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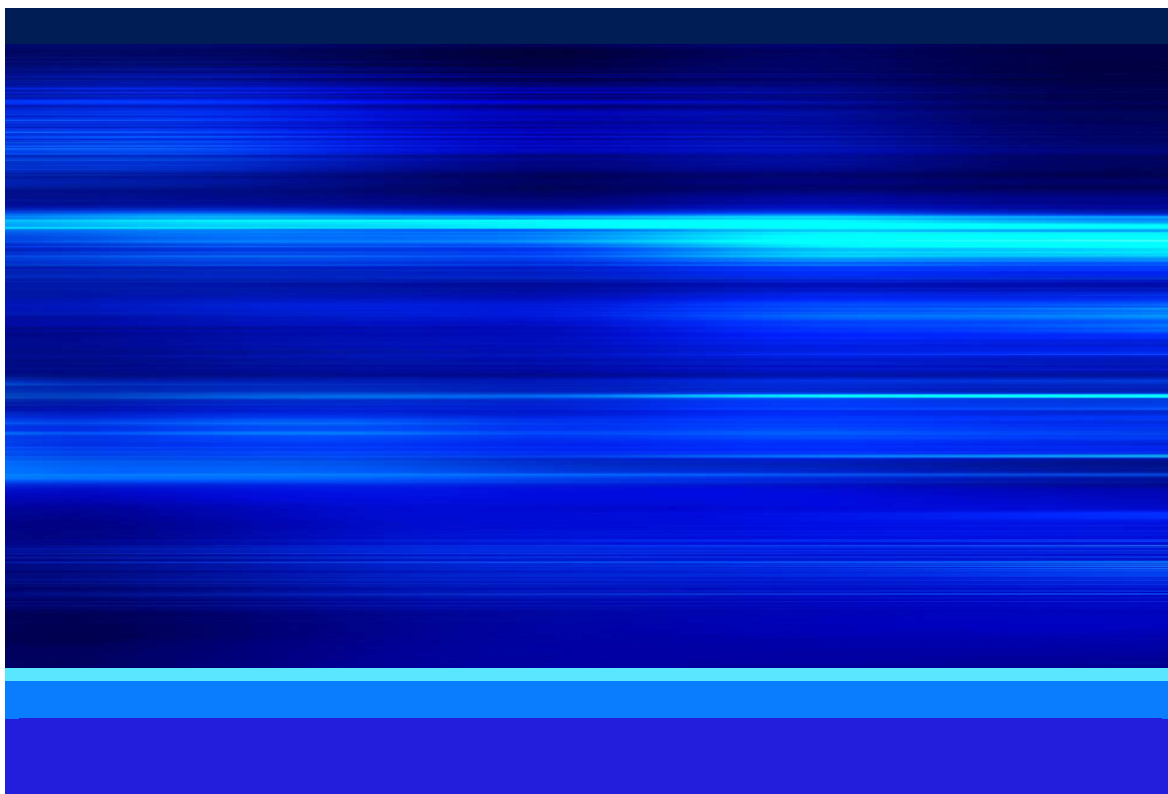
# Data Adequacy Supplement, Set 2

*Submitted to*  
California Energy Commission

*Prepared by*  
Black Rock Geothermal LLC

With assistance from  
**Jacobs**

Black Rock Geothermal Project  
(23-AFC-03)  
June 20, 2023



## Introduction

This Data Adequacy Supplement Set 2 ("Supplement Set 2") to Black Rock Geothermal LLC's Application for Certification (AFC) for the Black Rock Geothermal Project (23-AFC-03) provides information in response to the California Energy Commission ("CEC" or "Commission") Staff's data adequacy (DA) review of the AFC. This Supplement Set 2 provides additional information to support a determination by the Commission that the AFC contains adequate data to begin a power plant site certification proceeding under Title 20 of the California Code of Regulations and the Warren-Alquist Energy Resources Conservation and Development Act.

The format for this Supplement Set 2 follows the order of the AFC and provides additional information and responses to CEC Staff's information requests for several disciplines. Only sections for which CEC Staff requested additional information related to data adequacy are addressed in this Supplement. If the response calls for additional appended material, it is included at the end of each subsection. Appended material is identified by the prefix "DA" indicating an item submitted in response to a Staff Data Adequacy comment, a number referring to the applicable AFC chapter, and a sequential identifying number. For example, the appendix in response to a Transmission System Engineering comment would be Appendix DA3.0-1, because the AFC section describing electrical transmission is Section 3.0. Tables are also numbered in this way. Appended material is paginated separately from the remainder of the document.

Each subsection contains data adequacy comments or information requests, with numbers and summary titles and, in parentheses, the citation from Appendix B (Information Requirements for an Application) of Title 20, California Code of Regulations indicating a particular information requirement for the AFC. Each item follows with the CEC Staff comment on data adequacy for this item, under the heading "Information required to make AFC conform with regulations" followed by Black Rock Geothermal LLC's response to the information request and the information requested.

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## Acronyms and Abbreviations

|                  |  |
|------------------|--|
| AAQS             | Ambient Air Quality Standard                       |
| AFC              | Application for Certification                      |
| APLIC            | Avian Power Line Interaction Committee             |
| BHER             | BHE Renewables                                     |
| BRGP             | Black Rock Geothermal Project                      |
| BSA              | Biological Study Area                              |
| CEC              | California Energy Commission                       |
| CEQA             | California Environmental Quality Act               |
| CCR              | California Code of Regulations                     |
| CDFW             | California Department of Fish and Wildlife         |
| CESA             | California Endangered Species Act                  |
| CNDDDB           | California Natural Diversity Database              |
| CPM              | Compliance Project Manager                         |
| DA               | Data Adequacy                                      |
| dBA              | A-weighted decibels                                |
| ESA              | Federal Endangered Species Act                     |
| FC               | Federal Candidate for listing                      |
| FE               | Federally Endangered                               |
| FP               | Fully Protected                                    |
| FT               | Federally Threatened                               |
| ICAPCD           | Imperial County Air Pollution Control District     |
| m                | meters   |
| OHWM             | Ordinary High-Water Mark                           |
| PM <sub>10</sub> | Particulate matter, diameter of 10 microns or less |
| RWQCB            | Regional Water Quality Control Board               |
| SBSSNWR          | Sonny Bono Salton Sea National Wildlife Refuge     |
| SE               | State Endangered                                   |

## Data Adequacy Supplement, Set 2

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|           |  |
|-----------|--|
| SSC       | Species of Special Concern   |
| ST        | State Threatened   |
| USACE     | US Army Corps of Engineers   |
| USFWS     | United States Fish and Wildlife Service                              |
| USFWS BCC | United States Fish and Wildlife Service Bird of Conservation Concern |
| WL        | Watch List   |

## 5.1 Air Quality

### 6. Air Pollution Control District Application - Appendix B (g) (8) (A)

*The information necessary for the air pollution control district where the project is located to complete a Determination of Compliance.*

***Information required to make AFC conform with regulations:***

*Please provide a copy of the letter of completeness from the Imperial County Air Pollution Control District.*

**Response:** The Applicant received an incompleteness letter from the Imperial County Air Pollution Control District (ICAPCD) and provided the requested information on June 12, 2023. Based on discussions with the ICAPCD, the Applicant expects to receive a completeness letter by June 26, 2023. The Applicant will docket copies of the ICAPCD incompleteness letter, the Applicant's response, and the ICAPCD completeness letter when received.

## 5.2 Biological Resources

### 7. Site Conditions and Species Discussion - Appendix B (g) (1)

*...provide a discussion of the existing site conditions, the expected direct, indirect and cumulative impacts due to the construction, operation and maintenance of the project, the measures proposed to mitigate adverse environmental impacts of the project, the effectiveness of the proposed measures, and any monitoring plans proposed to verify the effectiveness of the mitigation...*

**Information required to make AFC conform with regulations:**

- a) *From Section 5.2.1 on page 170 in the second paragraph, staff has identified some discrepancies that need addressing. There is a discrepancy as to what is defined as the "project", which thus has affected how surveys have been conducted and even how survey buffer zones have been applied. This would have a direct effect on impacts and mitigation possibly required as well as permits. Please explain why "construction laydown, construction camps, borrow pits, parking lots, and pull sites" are not considered as part of the project and surveyed in the same way as the power plant boundary, gen-tie line, etc. that are considered project components.*

**Response:** The "Project" boundary is the Biological Study Area (BSA), which includes the power plant site, well pads and pipelines, gen-tie line with pull sites, water supply pipelines, construction laydown/parking, borrow pits, and construction camps, as outlined in black on Figure DA 5.2-1 (provided in Appendix DA 5.2-1a). The biological resource surveys, protocol-level (if necessary) or reconnaissance level, were conducted within the entire BSA in the same way for all Project features. Survey buffers for temporary impacts on permanent features were as follows: 1) geothermal power plant and associated piping and well pads received a 150-foot buffer and 2) gen-tie line received a 1,056-foot buffer for pole locations. The borrow pit, construction camp, and construction laydown and parking areas were unbuffered because they are only temporary impacts and no impacts are expected outside of the parcel boundary through the implementation of applicable mitigation measures. Habitat, land cover, and vegetation community mapping was conducted within a 1-mile radius of the plant area and within 1,000 feet of the well pads, production/injection pipelines, construction laydown/parking, borrow pits, construction camps, the gen-tie line, and water supply pipelines.

Also see response to Appendix B (g) (13) (B) regarding database query buffers.

- b) *Also, in the same paragraph on page 170, staff noticed survey buffer zones were greater than the project boundary to account for "flexible placement of Project features while avoiding sensitive areas." To assess impacts properly the location of the project boundary and components needs to be clearly defined. Please specify what project features may be relocated before construction starts.*

**Response:** Surveys were conducted over a larger area (shaded green on Figure DA 5.2-1 provided in Appendix DA 5.2-1a) to assist the Applicant in locating Project features to avoid sensitive biological resources during the preliminary engineering phase.

*Sections 5.2.2.2 and 5.2.2.3 must discuss and evaluate the impacts of the project on the adjacent Sonny Bono Salton Sea National Wildlife Refuge and the Imperial Wildlife Area, along which the project boundary, gen-tie lines and construction laydown/parking areas would run adjacent.*

**Response:** The potential temporary impacts to the adjacent Sonny Bono Salton Sea National Wildlife Refuge (SBSSNWR) and the Imperial Wildlife Area are discussed below.

### **Sonny Bono Salton Sea National Wildlife Refuge and Imperial Wildlife Area – Potential Construction Impacts**

Construction could have temporary impacts to special-status wildlife in the adjacent SBSSNWR and the Imperial Wildlife Area. The construction period is temporary and finite. Temporary impacts could occur from collisions with vehicles, collision with power line conductors or towers, electrocutions, air emissions, disturbance from noise, or disturbance from nighttime lighting. With the implementation of worker environmental awareness training, pre-construction surveys, and avoidance and mitigation measures proposed by the Applicant, there will be no significant, unmitigated environmental impacts associated with the construction of BRGP on adjacent properties.

Construction activities may also result in an increase in accidental road kills due to increased vehicle traffic. Direct losses of animals in and adjacent to the Project may occur as a result of disturbance (such as, where flushing of adults off nests or abandonment of nests results in loss of eggs or young birds due to predation or exposure). If an individual special-status wildlife species is present, it would not likely represent a substantial component of the region's population and impacts to individuals would not preclude the ability for the species to be self-sustaining. Implementation of mitigation measures such as speed limits, pre-construction surveys, monitoring, will reduce impacts to less than significant.

Equipment used during construction of the facilities would result in air emissions of particulate matter, nitrogen oxides, carbon monoxide, volatile organic compounds, and sulfur dioxide. These pollutants have the potential to affect biological resources. Detailed information on construction emissions is included in AFC Section 5.1, Air Quality. Construction emissions are expected to be below applicable ambient air quality health and secondary standards and, likewise, would be below significance criteria established for impacts to wildlife.

Project construction at the plant site would not result in significant direct or indirect impacts to wildlife movement corridors because of the already highly fragmented habitat present currently. In addition, the BSA is not within defined wildlife movement corridor. The fencing around the plant site is not expected to limit or impede foraging activity or general movements of wildlife species.

Noise from construction could temporarily discourage wildlife from foraging and nesting immediately adjacent to the Project area. Many bird species rely on vocalization during the breeding season to attract a mate within their territory. Noise levels from certain construction activities could reduce the reproductive success of nesting birds. The construction period is relatively short, and wildlife usually become habituated to ongoing general construction noise. As a result of these design features, the temporary nature of these activities, and the adherence to noise reducing mitigation measures, the noise levels at the Project fence line are not expected to have any significant impact on nearby wildlife resources.

Bright night lighting could disturb wildlife using areas adjacent to the BRGP (such as, nesting birds, foraging mammals, and flying insects). Night lighting is also suspected to attract migratory birds to areas and, if the lights are on tall structures, collisions could occur. Additionally, certain lighting may attract insects which in turn may attract birds, such as the short-eared owl, as well as bats to forage. The BRGP lighting will meet the requirements for security, safety, and will be shielded and pointed downward and away from the habitat outside of the Project area to minimize impacts to nesting birds and other nearby wildlife, and to reduce the potential for avian and bat attraction and collision. With implementation of lighting mitigation measures, the impacts to special-status wildlife will be less than significant.

The BRGP will result in construction of above ground structures, including power plant, substation, and the gen-tie line (with approximately 23 poles), that could potentially result in bird and bat collisions. Birds and bats would be expected to forage in adjacent lands, and the Project area is in the Pacific flyway used by migrating birds. The installation of gen-tie lines and poles will be constructed according to the most recent avian-friendly guidelines (APLIC 2006), ensuring that conductor wires are appropriately spaced to minimize the potential of avian electrocution. In addition, markers will be placed and maintained on the highest-bird-use portions of the proposed gen-tie lines to increase visibility and monitored for effectiveness. Bird and bat collisions would be reduced to less than significant levels by implementation of mitigation measures provided in DA 7 Site Conditions and Species Discussion.

### **Sonny Bono Salton Sea National Wildlife Refuge and Imperial Wildlife Area – Potential Operational Impacts**

Operation of the BRGP has potential to have direct and indirect impacts to special-status wildlife in the adjacent SBSSNWR and the Imperial Wildlife Area. Direct impacts could result in mortality of wildlife by crushing or vehicle collisions, collision with structures, or electrocution during operation and maintenance activities as wildlife species travel to and from the protected areas. Implementation of the impact avoidance, minimization, and mitigation measures will reduce the Project's impacts on listed and special status wildlife species and those species using the adjacent properties to a level of insignificance.

For protected wildlife species, indirect impacts are possible from the noise associated with the operations of the proposed Project. In general, nearly all equipment will be specified to have near-field maximum noise levels that do not exceed 90 A-weighted decibels (dBA) at three feet from the activity (or 85 dBA at three feet where available as a vendor standard) to limit the noise exposure of plant personnel to acceptable levels. It is expected that during normal steady-state operations the 80 dBA threshold will not be exceeded beyond plant boundaries. Therefore, no significant noise impacts to special-status bird species would occur as a result of the operation of the Project.

- c) *Surveys for Yuma Ridgway's rail (Rallus obsoletus yumanensis) and California black rail (Laterallus jamaicensis coturniculus) were said to be performed (page 170) because they are known to exist near the project (page 183) but page 188 contradicts this, saying the surveys were not done. Please provide and discuss survey results for these species. Since these are fully protected species and no take of these species are allowed full avoidance and mitigation measures must be demonstrated.*

**Response:** Appendix DA 5.2-1b (submitted under a request for confidential designation) provides the marsh bird technical survey report, *Distribution and occupancy of Yuma Ridgway's rails within proposed geothermal development areas in Imperial Valley, California*, (Sliwa and Conway 2022).

The BRGP is within the proposed development area (Figure 1, page 13, of this Sliwa and Conway report) that was assessed for potentially suitable marsh bird habitat. This area is predominantly agriculture fields, most of which had active crops. Two sections of Black Rock are fallow fields. On McKendry and Severe Road, there is an irrigation ditch with deep water and very thick vegetation consisting primarily of phragmites (*Phragmites australis*). No suitable marsh bird habitat was identified in the BRGP area (Figure 2, page 14, of this report). Overall, suitable rail habitat is currently not present in the Black Rock portion of the proposed project area; therefore, Yuma Ridgway's rail surveys were not conducted there.

- d) *Another fully protected species, the brown pelican, has a high potential to occur as a transient and is said to be more sensitive to noise than most species (page 192, 193). No take may occur; more discussion on how full avoidance will be assured is needed and why mitigation is not necessary. Also,*

*foraging habitat and nesting/roosting/burrowing habitat will be temporarily and permanently impacted for special status species like bats, birds, kit fox, etc. Please reconsider and evaluate the impacts to these species, including performing appropriate surveys, and whether mitigation may be appropriate.*

**Response:**

**Brown Pelican:**

Noise is not expected to result in take of or otherwise significantly affect brown pelican. At the closest point, BRGP is approximately 1,500 feet from the eastern edge and over 4,000 feet from the western edge of Obsidian Butte, a known roosting area. Even during the loudest construction activity, noise would attenuate to approximately 80 dBA at 1,500 feet from the noise source (Appendix DA 5.2-1c, provided under a request for confidential designation).<sup>1</sup> Therefore, temporary noise impacts to California pelican at Obsidian Butte will be less than significant.

Potential direct impacts to brown pelicans could include collision with structures or electrocution. Bird and bat collisions would be reduced to less than significant levels by the installation of gen-tie lines and poles that will be constructed according to the most recent avian-friendly guidelines (APLIC 2006), ensuring that conductor wires are appropriately spaced to minimize the potential of avian electrocution. In addition, markers will be placed and maintained on the highest-bird-use portions of the proposed gen-tie lines to increase visibility and monitored for effectiveness.

**Bats, birds, and burrowing species:** During the reconnaissance-level survey, biologists looked for canid burrows and suitable friable soil for burrow construction. Much of the BRGP is under active agriculture production, meaning flood irrigated or frequently disturbed, which is not suitable burrowing habitat.

The following mitigation measures are proposed to avoid and minimize impacts to birds and burrowing species such as kit fox, American badger, and Yuma hispid cotton rat.

- Biologists will perform pre-construction surveys for American badger, burrowing owl, desert kit fox, and Yuma hispid cotton rat, and active nests of migratory birds during the nesting season (generally February 1 through August 31)
- Construction avoidance and minimization measures such as speed limits, ramps for excavations to allow wildlife escape, and inspect pipes where wildlife could shelter
- Preventative Design Mitigation Measures such as shield lighting, noise-reducing measures, and construct gen-tie lines to avoid electrocution of bird and bat species (described below)
- Employees must go through worker environmental awareness training

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<sup>1</sup> **Section 5.2.2.2.6:** Project noise has potential to temporarily impact California brown pelican at Obsidian Butte. Based on Huntington Beach Energy Project testimony by bird hearing expert Robert Dooling, Ph.D., USFWS's commonly used 60 A-weighted decibels (dBA) is an overly conservative noise threshold for birds. The A-weighting scale was developed based on human hearing. Audiograms show that birds are as much as 15 to 20 decibels less sensitive to low frequency noises, such as that from construction equipment (CEC 2014). For the purposes of this analysis, 80 dBA was used as the bird noise threshold. Typical construction activities are predicted to generate average noise levels between 84 and 87 dBA at 50 feet from the edge of the construction activity; noise levels would attenuate to below 80 dBA at a distance between 100 and 200 feet from the source (Section 5.7, Noise). The loudest construction activity would be pile driving at 104 dBA at 50 feet (Section 5.7, Noise). One pile driving location is in the northwest corner of the plant site and noise would attenuate to less than 80 dBA by 1,500 feet (Section 5.7, Noise). With adherence to design noise reducing mitigation measures, the noise impacts to California pelican at Obsidian Butte will be less than significant.



