mule Deer*. Mule Deer Working Group, Western Association of Fish and Wildlife Agencies, USA.
- MacKay, P.J. 2006a. "Mojave Monkeyflower (*Mimulus mohavensis*).” Species account for the West Mojave Plan. Accessed October 2013. http://www.blm.gov/ca/pdfs/cdd_pdfs/mohavemonk1.PDF.
- MacKay, P.J. 2006b. "White-Margined Beardtongue (*Penstemon albomarginatus*).” Species account for the West Mojave Plan. Accessed October 2013. http://www.blm.gov/ca/pdfs/cdd_pdfs/whitemarg1.PDF.
- McCreedy, C. 2008. "Gila Woodpecker (*Melanerpes uropygialis*).” In *The Desert Bird Conservation Plan*. California Partners In Flight. Accessed October 2013. <http://www.prbo.org/calpif/htmldocs/desert.htm>.
- Olsen, T.G. 2003. *Carbonate Habitat Management Strategy*. Prepared for San Bernardino National Forest Association. April 29, 2003. Accessed October 2013. http://www.dmg.gov/documents/WMP_Volumes/Appendix%20S%20-%20CHMS.pdf.
- Pierson, E.D., and W.E. Rainey. 1998a. "California Leaf-Nosed Bat, *Macrotus californicus*.” In *Terrestrial Mammal Species of Special Concern in California*, 27–30, edited by B.C. Bolster. Accessed October 2013. <http://www.dfg.ca.gov/wildlife/nongame/ssc/docs/mammal/species/07.pdf>.

- Pierson, E.D., and W.E. Rainey. 1998b. "Townsend's Big-Eared Bat, *Corynorhinus townsendii pallescens* and *C. t. townsendii*." In *Terrestrial Mammal Species of Special Concern in California*, 35–41, edited by B.C. Bolster. Accessed October 2013. <http://www.dfg.ca.gov/wildlife/nongame/ssc/docs/mammal/species/09.pdf>.
- Rush, Scott A., Karen F. Gaines, William R. Eddleman and Courtney J. Conway. 2012. Clapper Rail (*Rallus longirostris*), *The Birds of North America Online* (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/340>.
- Sanders, A.C. 2006. "Mojave Tarplant (*Hemizonia mohavensis*)." Species account for the West Mojave Plan. Accessed October 2013. http://www.blm.gov/pgdata/etc/medialib/blm/ca/pdf/pdfs/cdd_pdfs.Par.79a96f52.File.pdf/mohavetar1.PDF.
- Sedgwick, James A. 2000. Willow Flycatcher (*Empidonax traillii*), *The Birds of North America Online* (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/533>.
- Sterling, J. 2008. "Bendire's Thrasher (*Toxostoma bendirei*)." In *California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California*, edited by W.D. Shuford and T. Gardali, 311–315. *Studies of Western Birds*, no. 1. California: Western Field Ornithologists (Camarillo), and California Department of Fish and Game (Sacramento).
- Tacha, T. C., S. A. Nesbitt and P. A. Vohs. 1992. Sandhill Crane (*Grus canadensis*), *The Birds of North America Online* (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/031>.
- Thomson, Robert C. et al. 2013, unpublished. *California Amphibian and Reptile Species of Special Concern* (Draft). California Department of Fish and Wildlife.
- USFWS (U.S. Fish and Wildlife Service). 1998. *Draft Recovery Plan for the Least Bell's Vireo*. Portland, Oregon: USFWS.
- USFWS. 1999. *Recovery Plan for the Arroyo Southwestern Toad*. July 24, 1999. Accessed October 2013. <http://www.amphibians.org/wp-content/uploads/2013/07/Arroyo-Southwestern-Toad-Recovery-Plan.pdf>.
- USFWS. 2002. *Southwestern Willow Flycatcher Recovery Plan*. Albuquerque, New Mexico: USFWS.