- Biological monitors will be present during construction when there is a potential risk to impact species

The potential impact to bats is primarily through the temporary loss of foraging habitat in agricultural land. Low quality suitable roosting habitat is present. The proposed geothermal buildings may provide low quality roosting in the future. No surveys were necessary because the primary impact to bats is foraging habitat. Potential for presence of maternity roosts or hibernacula in structures in or near the BSA is low; no abandoned buildings were observed during surveys in the BSA. Scattered palm trees with dead fronds still attached that form a skirt are present in the BSA at a very low density and have a moderate potential to be used as roosts by some species, while other sparsely distributed trees could provide transient roosts during migration for other tree-roosting bats. Temporary impacts to bats would include noise, lighting, and removal of agricultural lands for temporary construction use. Direct impacts would include collision with structures or electrocution. Through implementation of mitigation measures, including worker environmental awareness training, lighting that is shielded and pointed downward away from habitat outside of the BSA, noise-reducing mitigation measures, and construction of the gen-tie line with appropriate spacing of conductor wires to minimize potential electrocution and markers placed on the grounding wire to increase visibility, impacts to special-status bats will be less than significant.

- e) *More specifics are needed on mitigation measures, especially 5.2.3.7, 5.2.3.10 and 5.2.3.11. The last two sections discuss mitigation for burrowing owl, while surveys for burrowing owl were only done on a "reconnaissance" level according to page 188. Surveys that follow CDFW standards need to be performed for burrowing owl.*

**Response:** The California Department of Fish and Wildlife (formerly Game) 2012 *Staff Report on Burrowing Owl Mitigation* defines three survey steps (Appendix DA 5.2-1d). The 2022 wildlife reconnaissance level surveys satisfied the first two steps of the protocol, habitat assessment and determining occupancy. The third step, impact analysis, will be satisfied by conducting breeding season burrowing owl surveys. Breeding season burrowing owl surveys in the BSA plus 100-meter buffer in accordance with the *Staff Report on Burrowing Owl Mitigation* (CDFG 2012; Appendix DA 5.2-1d) guidelines will be conducted in coordination with input (Appendix DA 5.2-5). Three breeding season surveys and one follow up non-breeding season survey will be conducted. Surveys will be scheduled with a three-week lapse. Two surveys will be conducted within the peak breeding season, defined as from April 15 through July 15 (CDFW 2012). Breeding season is defined as from February 1 through August 31 and nonbreeding season September 1 through January 31. Results from breeding season surveys will be used to quantify mitigation and impacts to burrowing owls.

Breeding season burrowing owl survey schedule and reporting:

- June 5-9, 2023: first breeding season survey (within peak breeding season).
- July 5-15, 2023: second breeding season survey will be conducted (also within peak breeding season and in accordance with CDFW guidelines that one survey should take place between June 15 and July 15).
- Approximately August 4, 2023: preliminary report will be prepared summarizing the results of the first two survey sessions.
- Prior to August 31, 2023: third survey.
- Between September 1, 2023, and January 31, 2024: fourth non-breeding season survey.
- Approximately December 31, 2023: submission of final survey report.

If occupied burrowing owl burrows cannot be avoided in the BSA the Applicant will prepare a Burrowing Owl Artificial Burrow and Exclusion Plan following guidelines in the *Staff Report on Burrowing Owl Mitigation* (CDFG 2012; Appendix DA 5.2-1d). This plan will define exclusion techniques, such as installing one-way doors in burrow openings during the non-breeding season. The *Staff Report on Burrowing Owl Mitigation* states:

The current scientific literature indicates that burrow exclusion should only be conducted by qualified biologists (meeting the Biologist's Qualifications above) during the non-breeding season, before breeding behavior is exhibited and after the burrow is confirmed empty by site surveillance and/or scoping. The literature also indicates that when temporary or permanent burrow exclusion and/or burrow closure is implemented, burrowing owls should not be excluded from burrows unless or until:

- A Burrowing Owl Exclusion Plan is developed and approved by the applicable local CDFW office;
- Site monitoring is conducted prior to, during, and after exclusion of burrowing owls from their burrows sufficient to ensure take is avoided. Conduct daily monitoring for one week to confirm young of the year have fledged if the exclusion will occur immediately after the end of the breeding season.
- Excluded burrowing owls are documented using artificial or natural burrows on an adjoining mitigation site (if able to confirm by band re-sight).

Preconstruction surveys will follow the *Take avoidance (pre-construction) survey* guidelines in the *Staff Report on Burrowing Owl Mitigation* (CDFG 2012; Appendix DA 5.2-1d), which provides:

Take avoidance surveys are intended to detect the presence of burrowing owls on a project site at a fixed period in time and inform necessary take avoidance actions. Take avoidance surveys may detect changes in owl presence such as colonizing owls that have recently moved onto the site, migrating owls, resident burrowing owls changing burrow use, or young of the year that are still present and have not dispersed.

Pre-construction surveys will also establish buffer distances based on recommendations in the *Staff Report on Burrowing Owl Mitigation* (CDFG 2012; Appendix DA 5.2-1d):

Scobie and Faminow (2000) developed guidelines for activities around occupied burrowing owl nests recommending buffers around low, medium, and high disturbance activities, respectively (see below).

Recommended restricted activity dates and setback distances by level of disturbance for burrowing owls (Scobie and Faminow 2000).

| Location      | Time of Year   | Level of Disturbance |       |       |
|---------------|----------------|----------------------|-------|-------|
|               |                | Low                  | Med   | High  |
| Nesting sites | April 1-Aug 15 | 200 m*               | 500 m | 500 m |
| Nesting sites | Aug 16-Oct 15  | 200 m                | 200 m | 500 m |
| Nesting sites | Oct 16-Mar 31  | 50 m                 | 100 m | 500 m |

\* meters (m)

f) *Mitigation Measures*

**Preventative Design Mitigation Features:** The Project Owner will incorporate all feasible measures to avoid or minimize significant impacts to the local biological resources, which may include the following:

1. Design, install, and maintain facility lighting to prevent side casting of light toward wildlife habitat.
2. Equip steam blow piping with a temporary silencer that quiets the noise of steam blows. Orient the silencer to maximize the noise reduction to adjacent lands, such as SBSSNWR and Imperial Wildlife Area.
3. Design, install, and maintain transmission lines and all electrical components to reduce the likelihood of electrocutions of birds and bats by following Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006 (APLIC 2006).

**Overhead Gen-tie Line Monitoring to Avoid Harassment or Harm:** An APLIC recommended markers on the grounding wire of the proposed gen-tie lines will be installed. These markers will be placed and maintained on the highest-bird-use portions of the proposed gen-tie lines. Monitoring of the entire proposed gen-tie line, and sections of unmarked but comparable gen-tie line in the BSA, will be implemented for the first two years of operation, and may continue for up to 10 years (to determine effectiveness of remedies) if impacts are found to be excessive by a working group of interested agency personnel. Remedial actions to address collision deaths will be included in a Bird Collision Deterrent Proposal and Monitoring Plan. The Project Owner must implement the Compliance Project Manager (CPM) approved remedial actions wherever high bird use and evidence of bird collisions are found during post-construction monitoring and measure the effectiveness of the remedial actions for reducing impacts for at least one year following their implementation.

## 8. Additional Species Surveys - Appendix B (g) (13) (A) (v)

*...species and habitats identified by local, state, and federal agencies as needing protection, including but not limited to those identified by the California Natural Diversity Database, or where applicable, in Local Coastal Programs or in relevant decisions of the California Coastal Commission...*

**Information required to make AFC conform with regulations:**

*Species such as Yuma Ridgway's rail, burrowing owl and desert kit fox must be evaluated for impacts fully, along with a discussion of avoidance, minimization, and mitigation measures. See above (g)(1).*

**Response:** This section provides discussion of Yuma Ridgway's rail and desert kit fox, as burrowing owl avoidance, minimization, and mitigation measures are discussed above.

**Yuma Ridgway's Rail:** The marsh bird habitat assessments provided in Appendix DA 5.2-1b (under confidential designation) determined that suitable rail habitat is currently not present in the BRGP area; therefore, impacts to Yuma Ridgway's rail are not expected.

**Desert kit fox:** CDFW has not defined protocol-level surveys for desert kit fox. During the reconnaissance-level survey, biologists looked for canid burrows and suitable friable soil for burrow construction. Much of the BRGP is under active agriculture production, meaning flood irrigated or frequently disturbed, which is not suitable burrowing habitat. Proposed mitigation measures to avoid and minimize impacts to desert kit fox include:

- Biologists will perform pre-construction surveys for burrowing species, including desert kit fox.

- Construction avoidance and minimization measures such as speed limits, ramps for excavations to allow wildlife escape, and inspect pipes where wildlife could shelter.
- Employees must go through worker environmental awareness training.
- Biological monitors will be present during construction when there is a risk to impact species.

## 9. Surveys and Analysis within Buffers - Appendix B (g) (13) (B)

*Include a list of the species observed and those with a potential to occur within 1 mile of the project site and 1,000 feet from the outer edge of linear facility corridors. Maps or aerial photographs shall include:*

### **Information required to make AFC conform with regulations:**

*As mentioned in (g)(1), staff is concerned with how the definition of the "project" is being applied and how this is affecting the surveys. 1000 feet to all project components, including the construction laydown, parking, burrowing pits, etc., should be applied as a buffer zone uniformly and included in the BSA (Biological Study Area). This would directly affect the outcome of the species observed and with a potential to occur.*

**Response:** Habitat, land cover, and vegetation community mapping was conducted within a 1-mile radius of the plant area and within 1,000 feet of the well pads, pipelines, auxiliary features, and linear features. This was, in part to assess adjacent potentially suitable species habitat (Table DA 5.2-1 is provided below and presents the vegetation results of this assessment). The list of potentially occurring special-status species was built by querying the California Natural Diversity Database (CNDDDB) and the United States Fish and Wildlife Service (USFWS) Information for Planning and Consultation, as well as other publicly available studies, information, and resources, for special-status biological resources in a 12 U.S. Geological Survey-quadrangle query. A 12-quadrangle area is approximately the equivalent of a 15-mile buffer from BSA (the BSA spans two quadrangles, and all adjacent quadrangles were included).

The BSA includes the following buffers to assess indirect and temporary impacts on permanent features: 1) the Black Rock plant and associated piping and well pads received a 150-foot buffer and 2) the gen-tie line received a 1,056 feet buffer for pole locations. Locations with temporary disturbances, for example laydown areas, were unbuffered.

**Table DA 5.2-1. Vegetation Communities within the BRGP Biological Study Area Buffers**

| <b>Vegetation Communities and Other Cover Types</b> | <b>Acreage within the Biological Study Area Buffers<sup>a</sup></b> |
|---|---|
| Agriculture   | 3,022.32  |
| Barren Lands  | 95.81   |
| Canals and Drains                                   | 135.36  |
| Developed   | 393.42  |
| Disturbed with Vegetation                           | 819.99  |
| Disturbed with No Vegetation                        | 262.45  |
| Invasive Southwest Riparian Woodland and Shrubland  | 167.27  |
| North American Arid West Emergent Marsh             | 538.92  |
| North American Warm Desert Playa                    | 190.73  |

| <b>Vegetation Communities and Other Cover Types</b> | <b>Acreage within the Biological Study Area Buffers<sup>a</sup></b> |
|---|---|
| North American Warm Desert Volcanic Rockland        | 131.96  |
| Open Water  | 234.61  |
| <b>Total</b>  | <b>5,802.93</b>   |

Source: Jacobs 2022

<sup>a</sup> The BSA buffer areas include the 1-mile buffer of the facility and the 1,000-foot buffers of well pads, pipelines, auxiliary features, and linear features. These are not shown on any figures.

Also refer to DA 7 Site Conditions and Species provided above.

## 10. Wetland Delineation Figures - Appendix B (g) (13) (B)(iii)

*An aerial photo or wetlands delineation maps at a scale of (1:2,400) showing any potential jurisdictional and non-jurisdictional wetlands delineated out to 250 feet from the edge of disturbance if wetlands occur within 250 feet of the project site and/or related facilities that would be included with the U.S. Army Corps of Engineers Section 404 Permit application. For projects proposed to be located within the coastal zone, also provide aerial photographs or maps as described above that identify wetlands as defined by the Coastal Act.:*

### **Information required to make AFC conform with regulations:**

*Appendix 5.2-3 by itself does not meet the requirements. An overlay location of Photos 1-4 would improve the map. Although Figure 1 shows points where Photos 1-4 were taken it does not show where the wetlands are with respect to the project site. Also, Photos 1-4 do not meet the aerial requirement. Aerial photos will show more area much more accurately than ground photos. In addition, please make sure that the map/aerial photos represent all potential wetlands from the edge of potential disturbance within 250 feet of project site and related facilities. The buffer zone on the map should be clearly indicated.*

**Response:** A study to delineate aquatic resources was conducted in accordance with the U.S. Army Corps of Engineers Wetlands Delineation Manual (Environmental Laboratory 1987), the Ordinary High Water Mark (OHWM) Regulatory Guidance Letter No. 05-05 (USACE 2005), the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region Version 2.0 (USACE 2008), A Field Guide to the Identification of the OHWM in the Arid West Region of the Western United States (Lichvar and McColley 2008), and the Updated Datasheet for the Identification of the OHWM in the Arid West Region of the Western United States (Curtis and Lichvar 2010). No wetlands were found within the BSA (Appendix DA 5.2-2).

## 11. Biological Resources Discussion - Appendix B (g) (13) (C)

*A discussion of the biological resources at the proposed project site and related facilities. Related facilities include, but are not limited to, laydown and parking areas, gas and water supply pipelines, transmission lines, and roads. The discussion shall address the distribution of vegetation community types, denning or nesting sites, population concentrations, migration corridors, breeding habitats, and other appropriate biological resources including the following:*

### **Information required to make AFC conform with regulations:**

*Please reference (g)(1).*

**Response:** All Project features, plant, well pads, pipelines, gen-tie, laydown, parking, borrow pit, etc. and associated buffers were evaluated for biological resources. Potential special-status species lists were generated from an approximately 15-mile buffer query.

**Vegetation community and land cover types:** Vegetation mapping within the BRGP is provided in Figure DA 5.2-4 (provided within Appendix DA 5.2-3a). Table DA 5.2-1 *Vegetation Communities within the BRGP Biological Study Area Buffers* is provided in DA 9, Surveys and Analysis within Buffers - Appendix B (g) (13) (B). This table includes a summary of 5,800 acres of mapped vegetation within 1-mile of the facility and 1000-feet of well pads, pipelines, auxiliary features, and linear features. Appendix DA 5.2-3b is a figure showing the vegetation communities in the BSA buffers.

**Denning/nesting and breeding habitats:** In general, the BSA is highly disturbed by agriculture and geothermal development and does not contain high-quality natural habitat. Most of the land cover types found within the BSA are classified as nonnatural, including agriculture, developed, and disturbed. Nonnatural is defined as being modified by human activities, whereas natural vegetation and land cover types are defined as unmodified by human activities (NatureServe 2004). Natural vegetation types within the BSA include North American Arid West Emergent Marsh, North American Warm Desert Playa, and Invasive Southwest Riparian Woodland and Shrubland.

Breeding habitats are specific to species. Most of the species that are attracted to the Salton Sea feed in the water and breed nearby (for example, sand bars and islets) which are not present in the BSA. Other typical breeding habitats for wildlife species include marsh/wetlands and large trees, again, which are either not present in the BSA or small or low quality. AFC Section 5.2.1.5.3 provides a discussion of the suitable habitat for those wildlife species with moderate or high potential to occur in the BSA.

Table DA 5.2-2 provided below, presents a summary of special-status wildlife species with a potential to occur within the BSA. This subsection also includes a discussion of those species with moderate or high potential to occur or incidentally observed in the BSA.

**Table DA 5.2-2. Special-status Wildlife Species with Potential to Occur in the BSA**

| Class | Common Name              | Scientific Name                            | Regulatory Status <sup>a</sup> | Potential for Occurrence  |
|-------|--------------------------|--|--------------------------------|---|
| Bird  | Burrowing owl            | <i>Athene cunicularia</i>                  | SSC, BCC                       | Present   |
| Bird  | California brown pelican | <i>Pelecanus occidentalis californicus</i> | FP                             | High Potential. The BSA has no potential nesting or foraging habitat for this species, but because of proximity to a historical nesting colony on Obsidian Butte, this species would be expected to fly over the BSA. |
| Bird  | California gull          | <i>Larus californicus</i>                  | WLb, BCC                       | Present. Species was incidentally observed during surveys; however, no suitable nesting habitat is present within the BSA. This species has potential to forage in the BSA.   |
| Bird  | Cooper's hawk            | <i>Accipiter cooperii</i>                  | WL b                           | Present. Species was incidentally observed during surveys; however, no suitable nesting habitat is present within   |



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| Class  | Common Name               | Scientific Name                    | Regulatory Status <sup>a</sup> | Potential for Occurrence  |
|--------|---------------------------|------------------------------------|--------------------------------|---|
|        |                           |                                    |                                | the BSA. This species has potential to forage in the BSA.   |
| Bird   | Loggerhead shrike         | <i>Lanius ludovicianus</i>         | SSC, BCC                       | Low Potential   |
| Bird   | Long-billed curlew        | <i>Numenius americanus</i>         | WL b                           | Present. Species was incidentally observed during surveys; however, no suitable nesting habitat is present within the BSA. This species has potential to forage in the BSA. |
| Bird   | Mountain plover           | <i>Charadrius montanus</i>         | SSC, BCC                       | Low Potential   |
| Bird   | Short-eared owl           | <i>Asio flammeus</i>               | SSC, BCC                       | Low Potential   |
| Bird   | White-faced ibis          | <i>Plegadis chihi</i>              | WL b                           | Present. Species was incidentally observed during surveys; however, no suitable nesting habitat is present within the BSA. This species has potential to forage in the BSA. |
| Bird   | Yellow warbler            | <i>Setophaga petechia</i>          | SSC, BCC                       | Low Potential (foraging only)   |
| Mammal | American badger           | <i>Taxidea taxus</i>               | SSC, fur bearing mammal        | Low Potential   |
| Mammal | Big free-tailed bat       | <i>Nyctinomops macrotis</i>        | SSC                            | Low Potential (foraging only)   |
| Mammal | Desert kit fox            | <i>Vulpes macrotis arsipus</i>     | Fur bearing mammal             | Low Potential   |
| Mammal | California leaf-nosed bat | <i>Macrotis californicus</i>       | SSC                            | Low Potential (foraging only)   |
| Mammal | Mexican long-tongued bat  | <i>Choeronycteris mexicana</i>     | SSC                            | Low Potential (foraging only)   |
| Mammal | Pallid bat                | <i>Antrozous pallidus</i>          | SSC                            | Low Potential (foraging only)   |
| Mammal | Pocketed free-tailed bat  | <i>Nyctinomops femorosaccus</i>    | SSC                            | Low Potential (foraging only)   |
| Mammal | Spotted bat               | <i>Euderma maculatum</i>           | SSC                            | Low Potential (foraging only)   |
| Mammal | Western mastiff bat       | <i>Eumops perotis californicus</i> | SSC                            | Low Potential (foraging only)   |
| Mammal | Western yellow bat        | <i>Lasiurus xanthinus</i>          | SSC                            | Low Potential (foraging only)   |

| Class  | Common Name            | Scientific Name                   | Regulatory Status <sup>a</sup> | Potential for Occurrence |
|--------|------------------------|-----------------------------------|--------------------------------|--------------------------|
| Mammal | Yuma hispid cotton rat | <i>Sigmodon hispidus eremicus</i> | SSC                            | Moderate Potential       |

<sup>a</sup> Regulatory Status

BCC – USFWS Bird of Conservation Concern

FP – CDFW Fully Protected Species

SSC – CDFW Species of Special Concern

WL – CDFW Watch List Species

<sup>b</sup> California gull, Cooper's hawk, long-billed curlew, and white-faced ibis are CDFW WL for nesting colonies.

**Burrowing Owl.** Burrowing owls inhabit open areas such as grasslands, pastures, coastal dunes, desert scrub, and the edges of agricultural fields. Burrowing owls use abandoned rodent burrows or build burrows in semi-compacted soil in the slopes of drainage canals next to agricultural fields in the Imperial Valley (CDFW 2023). Suitable nesting habitat is present along irrigation canals and berms, and foraging habitat is present in adjacent agricultural fields. This species is common year-round at the SBSSNWR (USFWS 2018).

**California Brown Pelican.** The California brown pelican forages in open water and is a colonial nester, using offshore islands that afford protection from ground-dwelling predators. This species has been documented historically on small rocky islets offshore of Obsidian Butte, Obsidian Butte, east side of Morton Bay, and the Alamo River delta (CDFW 2023; AFC Appendix 5.2B, submitted under a request for confidential designation pending CEC staff review). Although suitable nesting or foraging habitat is not present in the BSA, Project components are less than 0.5 mile from a known nesting site at Obsidian Butte. In the fall and winter, California brown pelicans are reported as abundant to common at the SBSSNWR (USFWS 2018).

**California Gull.** California gulls nest along large freshwater or alkaline interior lakes (CDFW 2023). Preferred habitats during nonbreeding season include sandy beaches, mudflats, rocky intertidal areas, and fresh and saline emergent wetlands. Inland habitats include cropland habitats, landfill dumps, and open lawns in cities (CDFW 2022c). No suitable nesting sites are present in the BSA; however, this species was incidentally observed during biological surveys, and it has a potential to forage within the agricultural lands in BSA (AFC Appendix 5.2A). This species is also reported common to abundant year-round at the SBSSNWR (USFWS 2018). Throughout its winter range, California gulls often are among the most abundant species (CDFW 2022c).

**Cooper's Hawk.** The Cooper's hawk nests in wooded areas in southern California, including the Sierra Nevada foothills, New York Mountains, and Owens Valley from 0 to 9,000 feet above mean sea level. Typical nesting sites include dense oak, deciduous riparian, and other forest habitats near water. No suitable nesting sites are present in the BSA; however, this species was incidentally observed during biological surveys (AFC Appendix 5.2A). Cooper's hawks are reported as uncommon at the SBSSNWR (USFWS 2018).

**Long-billed Curlew.** This species breeds in northern California in grasslands and wet meadows adjacent to lakes or marshes. Long-billed curlews winter in coastal California estuaries and agricultural lands in Imperial County (CDFW 2022d). No suitable nesting sites are present in the BSA; however, this species was incidentally observed during biological surveys and the species has potential to forage in agricultural lands in the BSA (AFC Appendix 5.2A). Excluding the summer, long-billed curlews are reported as being common to abundant at the SBSSNWR (USFWS 2018).



**White-faced Ibis.** The white-faced ibis occurs in freshwater willow marshes with dense thickets of bulrush (*Scirpus* sp. or *Schoenoplectus* sp.) for nesting, interspersed with areas of willow for foraging. Historic records for this species occur at the mouth of the New River at the southeastern end of the Salton Sea (CDFW 2023). No suitable nesting sites are present in the BSA; however, this species was incidentally observed during biological surveys and the species has potential to forage in agricultural lands in the BSA (AFC Appendix 5.2A). This species also is reported as common to abundant at the SBSSNWR (USFWS 2018).

**Yuma Hispid Cotton Rat.** The Yuma hispid cotton rat occurs along the Colorado River and in grass and agricultural areas near irrigation waters (USFWS 2018). It occurs in wetlands and uplands with dense grass and herbaceous plants where it makes runways through the vegetation and burrows or nests on the surface (CDFW 2023). Moderately suitable nesting and foraging habitat is present in the BSA in canals, drains, moist areas, and agricultural lands. This species is relatively common in moist areas and agriculture at the SBSSNWR (USFWS 2018).

Table DA 5.2-3 identifies the full list of special-status species with potential for occurrence. The Habitat Requirements column defines what is required for each species and the Potential for Occurrence column describes if suitable habitat is present in the BSA.

**Population concentrations:** Although the BSA in general has low quality suitable habitat, the Salton Sea and associated wetlands/marsh are major attractants for waterfowl, shorebirds, and marsh birds. The BSA is less than one mile from the Salton Sea (see Figure DA 5.2-1 in Appendix DA 5.2-1a). Despite the increasing salinity of the Salton Sea, migratory bird species are attracted to the Salton Sea because of abundant food sources. The rivers, agricultural canals, and drains flowing into the Salton Sea contain freshwater, providing some habitat for piscivorous and insectivorous birds. The Salton Sea also provides important habitat features for migrating or overwintering birds such as islets, sand bars, and snags for nesting and roosting. Of specific note, Obsidian Butte and Alamo River delta are major roosting and feeding sites for California brown pelicans and migratory birds (CDFW n.d.). As a result, the Salton Sea is an important stop along the Pacific Flyway.

Table DA 5.2-3. Special-Status Wildlife with the Potential for Occurrence

Black Rock Geothermal Project

| Common Name               | Scientific Name                            | CESA/ESA            | CDFW Status <sup>a</sup> | Other Status <sup>b</sup> | Habitat Requirements  | Potential for Occurrence <sup>c</sup>  |
|---------------------------|--|---------------------|--------------------------|---------------------------|---|--|
| Invertebrates             |  |                     |                          |                           |   |  |
| Monarch butterfly         | <i>Danaus plexippus</i>                    | None/FC             | None                     | None                      | Migratory invertebrate. Monarchs in the southwest live in canyons or riparian areas. They lay their eggs on milkweed ( <i>Asclepias</i> spp.), which caterpillars feed exclusively on. The adults will nectar on many other species besides milkweed. | Not Expected. No milkweed observed during botanical surveys of the BSA.  |
| Fish                      |  |                     |                          |                           |   |  |
| Desert pupfish            | <i>Cyprinodon macularius</i>               | SE/FE               | None                     | None                      | Desert ponds, springs, marshes and streams in Southern California.  | Not Expected. No suitable habitat for this species in the BSA. This species is known to occur in the vicinity, but the Project will not impact any water ways. |
| Razorback sucker          | <i>Xyrauchen texanus</i>                   | SE/FE               | FP                       | None                      | Found in the Colorado river bordering California.   | Not Expected. No suitable habitat for this species in the BSA.   |
| Amphibians and Reptiles   |  |                     |                          |                           |   |  |
| Couch's spadefoot         | <i>Scaphiopus couchii</i>                  | None                | SSC                      | None                      | Temporary desert rain pools that last at least 7 days, within water temps > 15C, and subterranean refuge sites close by.  | Not Expected. No suitable habitat for this species in the BSA.   |
| Flat-tailed horned lizard | <i>Phrynosoma mcallii</i>                  | None                | SSC                      | None                      | Restricted to desert washes and desert flats in central riverside, eastern San Diego, and Imperial counties.  | Not Expected. No suitable habitat for this species in the BSA.   |
| Lowland leopard frog      | <i>Lithobates yavapaiensis</i>             | None                | SSC                      | None                      | Were found along the Colorado river and in streams near the Salton sea.   | Not Expected. No suitable habitat for this species in the BSA.   |
| Mojave Desert tortoise    | <i>Gopherus agassizii</i>                  | ST <sup>d</sup> /FT | None                     | None                      | Most commonly inhabits desert scrub, desert wash and Joshua tree habitats. The desert tortoise requires friable soil for burrow and nest construction and prefers creosote bush habitat and areas with wildflower blooms.                             | Not Expected. No suitable habitat for this species in the BSA.   |
| Sonoran Desert toad       | <i>Incilius alvarius</i>                   | None                | SSC                      | None                      | Breeds in temporary pools and irrigation ditches along the Colorado River and Southern Imperial Valley.   | Not Expected. One historical CNDDDB occurrence from 1916, possibly extirpated. The Project will not impact any water ways.                                     |
| Birds                     |  |                     |                          |                           |   |  |
| Black skimmer             | <i>Rynchops niger</i>                      | None                | SSC                      | USFWS - BCC               | Nest on gravel, bars, low islets, and sandy beaches. CDFW SSC status for nesting only.  | Not Expected: No suitable nesting habitat in BSA. This species is known from Refuge and historical CNDDDB occurrence from 1998.                                |
| Black-tailed gnatcatcher  | <i>Polioptila melanura</i>                 | None                | WL                       | None                      | Primarily inhabits wooded desert wash habitats; also occurs in desert scrub habitat, especially in winter.  | Not Expected: No suitable habitat in the BSA. Historical CNDDDB occurrences from 1968 and before. This species is uncommon to fairly common in the Refuge.     |
| Burrowing owl             | <i>Athene cunicularia</i>                  | None                | SSC                      | USFWS - BCC               | Inhabits open, dry annual or perennial grasslands, desert and scrublands characterized by low growing vegetation.   | Present: Suitable habitat, sign, and live owls were observed within the BSA during the March 2022 surveys. CNDDDB occurrences of this species in the BSA.      |
| California black rail     | <i>Laterallus jamaicensis coturniculus</i> | ST/None             | FP                       | USFWS - BCC               | Inhabits freshwater marshes, wet meadows, and shallow margins of saltwater marshes bordering larger bays.   | Not Expected: Protocol-level rail surveys conducted in 2022 in BSA did not detect any California black rail.   |

| Common Name              | Scientific Name                            | CESA/ESA          | CDFW Status <sup>a</sup> | Other Status <sup>b</sup> | Habitat Requirements   | Potential for Occurrence <sup>c</sup>  |
|--------------------------|--|-------------------|--------------------------|---------------------------|--|--|
| California brown pelican | <i>Pelecanus occidentalis californicus</i> | Delisted/Delisted | FP                       | None                      | Colonial nester on coastal islands just outside the surf line. Known to nest on Obsidian Butte and at mouth of Alamo River.  | High potential: The BSA has no potential nesting or foraging (open water) for this species, but because of proximity to a known nesting colony on Obsidian Butte, this species would be expected to fly over the BSA. Pelicans have high potential to fly over the BSA based on proximity to high use areas. Nesting colonies also known from mouth of the Alamo River. Forages on open water of Salton Sea. CNDDDB records of this species in BSA vicinity. This species was not observed during biological surveys of the BSA. |
| California gull          | <i>Larus californicus</i>                  | None              | WL                       | USFWS - BCC               | Littoral waters, sandy beaches, waters and shorelines of bays, tidal mud-flats, marshes, and lakes. CDFW WL status only for nesting.   | Present. Species was incidentally observed during surveys within the BSA; however, no suitable nesting habitat is present in the BSA. Historical CNDDDB occurrence from 1999 and before. This species is common to abundant in the Refuge year-round.  |
| Cooper's hawk            | <i>Accipiter cooperii</i>                  | None              | WL                       | None                      | Nest sites mainly in woodland, riparian growths of deciduous trees. CDFW WL for nesting only.  | Present: Species was incidentally observed during surveys within the BSA; however, no suitable nesting habitat is present in the BSA. Uncommon to fairly common in the Refuge. This species was incidentally observed during biological surveys of BSA.  |
| Crissal thrasher         | <i>Toxostoma crissale</i>                  | None              | SSC                      | None                      | Resident of southeastern deserts in desert riparian and desert wash habitats   | Not Expected: Historical CNDDDB records from 1940-1960s of this species in BSA vicinity. This species is rare to very uncommon in the Refuge. No suitable riparian habitat in the BSA.   |
| Gila woodpecker          | <i>Melanerpes uropygialis</i>              | SE/None           | None                     | USFWS - BCC               | In California, inhabits cottonwoods and other desert riparian trees, shade trees and date palms.   | Not Expected. Historical CNDDDB occurrences of this species from 1940-1950's. This species uncommon to fairly common in the Refuge. No suitable riparian habitat in the BSA.   |
| Gray-headed junco        | <i>Junco hyemalis caniceps</i>             | None              | WL                       | None                      | Summer resident of Clark Mountain (Eastern San Bernardino county) and Grapevine mountains (Inyo county). Nesting only.   | Not Expected. Historical CNDDDB occurrence from 1957. This species is rare to very uncommon in the Refuge.   |
| Gull-billed tern         | <i>Gelochelidon nilotica</i>               | None              | SSC                      | USFWS - BCC               | Only known breeding colonies at San Diego Bay and the Salton Sea. CDFW SSC status is for nesting only.   | Not Expected. No suitable nesting habitat in the BSA. This species is known from the Refuge but only historical CNDDDB occurrences from 1998 are present in BSA vicinity.  |
| Le Conte's thrasher      | <i>Toxostoma lecontei</i>                  | None              | SSC                      | USFWS - BCC               | Inhabits open desert wash, desert scrub, alkali desert scrub and desert succulent scrub habitat. This species commonly nests in dense, spiny shrub or densely branched cactus in desert wash habitat.  | Not Expected. No suitable nesting habitat in BSA. CNDDDB occurrence from 2009 in Refuge, but Refuge lists this species as extirpated breeding habitat.   |
| Loggerhead shrike        | <i>Lanius ludovicianus</i>                 | None              | SSC                      | None                      | Broken woodlands, savannah, pinyon-juniper, Joshua tree, and riparian woodlands, desert oases, scrub, and washes.  | Low Potential. No suitable nesting habitat in BSA. CNDDDB occurrence from 2007. The Refuge lists this species as occasional.   |
| Long-billed Curlew       | <i>Numenius americanus</i>                 | None              | WL                       | None                      | Inhibits Great Basin grassland, meadow and seeps. Favors gravelly soils and gently rolling terrain, and agriculture. Breeds in upland shortgrass prairies and wet meadows. Winters in Imperial County. CDFW WL for nesting only.   | Present. Species was incidentally observed during surveys within the BSA; however, no suitable nesting habitat is present in the BSA. No documented occurrences in CNDDDB. In winter, abundant in the Refuge.  |
| Merlin                   | <i>Falco columbarius</i>                   | None              | WL                       | None                      | Seacoast, tidal estuaries, open woodlands, savannahs, edges of grasslands and deserts, farms, and ranches. Clumps of trees or windbreaks are required for roosting in open country.  | Not Expected. No potentially suitable nesting habitat in BSA. CNDDDB occurrences in desert scrub east of the BSA. Rare to very uncommonly present in Refuge.   |
| Mountain plover          | <i>Charadrius montanus</i>                 | None              | SSC                      | USFWS - BCC               | Inhabits Great Basin grassland and scrub, Mojavean desert scrub, and Sonoran desert scrub. Breeding sites located on cliffs. Forages far afield, even to marshlands and ocean shores. This species is known to overwinter and forage in agricultural lands in Imperial Valley. | Low Potential. No suitable breeding habitat in the BSA, but this species is known to forage and overwinter in agricultural lands. Numerous CNDDDB occurrences in BSA vicinity. This species is uncommon to fairly common in the Refuge. This species was not observed during biological surveys of the BSA.  |
| Short-eared owl          | <i>Asio flammeus</i>                       | None              | SSC                      | USFWS - BCC               | Found in swamp lands, both fresh and salt lowland meadows, irrigated alfalfa fields. CDFW SSC status for nesting only.   | Low Potential. No suitable nesting habitat in the BSA. Historical CNDDDB occurrence of this species from 1956. This species is rare to occasionally observed in the Refuge.  |

| Common Name                    | Scientific Name                        | CESA/ESA | CDFW Status <sup>a</sup> | Other Status <sup>b</sup> | Habitat Requirements   | Potential for Occurrence <sup>c</sup>   |
|--------------------------------|--|----------|--------------------------|---------------------------|--|---|
| Southwestern willow flycatcher | <i>Empidonax traillii extimus</i>      | SE/FE    | None                     | None                      | Inhabits riparian woodlands in southern California.  | Not Expected: No suitable habitat in BSA. One CNDDDB occurrence in vicinity from 2007, and not reported from occurring in the Refuge.   |
| Western Snowy Plover           | <i>Charadrius alexandrinus nivosus</i> | None/FT  | SSC                      | None                      | Inhabits Great Basin standing waters, sandy shore, and wetland habitats. Needs sandy, gravelly, or friable soils for nesting.  | Not Expected: No suitable nesting habitat in BSA. One historical CNDDDB occurrence of this species from 1999. This species is uncommon to fairly common in the Refuge.  |
| White-faced Ibis               | <i>Plegadis chihi</i>                  | None     | WL                       | None                      | Forages in fresh emergent wetland, wet meadows, and flooded/irrigated pastures and croplands. Nests in dense fresh emergent wetland. CDFW WL for nesting only.   | Present. Species was incidentally observed during surveys within the BSA; however, no suitable nesting habitat is present in the BSA. Historical CNDDDB occurrence from 1980. This species is common to abundant in the Refuge.   |
| Yellow warbler                 | <i>Setophaga petechia</i>              | None     | SSC                      | USFWS - BCC               | Riparian plant associations in close proximity to water. Also nests in montane shrubbery in open conifer forests in cascades and Sierra Nevada. CDFW SSC status for nesting only.                                  | Low Potential. No suitable riparian nesting habitat in the BSA. Historical CNDDDB occurrences of this species from the 1952. This species is common, abundant or occasionally known in the Refuge. This species was not observed during biological surveys of the BSA.  |
| Yellow-breasted chat           | <i>Icteria virens</i>                  | None     | SSC                      | None                      | Summer resident inhabits riparian thickets of willow and salt cedar near watercourses. CDFW SSC status for nesting only.   | Not Expected: No suitable riparian habitat in the BSA. Historical CNDDDB occurrences of this species from the 1960s. This species is rare to very uncommon in the Refuge.   |
| Yuma Ridgway's rail            | <i>Rallus obsoletus yumanensis</i>     | ST/FE    | FP                       | None                      | Nests in freshwater marshes along the Colorado river and along the south and east ends of the Salton sea.  | Not Expected: No suitable habitat identified in the BSA based on protocol-level rail surveys conducted 2022.  |
| Mammals                        |  |          |                          |                           |  |   |
| American badger                | <i>Taxidea taxus</i>                   | None     | SSC                      | Fur bearing mammal        | Most abundant in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils in uncultivated land.  | Low Potential. Historical CNDDDB occurrences of this species from 1937. This species is known to occur on the Refuge. The BSA provides low quality suitable habitat. This species was not observed during biological surveys of the BSA.  |
| Big free-tailed bat            | <i>Nyctinomops macrotis</i>            | None     | SSC                      | None                      | Roosts in cliffs, rock crevices and some documentation of in buildings, caves, and tree cavities. This species prefers rocky and arid habitats including desert shrub, woodlands, evergreen forests, and riparian. | Low Potential. No CNDDDB records of this species in vicinity, but this species is known to occur on the Refuge. No suitable roosting habitat other than low quality buildings. This species may forage on agricultural lands in BSA and vicinity. This species was not observed during biological surveys of the BSA. |
| Desert bighorn sheep           | <i>Ovis canadensis nelsoni</i>         | None     | FP                       | None                      | Widely distributed from the White Mountains in Mono County to the Chocolate Mountains in Imperial County.  | Not Expected: Historical CNDDDB occurrence from 1986 near Chocolate Mountains. No suitable habitat in the BSA.  |
| Desert kit fox                 | <i>Vulpes macrotis arsipus</i>         | None     | None                     | Fur bearing mammal        | Inhabits open desert, shrubby, or shrub-grass habitat. This nocturnal species forages at night and typically resides in a den or burrow during the day.  | Low Potential. No CNDDDB records of this species in vicinity, but this species is known to occur on the Refuge. This species was not observed during biological surveys of the BSA.   |
| California leaf-nosed boat     | <i>Macrotis californicus</i>           | None     | SSC                      | None                      | Roost in caves, mines and buildings. Utilizes desert riparian habitat.   | Low Potential. No CNDDDB records of this species in vicinity, but this species is known to occur on the Refuge. No suitable roosting habitat other than low quality buildings. This species may forage on agricultural lands in BSA and vicinity. This species was not observed during biological surveys of the BSA. |
| Mexican long-tongued bat       | <i>Choeronycteris maxicana</i>         | None     | SSC                      | None                      | Roosts in caves, mines, rock crevices, and abandoned buildings. Known to use thorn scrub, Palo Verde-saguaro desert, semi-desert grassland, oak woodland, tropical deciduous forests, and riparian vegetation.     | Low Potential. No CNDDDB records of this species in vicinity, but this species is known to occur on the Refuge. No suitable roosting habitat other than low quality buildings. This species may forage on agricultural lands in BSA and vicinity. This species was not observed during biological surveys of the BSA. |
| Pallid bat                     | <i>Antrozous pallidus</i>              | None     | SSC                      | None                      | Inhabits rocky canyons, open farmland, scattered desert scrub, grassland, shrubland, woodland, and mixed conifer forest.   | Low Potential. Historical CNDDDB occurrences of this species from 1994. This species is known to occur on the Refuge. No suitable roosting habitat. This species may forage on  |