- USFWS. 2008. *Lane Mountain Milk-Vetch (Astragalus jaegerianus) 5-Year Review: Summary and Evaluation*. Ventura, California: USFWS, Ventura Fish and Wildlife Office. June 2008. Accessed October 2013. http://www.fws.gov/ecos/ajax/docs/five_year_review/doc1955.pdf.
- USFWS. 2009a. *Arroyo Toad (Bufo californicus (=microscaphus)) 5-Year Review: Summary and Evaluation*. Ventura, California: USFWS, Ventura Fish and Wildlife Office. August 2009. Accessed October 2013. http://www.biologicaldiversity.org/species/amphibians/arroyo_toad/pdfs/5_year_review_5-21-10.pdf.
- USFWS. 2009b. *Final Environmental Assessment: Proposal to Permit Take as Provided Under the Bald and Golden Eagle Protection Act*. Washington, D.C.: USFWS. April 2009. Accessed October 2013. http://www.fws.gov/alaska/eaglepermit/pdf/environmental_assessment.pdf.
- USFWS. 2009c. *Yuma Clapper Rail (Rallus longirostris yumanensis) Recovery Plan*. Draft First Revision. Albuquerque, New Mexico: USFWS, Southwest Region.
- USFWS. 2009d. *Mohave tui chub (Gila bicolor mohavensis = Siphaletes bicolor mohavensis) 5-Year Review: Summary and Evaluation*. Ventura, California: USFWS, Ventura Fish and Wildlife Office. January 2009. Accessed October 2013. http://ecos.fws.gov/docs/five_year_review/doc2392.pdf.
- USFWS. 2009e. *Owens Pupfish (Cyprinodon radiosus) 5-Year Review: Summary and Evaluation*. Ventura, California: USFWS, Ventura Fish and Wildlife Office. January 2009. Accessed October 2013. http://ecos.fws.gov/docs/five_year_review/doc2395.pdf.
- USFWS. 2009f. *Owens Tui Chub (Siphateles bicolor snyderi = Gila bicolor snyderi) 5-Year Review: Summary and Evaluation*. Ventura, California: USFWS, Ventura Fish and Wildlife Office. May 19, 2009. Accessed October 2013. http://ecos.fws.gov/docs/five_year_review/doc3212.pdf.
- USFWS. 2009g. *Eriogonum ovalifolium var. vineum (Cushenbury buckwheat) 5-Year Review: Summary and Evaluation*. Carlsbad, California: USFWS, Carlsbad Fish and Wildlife Office. August 13, 2009. Accessed October 2013. http://www.fws.gov/carlsbad/SpeciesStatusList/5YR/20090813_5YR_EROVVI.pdf.
- USFWS. 2009h. *Erigeron parishii (Parish's daisy) 5-Year Review: Summary and Evaluation*. Carlsbad, California: USFWS, Carlsbad Fish and Wildlife Office. August 13, 2009. Accessed October 2013. http://www.fws.gov/ecos/ajax/docs/five_year_review/doc2565.pdf.

- USFWS. 2009i. *Astragalus tricarinatus (Triple-Ribbed Milk-Vetch) 5-Year Review: Summary and Evaluation*. Carlsbad, California: USFWS, Carlsbad Fish and Wildlife Office. August 14, 2009. Accessed October 2013. http://www.fws.gov/ecos/ajax/docs/five_year_review/doc2560.pdf.
- USFWS. 2010. *Desert Pupfish (Cyprinodon macularius) 5-Year Review: Summary and Evaluation*. Phoenix, Arizona: USFWS, Arizona Ecological Services Office. Accessed October 2013. http://www.fws.gov/carlsbad/speciesstatuslist/5yr/20100929_5yr_depu.pdf.
- USFWS. 2011. *Revised Recovery Plan for the Mojave Population of the Desert Tortoise (Gopherus agassizii)*. May 6, 2011. Accessed October 2013. http://www.fws.gov/nevada/desert_tortoise/documents/recovery_plan/RRP%20for%20the%20Mojave%20Desert%20Tortoise%20-%20May%202011.pdf.
- USFWS. 2013a. "Threats to California Condors." Hopper Mountain National Wildlife Refuge Complex." April 17, 2013. Accessed October 2013. <http://www.fws.gov/hoppermountain/cacorecoveryprogram/Threats.html>.
- USFWS. 2013b. "Eagle Conservation Plan Guidance Module 1 – Land-based Wind Energy." April 2013. Accessed May 2014. http://www.fws.gov/migratorybirds/Eagle_Conservation_Plan_Guidance-Module%201.pdf.
- USGS. 2014 "USGS Longevity Records of North American Birds" Accessed June 2014 http://www.pwrc.usgs.gov/bbl/longevity/Longevity_main.cfm.
- Ventana Wildlife Society. 2013. "California Condor Reintroduction." Species Recovery.
- Wehausen, J. 2005. "Nelson's Bighorn Sheep (*Ovis canadensis nelsoni*)." Species account for the West Mojave Plan. Accessed October 2013. http://www.blm.gov/ca/pdfs/cdd_pdfs/Bighorn1.PDF.
- White, S.D. 2006. "Parish's Phacelia (*Phacelia parishii*)." Species account for the West Mojave Plan. Accessed October 2013. http://www.blm.gov/pgdata/etc/medialib/blm/ca/pdf/pdfs/cdd_pdfs.Par.deb1cb2b.File.pdf/parishphacelia1.PDF.
- Wilkinson, Gerald S., and Jason M. South. "Life history, ecology and longevity in bats." *Aging cell* 1, no. 2 (2002): 124-131.

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