| Common Name              | Scientific Name                    | CESA/ESA | CDFW Status <sup>a</sup> | Other Status <sup>b</sup> | Habitat Requirements  | Potential for Occurrence <sup>c</sup>   |
|--------------------------|------------------------------------|----------|--------------------------|---------------------------|---|---|
|                          |                                    |          |                          |                           |   | agricultural lands in BSA and vicinity. This species was not observed during biological surveys of the BSA.   |
| Pocketed free-tailed bat | <i>Nyctinomops femorosaccus</i>    | None     | SSC                      | None                      | Variety of arid areas in southern California; pine juniper woodlands, desert scrub, palm oasis, desert wash desert riparian, etc.   | Low Potential. Historical CNDDDB occurrences of this species from 1994. This species is known to occur on the Refuge. No suitable roosting habitat. This species may forage on agricultural lands in BSA and vicinity. This species was not observed during biological surveys of the BSA.                            |
| Spotted bat              | <i>Euderma maculatum</i>           | None     | SSC                      | None                      | Roosts in prominent rock features. Desert desert-scrub, pinyon-juniper woodland, ponderosa pine, mixed conifer forest, canyon bottoms, rims of cliffs, riparian areas, fields, and open pasture.    | Low Potential. No CNDDDB records of this species in vicinity, but this species is known to occur on the Refuge. No suitable roosting habitat other than low quality buildings. This species may forage on agricultural lands in BSA and vicinity. This species was not observed during biological surveys of the BSA. |
| Western mastiff bat      | <i>Eumops perotis californicus</i> | None     | SSC                      | None                      | Many open, semi-arid to arid habitats, including conifer and deciduous woodlands, coastal scrub, grasslands, chaparral, etc. Roosts in crevices in cliff faces, high buildings, trees, and tunnels. | Low Potential. Historical CNDDDB occurrences of this species from 1994. No suitable roosting habitat. This species may forage on agricultural lands in BSA and vicinity. This species was not observed during biological surveys of the BSA.  |
| Western yellow bat       | <i>Lasiurus xanthinus</i>          | None     | SSC                      | None                      | Found in valley foothill riparian, desert riparian, desert wash and palm oasis habitats.  | Low Potential. Historical CNDDDB occurrences of this species from 1994. This species is known to occur on the Refuge. No suitable roosting habitat. This species may forage on agricultural lands in BSA and vicinity. This species was not observed during biological surveys of the BSA.                            |
| Yuma hispid cotton rat   | <i>Sigmodon hispidus eremicus</i>  | None     | SSC                      | None                      | Along the Colorado river and in grass and agricultural areas near irrigation waters. Refuge literature indicates this species is relatively common in agricultural fields and moist habitats.       | Moderate Potential. CNDDDB occurrence of this species from 2008 in 1 mile buffer. This species is common in the Refuge. Moderate quality suitable habitat is present in the agricultural fields in BSA. This species was not observed during biological surveys of the BSA.   |

Notes:

Caspian tern were included in CNDDDB query but were not included in this analysis because their only special-status listing is International Union for Conservation of Nature least concern.

<sup>a</sup> CDFW Status

<sup>b</sup> Other Status

CESA = California Endangered Species Act

CDFW = California Department of Fish and Wildlife

ESA = Federal Endangered Species Act

FC = Federal Candidate for listing

FE = Federally Endangered

FT = Federally Threatened

FP = Fully Protected

SE = State Endangered

ST = State Threatened

SSC = Species of Special Concern

USFWS BCC = United State Fish and Wildlife Service Bird of Conservation Concern

<sup>c</sup> Potential for Occurrence definitions are provided in the body text (Section 5.2.1.5)

<sup>d</sup> Desert tortoise are listed as CESA threatened. As of October 19, 2020, California Fish and Game Commission listed this species as candidate species for consideration as CESA endangered (2020).

**Migration corridors:** The site is not located within any wildlife movement corridors (migration corridors). The BSA is located adjacent to, but outside of, identified essential regional wildlife linkages. The California Essential Habitat Connectivity Project has no mapped Essential Connectivity Areas within the BSA (Spencer et al. 2010). The closest Essential Connectivity Area is approximately 10 miles northeast of the BSA along the Chocolate Mountains. A Linkage Network for the California Deserts, used in the Desert Renewable Energy Conservation Plan (DRECP) analysis, has no mapped habitat linkages or wildlife movement corridors within the BSA (Penrod et al. 2012). The closest linkage network is more than 50 miles northwest of the Project and connects landscape blocks in the San Bernardino Mountains between Joshua Tree National Park and the San Bernardino National Forest.

For more information, please see DA 7 Site Conditions and Species Discussion - Appendix B (g) (1) and DA 9 Surveys and Analysis within Buffers - Appendix B (g) (13) (B).

## **12. Plant and Animal Surveys and Documentation - Appendix B (g) (13) (D)**

*A description and results of all field studies and seasonal surveys used to provide biological baseline information about the project site and associated facilities. Include copies of the California Natural Diversity Database records and field survey forms completed by the applicant's biologist(s). Identify the date(s) the surveys were completed, methods used to complete the surveys, and the name(s) and qualifications of the biologists conducting the surveys...*

### **Information required to make AFC conform with regulations:**

*More detail is needed to describe the method of plant and animal species surveys conducted as well as names/qualifications of biologists, field survey forms and CNDDDB records.*

**Response:** The resumes of the six primary biologists who conducted the BRGP biological surveys are provided in Appendix DA 5.2-4. Protocol-level plant surveys were conducted by Morgan King and Rachel Newton. Reconnaissance-level wildlife surveys were conducted by Morgan King, Robert Hernandez, and Rebecca John. Marsh bird surveys were conducted by Katherine Sliwa and Courtney Conway.

Table DA 5.2-4 provides the dates and personnel when surveys were conducted.



Table DA 5.2-4. Biological Survey and Aquatic Resource Delineation Dates and Personnel

| Dates                             | Biologists                              | Survey Description <sup>a</sup>   |
|-----------------------------------|---|---|
| February 28 through March 3, 2022 | Rachel Newton and Rebecca John          | Aquatic resource delineation and reconnaissance-level wildlife survey   |
| March 4, 2022                     | Rachel Newton and Morgan King           | Protocol-level botanical surveys  |
| March 5 through 12, 2022          | Rachel Newton and Morgan King           | Protocol-level botanical surveys, reconnaissance-level wildlife surveys |
| March 13, 2022                    | Rachel Newton and Morgan King           | Aquatic resource delineation and reconnaissance-level wildlife survey   |
| March 15, 2022                    | Rachel Newton and Eric Weis             | Aquatic resource delineation and reconnaissance-level wildlife survey   |
| March 19, 2022                    | Morgan King and Hannah Worthington      | Protocol-level botanical surveys  |
| May 6 through 31, 2022            | Kathryn M. Sliwa and Courtney J. Conway | Protocol-level Yuma Ridgway's rail and California black rail surveys    |
| November 4, 2022                  | Robert Hernandez                        | Reconnaissance-level biological survey                                  |

<sup>a</sup> Jacobs biologists, botanists, and subconsultants were hired by the Applicant to conduct surveys for three separate BHER projects during the same field efforts: BRGP, Elmore North Geothermal Project, and Morton Bay Geothermal Project. These dates and descriptions were for all projects and surveys to account for overlapping project features and buffers. Auxiliary features will be used by all three facilities and included in duplicate in all permit applications.

CNDDDB records (under confidential designation) were submitted digitally on May 24, 2023 for the special-status species observed during biological surveys of BRGP and associated buffers.

**Protocol-level plant survey methods:** Most of the BSA is highly manipulated by agriculture or degraded without vegetation, thus lacking in potentially suitable habitat for any special-status plant species. When natural communities with potentially suitable habitat for special-status plants were encountered, botanists conducted surveys in accordance with CDFW and USFWS protocols (CDFW 2018; USFWS 1996). Natural plant communities observed within the BSA occurred in small patches less than three feet in diameter and were most frequently found in intermittently flooded irrigation canals or along the perimeter of agriculture fields. One 2.8-acre isolated area of North American Warm Desert Playa was observed within the BSA, which contained poor-quality suitable saline/alkaline habitat. In suitable special-status plant habitat, botanists conducted pedestrian surveys to identify all species to the taxonomic level necessary to determine whether they are a special-status plant species. In large enough areas, the 2.8 acre North American Warm Desert Playa, biologists walked 50-foot transects to ensure 100% coverage of area. For small patches (less than 3 feet in diameter), it was not feasible to conduct transects so botanists did intuitively controlled pedestrian surveys of the area to ensure 100% coverage of area.

No CNDDDB forms were recorded because no special-status plants were observed.

**Reconnaissance-level wildlife survey methods:** Reconnaissance-level wildlife survey were conducted by windshield surveys and pedestrian surveys when suitable habitat was observed. Biologists drove 10-15 mph throughout the BRGP BSA looking for biological resources. Biologists gave special attention to each side of irrigation canals/drains, trees, riparian, and marsh/wetland habitats. The primary focus of this survey was to record observed wildlife species in the BSA, including incidental observations of burrowing

owls. Biologists recorded all wildlife observations and wildlife sign (such as burrows, tracks, scat, carcasses, and vocalizations). Notes were made on vegetation types providing potentially suitable wildlife habitat.

The 2022 wildlife reconnaissance level burrowing owl surveys satisfied the first two steps of the CDFG 2012 guidelines: habitat assessment and determining occupancy. The third step will be satisfied by conducting breeding season burrowing owl surveys, currently underway by Jacobs biologists.

Please see response to DA 7 Site Conditions and Species Discussion, Appendix B (g) (1) (e) above for further discussion on burrowing owls.

**Protocol-level marsh bird survey methods:** No suitable marsh bird habitat was identified in the BSA, so no surveys were conducted in this area. Survey methods used for suitable marsh bird habitat in Elmore North Geothermal Project and Morton Bay Geothermal Project are provided in Appendix 2, *Distribution and occupancy of Yuma Ridgway's rails within proposed geothermal development areas in Imperial Valley, California*, (Sliwa and Conway 2022).

### 13. Agency Discussions and Surveys - Appendix B (g) (13) (D) (i)

*Current biological resources surveys conducted using appropriate field survey protocols during the appropriate season(s). State and federal agencies with jurisdiction shall be consulted for field survey protocol guidance prior to surveys if a protocol exists;*

**Information required to make AFC conform with regulations:**

*Rail surveys were decided not to be done, including surveys for burrowing owl because they were "presumed present". There was no evidence of consulting with the CDFW or USFWS to see what species both agencies would recommend conducting a survey for. Staff believes protocol level surveys should be conducted for certain species such as the above, with the addition of kit fox.*

**Response:** This section describes rail, owl, and fox surveys.

**Yuma Ridgway's Rail:** Marsh bird habitat assessments were conducted in the proposed development area and no suitable habitat was present in BSA. The marsh bird technical survey report, *Distribution and occupancy of Yuma Ridgway's rails within proposed geothermal development areas in Imperial Valley, California*, (Sliwa and Conway 2022) documents the results of this protocol survey. See response DA 7 Site Conditions and Species Discussion - Appendix B (g)(1)(c).

**Burrowing owl:** The 2022 wildlife reconnaissance level surveys satisfied the first two steps of the CDFG 2012 guidelines: habitat assessment and determining occupancy. The third step will be satisfied by conducting breeding season burrowing owl surveys, which are currently underway. The results of the survey will be documented in a report following *Staff Report on Burrowing Owl Mitigation* (CDFG 2012, Appendix 5.2-1d) reporting recommendations.

Please see response to DA 7 Site Conditions and Species Discussion, for further discussion on burrowing owls.

**Desert kit fox:** CDFW has not defined protocol-level surveys for desert kit fox. During the reconnaissance-level survey, biologists looked for canid burrows and suitable friable soil for burrow construction. Much of the BSA is under active agriculture production, meaning flood irrigated or frequently disturbed, which is not suitable burrowing habitat.

Please also see response provided in DA 8 Additional Species Surveys- Appendix B (g)(13)(A)(v).



## 14. Wetland Discussions - Appendix B (g) (13) (D) (iii)

*If the project or any related facilities could impact a jurisdictional or non-jurisdictional wetland, provide completed Army Corps of Engineers wetland delineation forms or determination of wetland status pursuant to Coastal Act requirements, name(s) and qualifications of biologist(s) completing the delineation, the results of the delineation and a table showing wetland acreage amounts to be impacted.*

### **Information required to make AFC conform with regulations:**

*Besides issues raised previously about what is considered the "project" and what must be surveyed appropriately, staff found other discrepancies. Section 5.2.2.2.7 says that wetlands will not be affected, then contradicts that statement in the next sentence saying "if" gen-tie lines have impacts then a Section 404 permit would be required. Also, Figure 5.2-3 seems to show the project boundary and project related facilities intersecting with potential wetland features. This highlights again the importance of being clear on what is considered the "project" since laydown construction/parking area looks to overlap a wetland feature. In addition, wetland delineation forms were provided, but no details specified were mentioned or any discussion provided.*

**Response:** No wetlands were found within the BRGP BSA (Appendix DA 5.2-2). Please see the above response to DA 10 Wetland Delineation Figures - Appendix B (g) (13) (B)(iii), for further discussion.

## 15. Species Impacts and Sonny Bono Salton Sea National Wildlife Refuge Impacted Species - Appendix B (g) (13) (E) (i)

*...all impacts (direct, indirect, and cumulative) to biological resources from project site preparation, construction activities, plant operation, maintenance, and closure. Discussion shall also address sensitive species habitat impacts from cooling tower drift and air emissions;*

### **Information required to make AFC conform with regulations:**

*Please reference (g)(1)*

**Response:** The air quality impacts were assessed from construction and operation of the BRGP in Section 5.1 of the AFC.

### **Construction Air Emissions**

Construction impacts will not cause or contribute to the violation of an ambient air quality standard (AAQS), with the exception of particulate matter with an aerodynamic diameter of 10 microns or less (PM<sub>10</sub>). These standards were promulgated to protect public health and the environment. Therefore, impacts consisting of background and modeling impacts that are less than the AAQS are expected to have a less than significant impact on the environment. In the case of PM<sub>10</sub>, the Project area's background PM<sub>10</sub> concentrations already exceed the California AAQS and BRGP construction contributes approximately 11% of the AAQS for this finite and temporary activity (see AFC Table 5.1-33). To reduce the PM<sub>10</sub> impacts to less than significant levels, the Applicant will implement the following mitigation measures.

- All disturbed areas, including bulk material storage which is not being actively utilized, shall be effectively stabilized and visible emissions shall be limited to no greater than 20 percent opacity for dust emissions by using water, chemical stabilizers, dust suppressants, tarps or other suitable material such as vegetative ground cover.

- All onsite and offsite unpaved roads will be effectively stabilized and visible emissions shall be limited to no greater than 20 percent opacity for dust emissions by paving, chemical stabilizers, dust suppressants and/or watering, except as otherwise provided for by Rule 801.
- All unpaved traffic areas 1 acre or more with 75 or more average vehicle trips per day will be effectively stabilized and visible emissions shall be limited to no greater than 20 percent opacity for dust emissions by paving, chemical stabilizers, dust suppressants and/or watering.
- The transport of bulk materials shall be completely covered unless six inches of freeboard space from the top of the container is maintained with no spillage and loss of bulk material. In addition, the cargo compartment of all haul trucks is to be cleaned and/or washed at delivery site after removal of bulk material.
- All track-out or carry-out will be cleaned at the end of each workday or immediately when mud or dirt extends a cumulative distance of 50 linear feet or more onto a paved road within an urban area.
- Movement of bulk material shall be stabilized prior to handling or at points of transfer with application of sufficient water, chemical stabilizers or by sheltering or enclosing the operation and transfer line.
- The construction of any new unpaved road is prohibited within any area with a population of 500 or more unless the road meets the definition of a temporary unpaved road. Any temporary unpaved road shall be effectively stabilized, and visible emissions shall be limited to no greater than 20 percent opacity for dust emissions by paving, chemical stabilizers, dust suppressants and/or watering.
- Use alternative fueled or catalyst equipped diesel construction equipment, including all off-road and portable diesel-powered equipment to the extent feasible.
- Minimize idling time either by shutting equipment off when not in use or reducing the time of idling to 5 minutes as a maximum.
- Limit, to the extent feasible, the hours of operation of heavy-duty equipment and/or the amount of equipment in use.
- Replace fossil fueled equipment with electrically driven equivalents (provided they are not run via a portable generator set).

In addition, the air quality construction impacts were determined for secondary formation of particulate matter with an aerodynamic diameter of 2.5 microns or less (PM<sub>2.5</sub>) and ozone would be less than significant (see AFC Table 5.1-31).

### **Operational Air Emissions**

Operational impacts will not cause or contribute to the violation of an AAQS, with the exception of PM<sub>10</sub>. These standards were promulgated to protect public health and the environment. Therefore, impacts consisting of background and modeling impacts that are less than the AAQS are expected to have a less than significant impact on the environment. In the case of PM<sub>10</sub>, the Project area's background PM<sub>10</sub> concentrations already exceed the California AAQS and the BRGP contributes approximately 6.4% of the AAQS (see AFC Table 5.1-30). In addition, the air quality operational impacts were determined for secondary formation of particulate matter with an aerodynamic diameter of 2.5 microns or less (PM<sub>2.5</sub>) and ozone (see AFC Table 5.1-28), a fumigation analysis (see AFC Section 5.1.10.1.2), and a nitrogen deposition analysis (see AFC Section 5.1.10.1.3). These analyses demonstrate that the Project would have a less than significant impact on the environment and on sensitive species and habitats.

Due to the warm climate in the Project area, with daily average winter temperatures ranging between 65 and 75 degrees Fahrenheit, it is unlikely that a significant amount of cooling tower drift would extend off the Project site before evaporation occurs. Considering the Project area is surrounded by irrigated agricultural land and nearby Salton Sea, the additional moisture from the cooling towers is expected to be

negligible compared to moisture sources in the region and would not likely alter the local humidity level appreciably, resulting in changes to sensitive habitats.

## 16. Mitigation Adequacy - Appendix B (g) (13) (F) (i)

*All measures proposed to avoid and/or reduce adverse impacts to biological resources;*

### **Information required to make AFC conform with regulations:**

*These sections are lacking enough detail to determine whether mitigation is adequate. Details to include would be specifics of timing/methods/monitoring on nesting surveys (timing, buffer zones, monitoring, etc.), and other specific required surveys with protocols like the burrowing owl and rail surveys. Without these details, staff cannot determine if avoidance and mitigation will be sufficient. Certain required surveys are missing from discussion along with possible needed mitigation for impacts to species and habitat. Please Reference (g)(1).*

**Response:** This section provides more detail on pre-construction survey timing, methods, monitoring, and exclusion buffers for burrowing owls, birds protected by the Migratory Bird Treaty Act, and burrowing species (American badger, desert kit fox, and Yuma hispid cotton rat). No pre-construction surveys are required for Yuma Ridgway's rail because there is no suitable habitat in the BSA.

**Burrowing Owl:** Breeding season surveys in the BSA plus 100-meter buffer will be conducted in accordance with the *Staff Report on Burrowing Owl Mitigation* (CDFG 2012; Appendix DA 5.2-1d) guidelines and in coordination with CDFW (Appendix DA 5.2-5). Three breeding season surveys and one follow up non-breeding season survey will be conducted. Surveys will be scheduled with a three-week lapse. Two surveys will be conducted within the peak breeding season, defined as from April 15 through July 15 (CDFW 2012). Breeding season is defined as from February 1 through August 31 and nonbreeding season September 1 through January 31. Results from breeding season surveys will be used to quantify mitigation and impacts to burrowing owls.

Breeding season burrowing owl survey schedule and reporting:

- June 5-9, 2023: first breeding season survey (within peak breeding season).
- July 5-15, 2023: second breeding season survey will be conducted (also within peak breeding season and in accordance with CDFW guidelines that one survey should take place between June 15 and July 15).
- Approximately August 4, 2023: preliminary report will be prepared summarizing the results of the first two survey sessions.
- Prior to August 31, 2023: third survey.
- Between September 1, 2023, and January 31, 2024: fourth non-breeding season survey.
- Approximately December 31, 2023: submission of final survey report.

If occupied burrowing owl burrows cannot be avoided in the BSA the Applicant will prepare a Burrowing Owl Artificial Burrow and Exclusion Plan following guidelines in the *Staff Report on Burrowing Owl Mitigation* (CDFG 2012; Appendix DA 5.2-1d). This plan will define exclusion techniques, such as installing one-way doors in burrow openings during the non-breeding season.

Preconstruction surveys will follow the *Take avoidance (pre-construction) survey* guidelines in the *Staff Report on Burrowing Owl Mitigation* (CDFG 2012; Appendix DA 5.2-1d). Excerpt below:

Take avoidance surveys are intended to detect the presence of burrowing owls on a project site at a fixed period in time and inform necessary take avoidance actions. Take avoidance surveys may detect changes in owl presence such as colonizing owls that have recently moved onto the site, migrating owls, resident burrowing owls changing burrow use, or young of the year that are still present and have not dispersed.

The *Staff Report on Burrowing Owl Mitigation* (CDFG 2012; Appendix DA 5.2-1d) also recommends buffer distances based on disturbance level:

Scobie and Faminow (2000) developed guidelines for activities around occupied burrowing owl nests recommending buffers around low, medium, and high disturbance activities, respectively (see below).

Recommended restricted activity dates and setback distances by level of disturbance for burrowing owls (Scobie and Faminow 2000).

| Location      | Time of Year   | Level of Disturbance |       |       |
|---------------|----------------|----------------------|-------|-------|
|               |                | Low                  | Med   | High  |
| Nesting sites | April 1-Aug 15 | 200 m*               | 500 m | 500 m |
| Nesting sites | Aug 16-Oct 15  | 200 m                | 200 m | 500 m |
| Nesting sites | Oct 16-Mar 31  | 50 m                 | 100 m | 500 m |

\* meters (m)

The *Staff Report on Burrowing Owl Mitigation* (CDFG 2012) describes standard mitigation but does not quantify temporary or permanent mitigation ratios.

As set forth in more detail in Appendix A, the current scientific literature supports the conclusion that mitigation for permanent habitat loss necessitates replacement with an equivalent or greater habitat area for breeding, foraging, wintering, dispersal, presence of burrows, burrow surrogates, presence of fossorial mammal dens, well drained soils, and abundant and available prey within close proximity to the burrow.

Mitigating impacts. Habitat loss and degradation from rapid urbanization of farmland in the core areas of the Central and Imperial valleys is the greatest of many threats to burrowing owls in California (Shuford and Gardali, 2008). At a minimum, if burrowing owls have been documented to occupy burrows (see Definitions, Appendix B) at the Project site in recent years, the current scientific literature supports the conclusion that the site should be considered occupied and mitigation should be required by the California Environmental Quality Act (CEQA) lead agency to address Project -specific significant and cumulative impacts. Other site-specific and regionally significant and cumulative impacts may warrant mitigation. The current scientific literature indicates the following to be best practices. If these best practices cannot be implemented, the lead agency or lead investigator may consult with the Department to develop effective mitigation alternatives. The Department is also available to assist in the identification of suitable mitigation lands.

1. Where habitat will be temporarily disturbed, restore the disturbed area to pre- Project condition including decompacting soil and revegetating. Permanent habitat protection may be warranted if there is the potential that the temporary impacts may render a nesting site (nesting burrow and satellite burrows) unsustainable or unavailable depending on the time frame, resulting in reduced survival or abandonment. For the latter potential impact, see the permanent impact measures below.

2. Mitigate for permanent impacts to nesting, occupied and satellite burrows and/or burrowing owl habitat such that the habitat acreage, number of burrows and burrowing owls impacted are replaced based on the information provided in Appendix A. Note: A minimum habitat replacement recommendation is not provided here as it has been shown to serve as a default, replacing any site-specific analysis and discounting the wide variation in natal area, home range, foraging area, and other factors influencing burrowing owls and burrowing owl population persistence in a particular area.
3. Mitigate for permanent impacts to nesting, occupied and satellite burrows and burrowing owl habitat with (a) permanent conservation of similar vegetation communities (grassland, scrublands, desert, urban, and agriculture) to provide for burrowing owl nesting, foraging, wintering, and dispersal (i.e., during breeding and non-breeding seasons) comparable to or better than that of the impact area, and (b) sufficiently large acreage, and presence of fossorial mammals. The mitigation lands may require habitat enhancements including enhancement or expansion of burrows for breeding, shelter and dispersal opportunity, and removal or control of population stressors. If the mitigation lands are located adjacent to the impacted burrow site, ensure the nearest neighbor artificial or natural burrow clusters are at least within 210 meters (Fisher et al. 2007).
4. Permanently protect mitigation land through a conservation easement deeded to a nonprofit conservation organization or public agency with a conservation mission, for the purpose of conserving burrowing owl habitat and prohibiting activities incompatible with burrowing owl use. If the Project is located within the service area of a Department approved burrowing owl conservation bank, the Project proponent may purchase available burrowing owl conservation bank credits.
5. Develop and implement a mitigation land management plan to address long-term ecological sustainability and maintenance of the site for burrowing owls (see Management Plan and Artificial Burrow sections below, if applicable).
6. Fund the maintenance and management of mitigation land through the establishment of a long-term funding mechanism such as an endowment.

The Applicant proposes two compensatory mitigation measures for impacts to burrowing owl. The Project Owner's biologists are currently conducting breeding season burrowing owl surveys which will be used to quantify mitigation and impacts to live burrowing owls in occupied burrows. The Applicant proposes to mitigation of 100% of permanent impacts to burrowing owl foraging habitat, which is 108.41 acres of agricultural land.

Please see DA 17 Compensatory Habitat and Management Evaluation, for a discussion of a burrowing owl conservation bank.

**Birds Protected by Migratory Bird Treaty Act:** The Applicant has proposed pre-construction surveys in Mitigation Measure Section 5.2.3.7 *Pre-construction Surveys to Avoid Harassment or Harm*. Agency approved Nesting Bird Management Plans have relatively standard criteria for timing, methods, exclusion buffers:

- Nesting bird surveys will be conducted during the nesting season (typically February 1 through August 31).
- Nesting bird survey methods will follow standard nest locating techniques such as those described in Martin and Guepel (1993) and may vary based on site specific conditions, such as the complexity of habitat, the number of vantage points, birds observed in the area, and their territory size. Surveys may be systematic transects (e.g., 33 foot intervals), meandering transects (e.g., where specific topography, substrates, or vegetation are targeted) or other methods which are determined by the qualified biologist based on site-specific characteristics.

- Surveys will be conducted within ten days prior to the start of disturbance.
- Surveys will include a buffer of 300-feet for non-raptors and 500-feet for raptors.
- If active nests are found, an exclusion buffer will be established and marked in the field around each nest. Construction shall not occur within the designated nest exclusion buffer until the nest is no longer active (i.e., the young fledge from the nest, or the nest is abandoned). Standard agency approved nest exclusion buffer distances by bird species are provided in Table DA 5.2-5.
- Active nests will be monitored to ensure that measures are being employed to minimize disturbance to nesting birds.

Table DA 5.2-5. Agency Approved Nest Exclusion Buffers During Construction

| Avian Group<br>(nest type/<br>location) | Species Potentially Nesting Within BRGP   | Minimum Buffers for Ground<br>Construction Per Disturbance<br>Level (feet) |
|---|---|--|
| Waterfowl and<br>rails                  | Canada goose, wood duck, mallard, cinnamon teal,<br>ruddy duck, Virginia rail, sora, American coot, pied-<br>billed grebe | 150  |
|   | Yuma Ridgway's rail, California black rail  | Consult CDFW and USFWS   |
| Pelican                                 | California brown pelican  | Consult CDFW and USFWS   |
| Quail                                   | California quail, Gambel's quail  | 150  |
| Herons                                  | Great blue heron, great egret, snowy egret, cattle egret,<br>black-crowned night-heron                                    | 250  |
| Birds of prey<br>(Category 1)           | American kestrel, barn owl, western screech-owl   | 300  |
| Birds of prey<br>(Category 2)           | Cooper's hawk, red-tailed hawk red-shouldered hawk,<br>great horned owl, burrowing owl                                    | 300  |
| Birds of prey<br>(Category 3)           | Turkey vulture, red-tailed hawk (2; some rural/ remote),<br>white-tailed kite, northern harrier, long-eared owl           | 500  |
| Shorebirds                              | Killdeer  | 200  |
| Pigeons                                 | Band-tailed pigeon  | 150  |
| Doves                                   | Mourning dove, white-winged dove, common ground-<br>dove  | 150  |
| Roadrunners                             | Greater roadrunner  | 300  |
| Nightjars                               | Lesser nighthawk, common poorwill   | 150  |
| Swifts                                  | White-throated swift  | 200  |
| Hummingbirds                            | Black-chinned hummingbird, Anna's hummingbird,<br>Costa's hummingbird, Allen's hummingbird                                | 100  |
| Woodpeckers                             | Acorn woodpecker, ladder-backed woodpecker,<br>Nuttall's woodpecker, downy woodpecker, north- ern<br>flicker              | 150  |



| Avian Group<br>(nest type/<br>location)                     | Species Potentially Nesting Within BRGP  | Minimum Buffers for Ground<br>Construction Per Disturbance<br>Level (feet) |
|---|--|--|
| Passerines (cavity<br>and<br>crevice nesters)               | Say's phoebe, ash-throated flycatcher, brown- crested flycatcher, tree swallow, rock wren, canyon wren, house wren, Bewick's wren (2), mountain chickadee, oak titmouse, western bluebird  |  |
| Passerines<br>(bridge, culvert,<br>and building<br>nesters) | Black phoebe, Say's phoebe, northern rough-winged swallow, cliff swallow, barn swallow, house finch (3)  | 100  |
| Passerines<br>(ground nesters,<br>open habitats)            | Horned lark, rock wren, western meadowlark, orange-crowned warbler, lark sparrow, grasshopper sparrow  | 150  |
| Passerines<br>(understory and<br>thicket nesters)           | Bushtit, Bewick's wren blue- gray gnatcatcher (2), black-throated gray warbler, yellow- breasted chat, spotted towhee, black-chinned sparrow, sage sparrow, song sparrow, black-headed grosbeak, blue grosbeak, lazuli bunting, American goldfinch | 150  |

**Yuma Ridgway's Rail:** No surveys or monitoring is necessary because there is no suitable rail habitat in the BSA. Please see Data Adequacy 7, Appendix B (g)(1)(c).

**Burrowing species (American badger, desert kit fox, and Yuma hispid cotton rat):** The Applicant has proposed pre-construction surveys for these three species in Mitigation Measure Section 5.2.3.7

*Preconstruction Surveys to Avoid Harassment or Harm.* CDFW has not defined survey protocols for these species.

- Surveys would be pedestrian and include all suitable habitat within the BSA and a 250-foot buffer.
- Inactive burrows and setts that would be directly impacted by construction activities shall be excavated by hand and backfilled to prevent reuse by badgers or kit fox.
- Potentially and definitely active burrows and setts shall not be disturbed during the whelping/pupping season (February 1 through September 30). Potentially and definitely active dens that would be directly impacted by construction activities shall be monitored by the qualified biologist for three consecutive nights using a tracking medium (such as diatomaceous earth or fire clay) and/or infrared camera stations at the entrance. If no tracks are observed in the tracking medium or no photos of the target species are captured after three nights, the den shall be excavated and backfilled by hand. If tracks are observed, the qualified biologist shall directly observe the burrow or sett and block the entrance after the animal exits and the qualified biologist has verified that there are no animals in the burrow or sett. The burrow or den shall be blocked with natural materials (e.g., rocks, dirt, sticks, and vegetation piled in front of the entrance) or passive hazing methods shall be employed for the next three to five nights to discourage the badger or kit fox from continued use. Passive hazing methods shall be approved by CDFW. Live or other traps shall not be used (CCR Title 14 Section 460). A kit fox or badger shall never be trapped in its burrow/sett. After verification that the den is unoccupied it shall then be excavated and backfilled by hand to ensure that no badgers or kit fox are trapped in the den.



## 17. Compensatory Habitat and Management Evaluation - Appendix B (g) (13) (F) (ii)

*All off-site habitat mitigation and habitat improvement or compensation, and an identification of contacts for compensation habitat and management;*

### **Information required to make AFC conform with regulations:**

*These sections are lacking enough detail to determine whether mitigation is adequate. Also, no mention of where mitigation lands might be, the entity who would oversee upkeep, and so forth, is discussed. Please provide a detailed discussion and also the contact information specific to compensation habitat and management.*

**Response:** Breeding season burrowing owl surveys are currently underway and will be used to quantify mitigation and impacts to live burrowing owls in occupied burrows. The Applicant proposes to mitigate 100% of permanent impacts to burrowing owl foraging habitat, which is 108.41 acres of agricultural land (Mitigation Measure Section 5.2.3.11).

Compensatory mitigation for potential Project impacts to burrowing owl and burrowing owl habitat may be achieved by purchasing credits from Umbrella Bank Site 8 of the Mojave Desert Tortoise Conservation Bank, whose Service Area overlaps the plant sites. The conservation bank provides burrowing owl habitat credits and has been approved by both USFWS and CDFW. The Regulatory In-lieu Fee and Bank Information Tracking System (RIBITS) indicates that 106.3 credits for burrowing owl are available and 233.7 credits for burrowing owl habitat are available within Umbrella Bank Site 8.

The Mojave Desert Tortoise Conservation Bank  
Richard Lyons, Bank Manager  
[mojavedetobank@gmail.com](mailto:mojavedetobank@gmail.com)  
310-795-5616

## 18. Agency Communications - Appendix B (g) (13) (H)

*Submit copies of any preliminary correspondence between the project applicant and state and federal resource agencies regarding whether federal or state permits from other agencies such as the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, the U.S. Army Corps of Engineers, the California Department of Fish and Game, and the Regional Water Quality Control Board will be required for the proposed project.*

### **Information required to make AFC conform with regulations:**

*There was no official correspondence submitted or discussed. It was not specified whether the project applicant has reached out to any of these agencies. Reaching out to agency officials is essential due to protected wildlife areas, possible wetland features and potential special status species occurring adjacent to the project. Please submit copies of preliminary discussions with these agencies to show early coordination is in progress.*

**Response:** Appendix DA 5.2-5 provides preliminary agency communication with USFWS and CDFW regarding three BHE Renewables proposed projects.

## 19. Agency Contact and Communications - Appendix B (i) (2)

*The name, title, phone number, address (required), and email address (if known), of an official who was contacted within each agency, and provide the name of the official who will serve as a contact person for Commission staff.*

**Information required to make AFC conform with regulations:**

*It was not specified whether these agency officials have been contacted by the project applicant. The project applicant needs to reach out and contact these agencies and officials to also verify that they are providing the CEC with the correct official in charge of the region where the project is located.*

**Response:** Please see Appendix DA 5.2-5 for details regarding preliminary agency communications with USFWS and CDFW regarding the Project. Table DA 5.2-6.

**Table DA 5.2-6. Agency Contacts for Biological Resources**

| Issue                    | Agency                       | Contact Information  |
|--------------------------|------------------------------|--|
| State-listed species     | CDFW, Inland Deserts Region  | Magdalena Rodriguez<br>3602 Inland Empire Blvd, Suite C-220 Ontario, CA 91764<br>(909) 484-0167                        |
| State-listed species     | CDFW Salton Sea Program      | Charles (Charley) Land<br>78078 Country Club Drive Suite 109<br>Bermuda Dunes, CA 92203<br>(760) 218-0063              |
| Federally-listed species | USFWS                        | Vincent James/District Supervisor<br>777 E. Tahquitz Canyon Way, Suite 208<br>Palm Springs, CA 92262<br>(760) 322-2070 |
| Section 404              | USACE                        | Kyle Dahl<br>5900 La Place Ct<br>Carlsbad, CA 92008<br>(760) 602-4834  |
| Section 7 Consultation   | USACE                        | Kyle Dahl<br>5900 La Place Ct<br>Carlsbad, CA 92008<br>(760) 602-4834  |
| Waters of the State      | RWQCB – Colorado River Basin | Zakary Owens, P.G<br>73-720 Fred Waring Drive, Suite 100<br>Palm Desert, CA 92260<br>(530) 859-5515                    |

## 20. Schedule for Permits - Appendix B (i) (3)

*A schedule indicating when permits outside the authority of the commission will be obtained and the steps the applicant has taken or plans to take to obtain such permits.*

**Information required to make AFC conform with regulations:**

*This section asserts that the project will not require any permits. However, Table 5.2-7 repeatedly states impacts are “not anticipate(d)” or are not “expected”, which indicates a lesser degree of confidence in these statements. Also, what is defined as the BSA and surveyed will make a difference in possible permits required. Please provide clarification on this as well as a schedule for potentially required permits.*

**Response:** The Project will not require any biological resource or wetland permits. Therefore, a permit schedule is not necessary.

## 5.7 Noise and Vibration

### 27. Operational Noise at Site Boundary - Appendix B (g) (4) (D)

*An estimate of the project noise levels, during both construction and operation, at residences, hospitals, libraries, schools, places of worship or other facilities where quiet is an important attribute of the environment, within the area impacted by the proposed project.*

**Information required to make AFC conform with regulations:**

*Only cooling tower noise level was provided (Section 5.7.3.3.3 p. 5.7-9 to 5.7-10); however, the aggregate noise level from all operational equipment was not provided. Please provide the project's total operational noise level at one of the project site boundaries.*

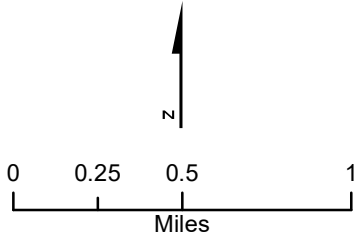
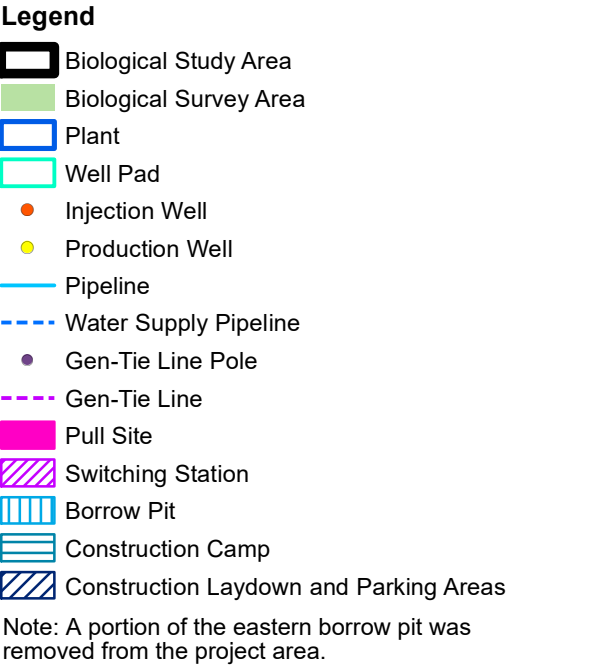
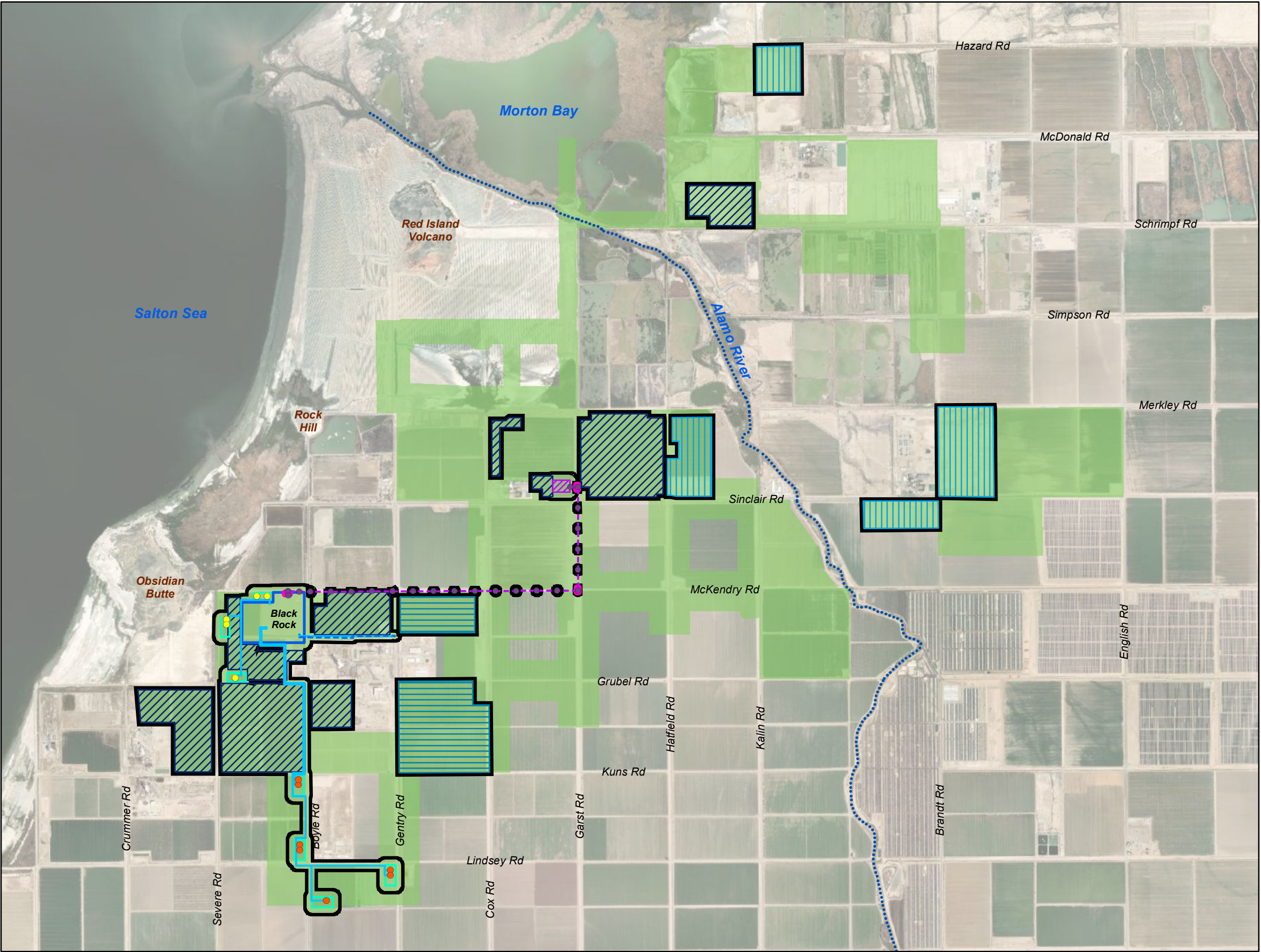
**Response:** BRGP's predicted noise impacts, including all steady-state operating equipment, at the nearest human receptor site is predicted to be 58 dBA.

## **Appendix DA 5.2-1a**

### **Biological Study Area**







**Figure DA 5.2-1a**  
**Biological Study Area**  
**Black Rock Geothermal Project**  
Imperial County, California

**Appendix DA 5. 5.2-1b**  
**Distribution and occupancy of Yuma**  
**Ridgway's rails within proposed**  
**geothermal development areas in**  
**Imperial Valley, California –**  
**CONFIDENTIAL**





**Appendix DA 5.2-1c**  
**CNDDB Occurrences within 1 Mile –**  
**CONFIDENTIAL**



# **Appendix DA 5.2-1d**

## **Staff Report on Burrowing Owl**

### **Mitigation**



# **Staff Report on Burrowing Owl Mitigation**

State of California

Natural Resources Agency

**Department of Fish and Game**

March 7, 2012<sup>1</sup>

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<sup>1</sup> This document replaces the Department of Fish and Game 1995 Staff Report On Burrowing Owl Mitigation.

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## INTRODUCTION AND PURPOSE

Maintaining California's rich biological diversity is dependent on the conservation of species and their habitats. The California Department of Fish and Game (Department) has designated certain species as "species of special concern" when their population viability and survival is adversely affected by risk factors such as precipitous declines or other vulnerability factors (Shuford and Gardali 2008). Preliminary analyses of regional patterns for breeding populations of burrowing owls (*Athene cunicularia*) have detected declines both locally in their central and southern coastal breeding areas, and statewide where the species has experienced modest breeding range retraction (Gervais et al. 2008). In California, threat factors affecting burrowing owl populations include habitat loss, degradation and modification, and eradication of ground squirrels resulting in a loss of suitable burrows required by burrowing owls for nesting, protection from predators, and shelter (See Appendix A).

The Department recognized the need for a comprehensive conservation and mitigation strategy for burrowing owls, and in 1995 directed staff to prepare a report describing mitigation and survey recommendations. This report, "1995 Staff Report on Burrowing Owl Mitigation," (Staff Report) (CDFG 1995), contained Department-recommended burrowing owl and burrow survey techniques and mitigation measures intended to offset the loss of habitat and slow or reverse further decline of this species. Notwithstanding these measures, over the past 15+ years, burrowing owls have continued to decline in portions of their range (DeSante et al. 2007, Wilkerson and Siegel, 2010). The Department has determined that reversing declining population and range trends for burrowing owls will require implementation of more effective conservation actions, and evaluating the efficacy of the Department's existing recommended avoidance, minimization and mitigation approaches for burrowing owls.

The Department has identified three main actions that together will facilitate a more viable, coordinated, and concerted approach to conservation and mitigation for burrowing owls in California. These include:

1. Incorporating burrowing owl comprehensive conservation strategies into landscape-based planning efforts such as Natural Community Conservation Plans (NCCPs) and multi-species Habitat Conservation Plans (HCPs) that specifically address burrowing owls.
2. Developing and implementing a statewide conservation strategy (Burkett and Johnson, 2007) and local or regional conservation strategies for burrowing owls, including the development and implementation of a statewide burrowing owl survey and monitoring plan.
3. Developing more rigorous burrowing owl survey methods, working to improve the adequacy of impacts assessments; developing clear and effective avoidance and minimization measures; and developing mitigation measures to ensure impacts to the species are effectively addressed at the project, local, and/or regional level (the focus of this document).

This Report sets forth the Department's recommendations for implementing the third approach identified above by revising the 1995 Staff Report, drawing from the most relevant and current knowledge and expertise, and incorporating the best scientific information

available pertaining to the species. It is designed to provide a compilation of the best available science for Department staff, biologists, planners, land managers, California Environmental Quality Act (CEQA) lead agencies, and the public to consider when assessing impacts of projects or other activities on burrowing owls.

This revised Staff Report takes into account the California Burrowing Owl Consortium's Survey Protocol and Mitigation Guidelines (CBOC 1993, 1997) and supersedes the survey, avoidance, minimization and mitigation recommendations in the 1995 Staff Report. Based on experiences gained from implementing the 1995 Staff Report, the Department believes revising that report is warranted. This document also includes general conservation goals and principles for developing mitigation measures for burrowing owls.

## **DEPARTMENT ROLE AND LEGAL AUTHORITIES**

The mission of the Department is to manage California's diverse fish, wildlife and plant resources, and the habitats upon which they depend, for their ecological values and for their use and enjoyment by the public. The Department has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and habitats necessary to maintain biologically sustainable populations of those species (Fish and Game Code (FGC) §1802). The Department, as trustee agency pursuant to CEQA (See CEQA Guidelines, §15386), has jurisdiction by law over natural resources, including fish and wildlife, affected by a project, as that term is defined in Section 21065 of the Public Resources Code. The Department exercises this authority by reviewing and commenting on environmental documents and making recommendations to avoid, minimize, and mitigate potential negative impacts to those resources held in trust for the people of California.

Field surveys designed to detect the presence of a particular species, habitat element, or natural community are one of the tools that can assist biologists in determining whether a species or habitat may be significantly impacted by land use changes or disturbance. The Department reviews field survey data as well as site-specific and regional information to evaluate whether a project's impacts may be significant. This document compiles the best available science for conducting habitat assessments and surveys, and includes considerations for developing measures to avoid impacts or mitigate unavoidable impacts.

### **CEQA**

CEQA requires public agencies in California to analyze and disclose potential environmental impacts associated with a project that the agency will carry out, fund, or approve. Any potentially significant impact must be mitigated to the extent feasible. Project-specific CEQA mitigation is important for burrowing owls because most populations exist on privately owned parcels that, when proposed for development or other types of modification, may be subject to the environmental review requirements of CEQA.

### **Take**

Take of individual burrowing owls and their nests is defined by FGC section 86, and prohibited by sections 3503, 3503.5 and 3513. Take is defined in FGC Section 86 as "hunt, pursue, catch, capture or kill, or attempt to hunt, pursue, catch, capture or kill."

## **Migratory Bird Treaty Act**

The Migratory Bird Treaty Act (MBTA) implements various treaties and conventions between the United States and Canada, Japan, Mexico, and Russia for the protection of migratory birds, including the burrowing owl (50 C.F.R. § 10). The MBTA protects migratory bird nests from possession, sale, purchase, barter, transport, import and export, and collection. The other prohibitions of the MBTA - capture, pursue, hunt, and kill - are inapplicable to nests. The regulatory definition of take, as defined in Title 50 C.F.R. part 10.12, means to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to hunt, shoot, wound, kill, trap, capture, or collect. Only the verb "collect" applies to nests. It is illegal to collect, possess, and by any means transfer possession of any migratory bird nest. The MBTA prohibits the destruction of a nest when it contains birds or eggs, and no possession shall occur during the destruction (see Fish and Wildlife Service, Migratory Bird Permit Memorandum, April 15, 2003). Certain exceptions to this prohibition are included in 50 C.F.R. section 21. Pursuant to Fish & Game Code section 3513, the Department enforces the Migratory Bird Treaty Act consistent with rules and regulations adopted by the Secretary of the Interior under provisions of the Migratory Treaty Act.

## **Regional Conservation Plans**

Regional multiple species conservation plans offer long-term assurances for conservation of covered species at a landscape scale, in exchange for biologically appropriate levels of incidental take and/or habitat loss as defined in the approved plan. California's NCCP Act (FGC §2800 et seq.) governs such plans at the state level, and was designed to conserve species, natural communities, ecosystems, and ecological processes across a jurisdiction or a collection of jurisdictions. Complementary federal HCPs are governed by the Endangered Species Act (7 U.S.C. § 136, 16 U.S.C. § 1531 et seq.) (ESA). Regional conservation plans (and certain other landscape-level conservation and management plans), may provide conservation for unlisted as well as listed species. Because the geographic scope of NCCPs and HCPs may span many hundreds of thousands of acres, these planning tools have the potential to play a significant role in conservation of burrowing owls, and grasslands and other habitats.

## **Fish and Game Commission Policies**

There are a number of Fish and Game Commission policies (see FGC §2008) that can be applied to burrowing owl conservation. These include policies on: Raptors, Cooperation, Endangered and Threatened Species, Land Use Planning, Management and Utilization of Fish and Wildlife on Federal Lands, Management and Utilization of Fish and Wildlife on Private Lands, and Research.

## **GUIDING PRINCIPLES FOR CONSERVATION**

Unless otherwise provided in a statewide, local, or regional conservation strategy, surveying and evaluating impacts to burrowing owls, as well as developing and implementing avoidance, minimization, and mitigation and conservation measures incorporate the following principles. These principles are a summary of Department staff expert opinion and were used to guide the preparation of this document.



1. Use the Precautionary Principle (Noss et al.1997), by which the alternative of increased conservation is deliberately chosen in order to buffer against incomplete knowledge of burrowing owl ecology and uncertainty about the consequences to burrowing owls of potential impacts, including those that are cumulative.
2. Employ basic conservation biology tenets and population-level approaches when determining what constitutes appropriate avoidance, minimization, and mitigation for impacts. Include mitigation effectiveness monitoring and reporting, and use an adaptive management loop to modify measures based on results.
3. Protect and conserve owls in wild, semi-natural, and agricultural habitats (conserve is defined at FGC §1802).
4. Protect and conserve natural nest burrows (or burrow surrogates) previously used by burrowing owls and sufficient foraging habitat and protect auxiliary “satellite” burrows that contribute to burrowing owl survivorship and natural behavior of owls.

## **CONSERVATION GOALS FOR THE BURROWING OWL IN CALIFORNIA**

It is Department staff expert opinion that the following goals guide and contribute to the short and long-term conservation of burrowing owls in California:

1. Maintain size and distribution of extant burrowing owl populations (allowing for natural population fluctuations).
2. Increase geographic distribution of burrowing owls into formerly occupied historical range where burrowing owl habitat still exists, or where it can be created or enhanced, and where the reason for its local disappearance is no longer of concern.
3. Increase size of existing populations where possible and appropriate (for example, considering basic ecological principles such as carrying capacity, predator-prey relationships, and inter-specific relationships with other species at risk).
4. Protect and restore self-sustaining ecosystems or natural communities which can support burrowing owls at a landscape scale, and which will require minimal long-term management.
5. Minimize or prevent unnatural causes of burrowing owl population declines (e.g., nest burrow destruction, chemical control of rodent hosts and prey).
6. Augment/restore natural dynamics of burrowing owl populations including movement and genetic exchange among populations, such that the species does not require future listing and protection under the California Endangered Species Act (CESA) and/or the federal Endangered Species Act (ESA).
7. Engage stakeholders, including ranchers; farmers; military; tribes; local, state, and federal agencies; non-governmental organizations; and scientific research and education communities involved in burrowing owl protection and habitat management.

## **ACTIVITIES WITH THE POTENTIAL TO TAKE OR IMPACT BURROWING OWLS**

The following activities are examples of activities that have the potential to take burrowing owls, their nests or eggs, or destroy or degrade burrowing owl habitat: grading, disking, cultivation, earthmoving, burrow blockage, heavy equipment compacting and crushing burrow tunnels, levee maintenance, flooding, burning and mowing (if burrows are impacted), and operating wind turbine collisions (collectively hereafter referred to as “projects” or “activities”

whether carried out pursuant to CEQA or not). In addition, the following activities may have impacts to burrowing owl populations: eradication of host burrowers; changes in vegetation management (i.e. grazing); use of pesticides and rodenticides; destruction, conversion or degradation of nesting, foraging, over-wintering or other habitats; destruction of natural burrows and burrow surrogates; and disturbance which may result in harassment of owls at occupied burrows.

## **PROJECT IMPACT EVALUATIONS**

The following three progressive steps are effective in evaluating whether projects will result in impacts to burrowing owls. The information gained from these steps will inform any subsequent avoidance, minimization and mitigation measures. The steps for project impact evaluations are: 1) habitat assessment, 2) surveys, and 3) impact assessment. Habitat assessments are conducted to evaluate the likelihood that a site supports burrowing owl. Burrowing owl surveys provide information needed to determine the potential effects of proposed projects and activities on burrowing owls, and to avoid take in accordance with FGC sections 86, 3503, and 3503.5. Impact assessments evaluate the extent to which burrowing owls and their habitat may be impacted, directly or indirectly, on and within a reasonable distance of a proposed CEQA project activity or non-CEQA project. These three site evaluation steps are discussed in detail below.

### **Biologist Qualifications**

The current scientific literature indicates that only individuals meeting the following minimum qualifications should perform burrowing owl habitat assessments, surveys, and impact assessments:

1. Familiarity with the species and its local ecology;
2. Experience conducting habitat assessments and non-breeding and breeding season surveys, or experience with these surveys conducted under the direction of an experienced surveyor;
3. Familiarity with the appropriate state and federal statutes related to burrowing owls, scientific research, and conservation;
4. Experience with analyzing impacts of development on burrowing owls and their habitat.

### **Habitat Assessment Data Collection and Reporting**

A habitat assessment is the first step in the evaluation process and will assist investigators in determining whether or not occupancy surveys are needed. Refer to Appendix B for a definition of burrowing owl habitat. Compile the detailed information described in Appendix C when conducting project scoping, conducting a habitat assessment site visit and preparing a habitat assessment report.

### **Surveys**

Burrowing owl surveys are the second step of the evaluation process and the best available scientific literature recommends that they be conducted whenever burrowing owl habitat or sign (see Appendix B) is encountered on or adjacent to (within 150 meters) a project site

(Thomsen 1971, Martin 1973). Occupancy of burrowing owl habitat is confirmed at a site when at least one burrowing owl, or its sign at or near a burrow entrance, is observed within the last three years (Rich 1984). Burrowing owls are more detectable during the breeding season with detection probabilities being highest during the nestling stage (Conway et al. 2008). In California, the burrowing owl breeding season extends from 1 February to 31 August (Haug et al. 1993, Thompson 1971) with some variances by geographic location and climatic conditions. Several researchers suggest three or more survey visits during daylight hours (Haug and Diduik 1993, CBOC 1997, Conway and Simon 2003) and recommend each visit occur at least three weeks apart during the peak of the breeding season, commonly accepted in California as between 15 April and 15 July (CBOC 1997). Conway and Simon (2003) and Conway et al. (2008) recommended conducting surveys during the day when most burrowing owls in a local area are in the laying and incubation period (so as not to miss early breeding attempts), during the nesting period, and in the late nestling period when most owls are spending time above ground.

Non-breeding season (1 September to 31 January) surveys may provide information on burrowing owl occupancy, but do not substitute for breeding season surveys because results are typically inconclusive. Burrowing owls are more difficult to detect during the non-breeding season and their seasonal residency status is difficult to ascertain. Burrowing owls detected during non-breeding season surveys may be year-round residents, young from the previous breeding season, pre-breeding territorial adults, winter residents, dispersing juveniles, migrants, transients or new colonizers. In addition, the numbers of owls and their pattern of distribution may differ during winter and breeding seasons. However, on rare occasions, non-breeding season surveys may be warranted (i.e., if the site is believed to be a wintering site only based on negative breeding season results). Refer to Appendix D for information on breeding season and non-breeding season survey methodologies.

## **Survey Reports**

Adequate information about burrowing owls present in and adjacent to an area that will be disturbed by a project or activity will enable the Department, reviewing agencies and the public to effectively assess potential impacts and will guide the development of avoidance, minimization, and mitigation measures. The survey report includes but is not limited to a description of the proposed project or proposed activity, including the proposed project start and end dates, as well as a description of disturbances or other activities occurring on-site or nearby. Refer to Appendix D for details included in a survey report.

## **Impact Assessment**

The third step in the evaluation process is the impact assessment. When surveys confirm occupied burrowing owl habitat in or adjoining the project area, there are a number of ways to assess a project's potential significant impacts to burrowing owls and their habitat. Richardson and Miller (1997) recommended monitoring raptor behavior prior to developing management recommendations and buffers to determine the extent to which individuals have been sensitized to human disturbance. Monitoring results will also provide detail necessary for developing site-specific measures. Postovit and Postovit (1987) recommended an analytical approach to mitigation planning: define the problem (impact), set goals (to guide mitigation development), evaluate and select mitigation methods, and monitor the results.

*Define the problem.* The impact assessment evaluates all factors that could affect burrowing owls. Postovit and Postovit (1987) recommend evaluating the following in assessing impacts to raptors and planning mitigation: type and extent of disturbance, duration and timing of disturbance, visibility of disturbance, sensitivity and ability to habituate, and influence of environmental factors. They suggest identifying and addressing all potential direct and indirect impacts to burrowing owls, regardless of whether or not the impacts will occur during the breeding season. Several examples are given for each impact category below; however, examples are not intended to be used exclusively.

*Type and extent of the disturbance.* The impact assessment describes the nature (source) and extent (scale) of potential project impacts on occupied, satellite and unoccupied burrows including acreage to be lost (temporary or permanent), fragmentation/edge being created, increased distance to other nesting and foraging habitat, and habitat degradation. Discuss any project activities that impact either breeding and/or non-breeding habitat which could affect owl home range size and spatial configuration, negatively affect onsite and offsite burrowing owl presence, increase energetic costs, lower reproductive success, increase vulnerability to predation, and/or decrease the chance of procuring a mate.

*Duration and timing of the impact.* The impact assessment describes the amount of time the burrowing owl habitat will be unavailable to burrowing owls (temporary or permanent) on the site and the effect of that loss on essential behaviors or life history requirements of burrowing owls, the overlap of project activities with breeding and/or non-breeding seasons (timing of nesting and/or non-breeding activities may vary with latitude and climatic conditions, which should be considered with the timeline of the project or activity), and any variance of the project activities in intensity, scale and proximity relative to burrowing owl occurrences.

*Visibility and sensitivity.* Some individual burrowing owls or pairs are more sensitive than others to specific stimuli and may habituate to ongoing visual or audible disturbance. Site-specific monitoring may provide clues to the burrowing owl's sensitivities. This type of assessment addresses the sensitivity of burrowing owls within their nesting area to humans on foot, and vehicular traffic. Other variables are whether the site is primarily in a rural versus urban setting, and whether any prior disturbance (e.g., human development or recreation) is known at the site.

*Environmental factors.* The impact assessment discusses any environmental factors that could be influenced or changed by the proposed activities including nest site availability, predators, prey availability, burrowing mammal presence and abundance, and threats from other extrinsic factors such as human disturbance, urban interface, feral animals, invasive species, disease or pesticides.

*Significance of impacts.* The impact assessment evaluates the potential loss of nesting burrows, satellite burrows, foraging habitat, dispersal and migration habitat, wintering habitat, and habitat linkages, including habitat supporting prey and host burrowers and other essential habitat attributes. This assessment determines if impacts to the species will result in significant impacts to the species locally, regionally and range-wide per CEQA Guidelines §15382 and Appendix G. The significance of the impact to habitat depends on the extent of habitat disturbed and length of time the habitat is unavailable (for example: minor – several days, medium – several weeks to months, high - breeding season affecting juvenile survival,

or over winter affecting adult survival).

*Cumulative effects.* The cumulative effects assessment evaluates two consequences: 1) the project's proportional share of reasonably foreseeable impacts on burrowing owls and habitat caused by the project or in combination with other projects and local influences having impacts on burrowing owls and habitat, and 2) the effects on the regional owl population resulting from the project's impacts to burrowing owls and habitat.

*Mitigation goals.* Establishing goals will assist in planning mitigation and selecting measures that function at a desired level. Goals also provide a standard by which to measure mitigation success. Unless specifically provided for through other FGC Sections or through specific regulations, take, possession or destruction of individual burrowing owls, their nests and eggs is prohibited under FGC sections 3503, 3503.5 and 3513. Therefore, a required goal for all project activities is to avoid take of burrowing owls. Under CEQA, goals would consist of measures that would avoid, minimize and mitigate impacts to a less than significant level. For individual projects, mitigation must be roughly proportional to the level of impacts, including cumulative impacts, in accordance with the provisions of CEQA (CEQA Guidelines, §§ 15126.4(a)(4)(B), 15064, 15065, and 16355). In order for mitigation measures to be effective, they must be specific, enforceable, and feasible actions that will improve environmental conditions. As set forth in more detail in Appendix A, the current scientific literature supports the conclusion that mitigation for permanent habitat loss necessitates replacement with an equivalent or greater habitat area for breeding, foraging, wintering, dispersal, presence of burrows, burrow surrogates, presence of fossorial mammal dens, well drained soils, and abundant and available prey within close proximity to the burrow.

## **MITIGATION METHODS**

The current scientific literature indicates that any site-specific avoidance or mitigation measures developed should incorporate the best practices presented below or other practices confirmed by experts and the Department. The Department is available to assist in the development of site-specific avoidance and mitigation measures.

*Avoiding.* A primary goal is to design and implement projects to seasonally and spatially avoid negative impacts and disturbances that could result in take of burrowing owls, nests, or eggs. Other avoidance measures may include but not be limited to:

- Avoid disturbing occupied burrows during the nesting period, from 1 February through 31 August.
- Avoid impacting burrows occupied during the non-breeding season by migratory or non-migratory resident burrowing owls.
- Avoid direct destruction of burrows through chaining (dragging a heavy chain over an area to remove shrubs), disking, cultivation, and urban, industrial, or agricultural development.
- Develop and implement a worker awareness program to increase the on-site worker's recognition of and commitment to burrowing owl protection.
- Place visible markers near burrows to ensure that farm equipment and other machinery does not collapse burrows.
- Do not fumigate, use treated bait or other means of poisoning nuisance animals in areas where burrowing owls are known or suspected to occur (e.g., sites observed with nesting

owls, designated use areas).

- Restrict the use of treated grain to poison mammals to the months of January and February.

*Take avoidance (pre-construction) surveys.* Take avoidance surveys are intended to detect the presence of burrowing owls on a project site at a fixed period in time and inform necessary take avoidance actions. Take avoidance surveys may detect changes in owl presence such as colonizing owls that have recently moved onto the site, migrating owls, resident burrowing owls changing burrow use, or young of the year that are still present and have not dispersed. Refer to Appendix D for take avoidance survey methodology.

*Site surveillance.* Burrowing owls may attempt to colonize or re-colonize an area that will be impacted; thus, the current scientific literature indicates a need for ongoing surveillance at the project site during project activities is recommended. The surveillance frequency/effort should be sufficient to detect burrowing owls if they return. Subsequent to their new occupancy or return to the site, take avoidance measures should assure with a high degree of certainty that take of owls will not occur.

*Minimizing.* If burrowing owls and their habitat can be protected in place on or adjacent to a project site, the use of buffer zones, visual screens or other measures while project activities are occurring can minimize disturbance impacts. Conduct site-specific monitoring to inform development of buffers (see Visibility and sensitivity above). The following general guidelines for implementing buffers should be adjusted to address site-specific conditions using the impact assessment approach described above. The CEQA lead agency and/or project proponent is encouraged to consult with the Department and other burrowing owl experts for assistance in developing site-specific buffer zones and visual screens.

*Buffers.* Holroyd et al. (2001) identified a need to standardize management and disturbance mitigation guidelines. For instance, guidelines for mitigating impacts by petroleum industries on burrowing owls and other prairie species (Scobie and Faminow, 2000) may be used as a template for future mitigation guidelines (Holroyd et al. 2001). Scobie and Faminow (2000) developed guidelines for activities around occupied burrowing owl nests recommending buffers around low, medium, and high disturbance activities, respectively (see below).

Recommended restricted activity dates and setback distances by level of disturbance for burrowing owls (Scobie and Faminow 2000).

| Location      | Time of Year   | Level of Disturbance |       |       |
|---------------|----------------|----------------------|-------|-------|
|               |                | Low                  | Med   | High  |
| Nesting sites | April 1-Aug 15 | 200 m*               | 500 m | 500 m |
| Nesting sites | Aug 16-Oct 15  | 200 m                | 200 m | 500 m |
| Nesting sites | Oct 16-Mar 31  | 50 m                 | 100 m | 500 m |

\* meters (m)

Based on existing vegetation, human development, and land uses in an area, resource managers may decide to allow human development or resource extraction closer to these area/sites than recommended above. However, if it is decided to allow activities closer than

the setback distances recommended, a broad-scale, long-term, scientifically-rigorous monitoring program ensures that burrowing owls are not detrimentally affected by alternative approaches.

Other minimization measures include eliminating actions that reduce burrowing owl forage and burrowing surrogates (e.g. ground squirrel), or introduce/facilitate burrowing owl predators. Actions that could influence these factors include reducing livestock grazing rates and/or changing the timing or duration of grazing or vegetation management that could result in less suitable habitat.

*Burrow exclusion and closure.* Burrow exclusion is a technique of installing one-way doors in burrow openings during the non-breeding season to temporarily exclude burrowing owls, or permanently exclude burrowing owls and close burrows after verifying burrows are empty by site monitoring and scoping. Exclusion in and of itself is not a take avoidance, minimization or mitigation method. Eviction of burrowing owls is a potentially significant impact under CEQA.

The long-term demographic consequences of these techniques have not been thoroughly evaluated, and the fate of evicted or excluded burrowing owls has not been systematically studied. Because burrowing owls are dependent on burrows at all times of the year for survival and/or reproduction, evicting them from nesting, roosting, and satellite burrows may lead to indirect impacts or take. Temporary or permanent closure of burrows may result in significant loss of burrows and habitat for reproduction and other life history requirements. Depending on the proximity and availability of alternate habitat, loss of access to burrows will likely result in varying levels of increased stress on burrowing owls and could depress reproduction, increase predation, increase energetic costs, and introduce risks posed by having to find and compete for available burrows. Therefore, exclusion and burrow closure are not recommended where they can be avoided. The current scientific literature indicates consideration of all possible avoidance and minimization measures before temporary or permanent exclusion and closure of burrows is implemented, in order to avoid take.

The results of a study by Trulio (1995) in California showed that burrowing owls passively displaced from their burrows were quickly attracted to adjacent artificial burrows at five of six passive relocation sites. The successful sites were all within 75 meters (m) of the destroyed burrow, a distance generally within a pair's territory. This researcher discouraged using passive relocation to artificial burrows as a mitigation measure for lost burrows without protection of adjacent foraging habitat. The study results indicated artificial burrows were used by evicted burrowing owls when they were approximately 50-100 m from the natural burrow (Thomsen 1971, Haug and Oliphant 1990). Locating artificial or natural burrows more than 100 m from the eviction burrow may greatly reduce the chances that new burrows will be used. Ideally, exclusion and burrow closure is employed only where there are adjacent natural burrows and non-impacted, sufficient habitat for burrowing owls to occupy with permanent protection mechanisms in place. Any new burrowing owl colonizing the project site after the CEQA document has been adopted may constitute changed circumstances that should be addressed in a re-circulated CEQA document.

The current scientific literature indicates that burrow exclusion should only be conducted by qualified biologists (meeting the Biologist's Qualifications above) during the non-breeding



season, before breeding behavior is exhibited and after the burrow is confirmed empty by site surveillance and/or scoping. The literature also indicates that when temporary or permanent burrow exclusion and/or burrow closure is implemented, burrowing owls should not be excluded from burrows unless or until:

- A Burrowing Owl Exclusion Plan (see Appendix E) is developed and approved by the applicable local DFG office;
- Permanent loss of occupied burrow(s) and habitat is mitigated in accordance with the Mitigating Impacts sections below. Temporary exclusion is mitigated in accordance with the item #1 under Mitigating Impacts below.
- Site monitoring is conducted prior to, during, and after exclusion of burrowing owls from their burrows sufficient to ensure take is avoided. Conduct daily monitoring for one week to confirm young of the year have fledged if the exclusion will occur immediately after the end of the breeding season.
- Excluded burrowing owls are documented using artificial or natural burrows on an adjoining mitigation site (if able to confirm by band re-sight).

*Translocation (Active relocation offsite >100 meters).* At this time, there is little published information regarding the efficacy of translocating burrowing owls, and additional research is needed to determine subsequent survival and breeding success (Klute et al. 2003, Holroyd et al. 2001). Study results for translocation in Florida implied that hatching success may be decreased for populations of burrowing owls that undergo translocation (Nixon 2006). At this time, the Department is unable to authorize the capture and relocation of burrowing owls except within the context of scientific research (FGC §1002) or a NCCP conservation strategy.

*Mitigating impacts.* Habitat loss and degradation from rapid urbanization of farmland in the core areas of the Central and Imperial valleys is the greatest of many threats to burrowing owls in California (Shuford and Gardali, 2008). At a minimum, if burrowing owls have been documented to occupy burrows (see Definitions, Appendix B) at the project site in recent years, the current scientific literature supports the conclusion that the site should be considered occupied and mitigation should be required by the CEQA lead agency to address project-specific significant and cumulative impacts. Other site-specific and regionally significant and cumulative impacts may warrant mitigation. The current scientific literature indicates the following to be best practices. If these best practices cannot be implemented, the lead agency or lead investigator may consult with the Department to develop effective mitigation alternatives. The Department is also available to assist in the identification of suitable mitigation lands.

1. Where habitat will be temporarily disturbed, restore the disturbed area to pre-project condition including decompacting soil and revegetating. Permanent habitat protection may be warranted if there is the potential that the temporary impacts may render a nesting site (nesting burrow and satellite burrows) unsustainable or unavailable depending on the time frame, resulting in reduced survival or abandonment. For the latter potential impact, see the permanent impact measures below.
2. Mitigate for permanent impacts to nesting, occupied and satellite burrows and/or burrowing owl habitat such that the habitat acreage, number of burrows and burrowing owls impacted are replaced based on the information provided in Appendix A. Note: A

minimum habitat replacement recommendation is not provided here as it has been shown to serve as a default, replacing any site-specific analysis and discounting the wide variation in natal area, home range, foraging area, and other factors influencing burrowing owls and burrowing owl population persistence in a particular area.

3. Mitigate for permanent impacts to nesting, occupied and satellite burrows and burrowing owl habitat with (a) permanent conservation of similar vegetation communities (grassland, scrublands, desert, urban, and agriculture) to provide for burrowing owl nesting, foraging, wintering, and dispersal (i.e., during breeding and non-breeding seasons) comparable to or better than that of the impact area, and (b) sufficiently large acreage, and presence of fossorial mammals. The mitigation lands may require habitat enhancements including enhancement or expansion of burrows for breeding, shelter and dispersal opportunity, and removal or control of population stressors. If the mitigation lands are located adjacent to the impacted burrow site, ensure the nearest neighbor artificial or natural burrow clusters are at least within 210 meters (Fisher et al. 2007).
4. Permanently protect mitigation land through a conservation easement deeded to a non-profit conservation organization or public agency with a conservation mission, for the purpose of conserving burrowing owl habitat and prohibiting activities incompatible with burrowing owl use. If the project is located within the service area of a Department-approved burrowing owl conservation bank, the project proponent may purchase available burrowing owl conservation bank credits.
5. Develop and implement a mitigation land management plan to address long-term ecological sustainability and maintenance of the site for burrowing owls (see Management Plan and Artificial Burrow sections below, if applicable).
6. Fund the maintenance and management of mitigation land through the establishment of a long-term funding mechanism such as an endowment.
7. Habitat should not be altered or destroyed, and burrowing owls should not be excluded from burrows, until mitigation lands have been legally secured, are managed for the benefit of burrowing owls according to Department-approved management, monitoring and reporting plans, and the endowment or other long-term funding mechanism is in place or security is provided until these measures are completed.
8. Mitigation lands should be on, adjacent or proximate to the impact site where possible and where habitat is sufficient to support burrowing owls present.
9. Where there is insufficient habitat on, adjacent to, or near project sites where burrowing owls will be excluded, acquire mitigation lands with burrowing owl habitat away from the project site. The selection of mitigation lands should then focus on consolidating and enlarging conservation areas located outside of urban and planned growth areas, within foraging distance of other conserved lands. If mitigation lands are not available adjacent to other conserved lands, increase the mitigation land acreage requirement to ensure a selected site is of sufficient size. Offsite mitigation may not adequately offset the biological and habitat values impacted on a one to one basis. Consult with the Department when determining offsite mitigation acreages.
10. Evaluate and select suitable mitigation lands based on a comparison of the habitat attributes of the impacted and conserved lands, including but not limited to: type and structure of habitat being impacted or conserved; density of burrowing owls in impacted and conserved habitat; and significance of impacted or conserved habitat to the species range-wide. Mitigate for the highest quality burrowing owl habitat impacted first and foremost when identifying mitigation lands, even if a mitigation site is located outside of

a lead agency's jurisdictional boundary, particularly if the lead agency is a city or special district.

11. Select mitigation lands taking into account the potential human and wildlife conflicts or incompatibility, including but not limited to, human foot and vehicle traffic, and predation by cats, loose dogs and urban-adapted wildlife, and incompatible species management (i.e., snowy plover).
12. Where a burrowing owl population appears to be highly adapted to heavily altered habitats such as golf courses, airports, athletic fields, and business complexes, permanently protecting the land, augmenting the site with artificial burrows, and enhancing and maintaining those areas may enhance sustainability of the burrowing owl population onsite. Maintenance includes keeping lands grazed or mowed with weed-eaters or push mowers, free from trees and shrubs, and preventing excessive human and human-related disturbance (e.g., walking, jogging, off-road activity, dog-walking) and loose and feral pets (chasing and, presumably, preying upon owls) that make the environment uninhabitable for burrowing owls (Wesemann and Rowe 1985, Millsap and Bear 2000, Lincer and Bloom 2007). Items 4, 5 and 6 also still apply to this mitigation approach.
13. If there are no other feasible mitigation options available and a lead agency is willing to establish and oversee a Burrowing Owl Mitigation and Conservation Fund that funds on a competitive basis acquisition and permanent habitat conservation, the project proponent may participate in the lead agency's program.

*Artificial burrows.* Artificial burrows have been used to replace natural burrows either temporarily or long-term and their long-term success is unclear. Artificial burrows may be an effective addition to in-perpetuity habitat mitigation if they are augmenting natural burrows, the burrows are regularly maintained (i.e., no less than annual, with biennial maintenance recommended), and surrounding habitat patches are carefully maintained. There may be some circumstances, for example at airports, where squirrels will not be allowed to persist and create a dynamic burrow system, where artificial burrows may provide some support to an owl population.

Many variables may contribute to the successful use of artificial burrows by burrowing owls, including pre-existence of burrowing owls in the area, availability of food, predators, surrounding vegetation and proximity, number of natural burrows in proximity, type of materials used to build the burrow, size of the burrow and entrance, direction in which the burrow entrance is facing, slope of the entrance, number of burrow entrances per burrow, depth of the burrow, type and height of perches, and annual maintenance needs (Belthoff and King 2002, Smith et al. 2005, Barclay et al. 2011). Refer to Barclay (2008) and (2011) and to Johnson et al. 2010 (unpublished report) for guidance on installing artificial burrows including recommendations for placement, installation and maintenance.

Any long-term reliance on artificial burrows as natural burrow replacements must include semi-annual to annual cleaning and maintenance and/or replacement (Barclay et al. 2011, Smith and Conway 2005, Alexander et al. 2005) as an ongoing management practice. Alexander et al. (2005), in a study of the use of artificial burrows found that all of 20 artificial burrows needed some annual cleaning and maintenance. Burrows were either excavated by predators, blocked by soil or vegetation, or experienced substrate erosion forming a space beneath the tubing that prevented nestlings from re-entering the burrow.

*Mitigation lands management plan.* Develop a Mitigation Lands Management Plan for projects that require off-site or on-site mitigation habitat protection to ensure compliance with and effectiveness of identified management actions for the mitigation lands. A suggested outline and related vegetation management goals and monitoring success criteria can be found in Appendix E.

### **Mitigation Monitoring and Reporting**

Verify the compliance with required mitigation measures, the accuracy of predictions, and ensure the effectiveness of all mitigation measures for burrowing owls by conducting follow-up monitoring, and implementing midcourse corrections, if necessary, to protect burrowing owls. Refer to CEQA Guidelines Section 15097 and the CEQA Guidelines for additional guidance on mitigation, monitoring and reporting. Monitoring is qualitatively different from site surveillance; monitoring normally has a specific purpose and its outputs and outcomes will usually allow a comparison with some baseline condition of the site before the mitigation (including avoidance and minimization) was undertaken. Ideally, monitoring should be based on the Before-After Control-Impact (BACI) principle (McDonald et al. 2000) that requires knowledge of the pre-mitigation state to provide a reference point for the state and change in state after the project and mitigation have been implemented.

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## **Appendix A. Burrowing Owl Natural History and Threats**

### **Diet**

Burrowing owl diet includes arthropods, small rodents, birds, amphibians, reptiles, and carrion (Haug et al. 1993).

### **Breeding**

In California, the breeding season for the burrowing owl typically occurs between 1 February and 31 August although breeding in December has been documented (Thompson 1971, Gervais et al. 2008); breeding behavior includes nest site selection by the male, pair formation, copulation, egg laying, hatching, fledging, and post-fledging care of young by the parents. The peak of the breeding season occurs between 15 April and 15 July and is the period when most burrowing owls have active nests (eggs or young). The incubation period lasts 29 days (Coulombe 1971) and young fledge after 44 days (Haug et al. 1993). Note that the timing of nesting activities may vary with latitude and climatic conditions. Burrowing owls may change burrows several times during the breeding season, starting when nestlings are about three weeks old (Haug et al. 1993).

### **Dispersal**

The following discussion is an excerpt from Gervais et al (2008):

“The burrowing owl is often considered a sedentary species (e.g., Thomsen 1971). A large proportion of adults show strong fidelity to their nest site from year to year, especially where resident, as in Florida (74% for females, 83% for males; Millsap and Bear 1997). In California, nest-site fidelity rates were 32%–50% in a large grassland and 57% in an agricultural environment (Ronan 2002, Catlin 2004, Catlin et al. 2005). Differences in these rates among sites may reflect differences in nest predation rates (Catlin 2004, Catlin et al. 2005). Despite the high nest fidelity rates, dispersal distances may be considerable for both juveniles (natal dispersal) and adults (postbreeding dispersal), but this also varied with location (Catlin 2004, Rosier et al. 2006). Distances of 53 km to roughly 150 km have been observed in California for adult and natal dispersal, respectively (D. K. Rosenberg and J. A. Gervais, unpublished data), despite the difficulty in detecting movements beyond the immediate study area (Koenig et al. 1996).”

### **Habitat**

The burrowing owl is a small, long-legged, ground-dwelling bird species, well-adapted to open, relatively flat expanses. In California, preferred habitat is generally typified by short, sparse vegetation with few shrubs, level to gentle topography and well-drained soils (Haug et al. 1993). Grassland, shrub steppe, and desert are naturally occurring habitat types used by the species. In addition, burrowing owls may occur in some agricultural areas, ruderal grassy fields, vacant lots and pastures if the vegetation structure is suitable and there are useable burrows and foraging habitat in proximity (Gervais et al 2008). Unique amongst North

American raptors, the burrowing owl requires underground burrows or other cavities for nesting during the breeding season and for roosting and cover, year round. Burrows used by the owls are usually dug by other species termed host burrowers. In California, California ground squirrel (*Spermophilus beecheyi*) and round-tailed ground squirrel (*Citellus tereticaudus*) burrows are frequently used by burrowing owls but they may use dens or holes dug by other fossorial species including badger (*Taxidea taxus*), coyote (*Canis latrans*), and fox (e.g., San Joaquin kit fox, *Vulpes macrotis mutica*; Ronan 2002). In some instances, owls have been known to excavate their own burrows (Thompson 1971, Barclay 2007). Natural rock cavities, debris piles, culverts, and pipes also are used for nesting and roosting (Rosenberg et al. 1998). Burrowing owls have been documented using artificial burrows for nesting and cover (Smith and Belthoff, 2003).

*Foraging habitat.* Foraging habitat is essential to burrowing owls. The following discussion is an excerpt from Gervais et al. (2008):

“Useful as a rough guide to evaluating project impacts and appropriate mitigation for burrowing owls, adult male burrowing owls home ranges have been documented (calculated by minimum convex polygon) to comprise anywhere from 280 acres in intensively irrigated agroecosystems in Imperial Valley (Rosenberg and Haley 2004) to 450 acres in mixed agricultural lands at Lemoore Naval Air Station, CA (Gervais et al. 2003), to 600 acres in pasture in Saskatchewan, Canada (Haug and Oliphant 1990). But owl home ranges may be much larger, perhaps by an order of magnitude, in non-irrigated grasslands such as at Carrizo Plain, California (Gervais et al. 2008), based on telemetry studies and distribution of nests. Foraging occurs primarily within 600 m of their nests (within approximately 300 acres, based on a circle with a 600 m radius) during the breeding season.”

*Importance of burrows and adjacent habitat.* Burrows and the associated surrounding habitat are essential ecological requisites for burrowing owls throughout the year and especially during the breeding season. During the non-breeding season, burrowing owls remain closely associated with burrows, as they continue to use them as refuge from predators, shelter from weather and roost sites. Resident populations will remain near the previous season’s nest burrow at least some of the time (Coulombe 1971, Thomsen 1971, Botelho 1996, LaFever et al. 2008).

In a study by Lutz and Plumpton (1999) adult males and females nested in formerly used sites at similar rates (75% and 63%, respectively) (Lutz and Plumpton 1999). Burrow fidelity has been reported in some areas; however, more frequently, burrowing owls reuse traditional nesting areas without necessarily using the same burrow (Haug et al. 1993, Dechant et al. 1999). Burrow and nest sites are re-used at a higher rate if the burrowing owl has reproduced successfully during the previous year (Haug et al. 1993) and if the number of burrows isn’t limiting nesting opportunity.

Burrowing owls may use “satellite” or non-nesting burrows, moving young at 10-14 days, presumably to reduce risk of predation (Desmond and Savidge 1998) and possibly to avoid nest parasites (Dechant et al. 1999). Successful nests in Nebraska had more active satellite burrows within 75 m of the nest burrow than unsuccessful nests (Desmond and Savidge

1999). Several studies have documented the number of satellite burrows used by young and adult burrowing owls during the breeding season as between one and 11 burrows with an average use of approximately five burrows (Thompson 1984, Haug 1985, Haug and Oliphant 1990). Supporting the notion of selecting for nest sites near potential satellite burrows, Ronan (2002) found burrowing owl families would move away from a nest site if their satellite burrows were experimentally removed through blocking their entrance.

Habitat adjacent to burrows has been documented to be important to burrowing owls. Gervais et al. (2003) found that home range sizes of male burrowing owls during the nesting season were highly variable within but not between years. Their results also suggested that owls concentrate foraging efforts within 600 meters of the nest burrow, as was observed in Canada (Haug and Oliphant 1990) and southern California (Rosenberg and Haley 2004). James et al. (1997), reported habitat modification factors causing local burrowing owl declines included habitat fragmentation and loss of connectivity.

In conclusion, the best available science indicates that essential habitat for the burrowing owl in California must include suitable year-round habitat, primarily for breeding, foraging, wintering and dispersal habitat consisting of short or sparse vegetation (at least at some time of year), presence of burrows, burrow surrogates or presence of fossorial mammal dens, well-drained soils, and abundant and available prey within close proximity to the burrow.

### **Threats to Burrowing Owls in California**

*Habitat loss.* Habitat loss, degradation, and fragmentation are the greatest threats to burrowing owls in California. According to DeSante et al. (2007), “the vast majority of burrowing owls [now] occur in the wide, flat lowland valleys and basins of the Imperial Valley and Great Central Valley [where] for the most part,...the highest rates of residential and commercial development in California are occurring.” Habitat loss from the State’s long history of urbanization in coastal counties has already resulted in either extirpation or drastic reduction of burrowing owl populations there (Gervais et al. 2008). Further, loss of agricultural and other open lands (such as grazed landscapes) also negatively affect owl populations. Because of their need for open habitat with low vegetation, burrowing owls are unlikely to persist in agricultural lands dominated by vineyards and orchards (Gervais et al. 2008).

*Control of burrowing rodents.* According to Klute et al. (2003), the elimination of burrowing rodents through control programs is a primary factor in the recent and historical decline of burrowing owl populations nationwide. In California, ground squirrel burrows are most often used by burrowing owls for nesting and cover; thus, ground squirrel control programs may affect owl numbers in local areas by eliminating a necessary resource.

*Direct mortality.* Burrowing owls suffer direct losses from a number of sources. Vehicle collisions are a significant source of mortality especially in the urban interface and where owls nest alongside roads (Haug et al. 1993, Gervais et al. 2008). Road and ditch maintenance, modification of water conveyance structures (Imperial Valley) and discing to control weeds in fallow fields may destroy burrows (Rosenberg and Haley 2004, Catlin and Rosenberg 2006) which may trap or crush owls. Wind turbines at Altamont Pass Wind Resource Area are known to cause direct burrowing owl mortality (Thelander et al. 2003). Exposure to

pesticides may pose a threat to the species but is poorly understood (Klute et al. 2003, Gervais et al. 2008).

## Appendix B. Definitions

Some key terms that appear in this document are defined below.

**Adjacent habitat** means burrowing owl habitat that abuts the area where habitat and burrows will be impacted and rendered non-suitable for occupancy.

**Breeding (nesting) season** begins as early as 1 February and continues through 31 August (Thomsen 1971, Zarn 1974). The timing of breeding activities may vary with latitude and climatic conditions. The breeding season includes pairing, egg-laying and incubation, and nestling and fledging stages.

**Burrow exclusion** is a technique of installing one-way doors in burrow openings during the non-breeding season to temporarily exclude burrowing owls or permanently exclude burrowing owls and excavate and close burrows after confirming burrows are empty.

**Burrowing owl habitat** generally includes, but is not limited to, short or sparse vegetation (at least at some time of year), presence of burrows, burrow surrogates or presence of fossorial mammal dens, well-drained soils, and abundant and available prey.

**Burrow surrogates** include culverts, piles of concrete rubble, piles of soil, burrows created along soft banks of ditches and canals, pipes, and similar structures.

**Civil twilight** - Morning civil twilight begins when the geometric center of the sun is 6 degrees below the horizon (civil dawn) and ends at sunrise. Evening civil twilight begins at sunset and ends when the geometric center of the sun reaches 6 degrees below the horizon (civil dusk). During this period there is enough light from the sun that artificial sources of light may not be needed to carry on outdoor activities. This concept is sometimes enshrined in laws, for example, when drivers of automobiles must turn on their headlights (called lighting-up time in the UK); when pilots may exercise the rights to fly aircraft. Civil twilight can also be described as the limit at which twilight illumination is sufficient, under clear weather conditions, for terrestrial objects to be clearly distinguished; at the beginning of morning civil twilight, or end of evening civil twilight, the horizon is clearly defined and the brightest stars are visible under clear atmospheric conditions.

**Conservation** for burrowing owls may include but may not be limited to protecting remaining breeding pairs or providing for population expansion, protecting and enhancing breeding and essential habitat, and amending or augmenting land use plans to stabilize populations and other specific actions to avoid the need to list the species pursuant to California or federal Endangered Species Acts.

**Contiguous** means connected together so as to form an uninterrupted expanse in space.

**Essential habitat** includes nesting, foraging, wintering, and dispersal habitat.

**Foraging habitat** is habitat within the estimated home range of an occupied burrow, supports suitable prey base, and allows for effective hunting.

**Host burrowers** include ground squirrels, badgers, foxes, coyotes, gophers etc.

**Locally significant species** is a species that is not rare from a statewide perspective but is rare or uncommon in a local context such as within a county or region (CEQA §15125 (c)) or is so designated in local or regional plans, policies, or ordinances (CEQA Guidelines, Appendix G). Examples include a species at the outer limits of its known range or occurring in a unique habitat type.

**Non-breeding season** is the period of time when nesting activity is not occurring, generally September 1 through January 31, but may vary with latitude and climatic conditions.

**Occupied site or occupancy** means a site that is assumed occupied if at least one burrowing owl has been observed occupying a burrow within the last three years (Rich 1984). Occupancy of suitable burrowing owl habitat may also be indicated by owl sign including its molted feathers, cast pellets, prey remains, eggshell fragments, or excrement at or near a burrow entrance or perch site.

**Other impacting activities** may include but may not be limited to agricultural practices, vegetation management and fire control, pest management, conversion of habitat from rangeland or natural lands to more intensive agricultural uses that could result in “take”. These impacting activities may not meet the definition of a project under CEQA.

**Passive relocation** is a technique of installing one-way doors in burrow openings to temporarily or permanently evict burrowing owls and prevent burrow re-occupation.

**Peak of the breeding season** is between 15 April and 15 July.

**Sign** includes its tracks, molted feathers, cast pellets (defined as 1-2” long brown to black regurgitated pellets consisting of non-digestible portions of the owls’ diet, such as fur, bones, claws, beetle elytra, or feathers), prey remains, egg shell fragments, owl white wash, nest burrow decoration materials (e.g., paper, foil, plastic items, livestock or other animal manure, etc.), possible owl perches, or other items.



## Appendix C. Habitat Assessment and Reporting Details

### Habitat Assessment Data Collection and Reporting

Current scientific literature indicates that it would be most effective to gather the data in the manner described below when conducting project scoping, conducting a habitat assessment site visit and preparing a habitat assessment report:

1. Conduct at least one visit covering the entire potential project/activity area including areas that will be directly or indirectly impacted by the project. Survey adjoining areas within 150 m (Thomsen 1971, Martin 1973), or more where direct or indirect effects could potentially extend offsite. If lawful access cannot be achieved to adjacent areas, surveys can be performed with a spotting scope or other methods.
2. Prior to the site visit, compile relevant biological information for the site and surrounding area to provide a local and regional context.
3. Check all available sources for burrowing owl occurrence information regionally prior to a field inspection. The CNDDDB and BIOS (see References cited) may be consulted for known occurrences of burrowing owls. Other sources of information include, but are not limited to, the Proceedings of the California Burrowing Owl Symposium (Barclay et al. 2007), county bird atlas projects, Breeding Bird Survey records, eBIRD (<http://ebird.org>), Gervais et al. (2008), local reports or experts, museum records, and other site-specific relevant information.
4. Identify vegetation and habitat types potentially supporting burrowing owls in the project area and vicinity.
5. Record and report on the following information:
  - a. A full description of the proposed project, including but not limited to, expected work periods, daily work schedules, equipment used, activities performed (such as drilling, construction, excavation, etc.) and whether the expected activities will vary in location or intensity over the project's timeline;
  - b. A regional setting map, showing the general project location relative to major roads and other recognizable features;
  - c. A detailed map (preferably a USGS topo 7.5' quad base map) of the site and proposed project, including the footprint of proposed land and/or vegetation-altering activities, base map source, identifying topography, landscape features, a north arrow, bar scale, and legend;
  - d. A written description of the biological setting, including location (Section, Township, Range, baseline and meridian), acreage, topography, soils, geographic and hydrologic characteristics, land use and management history on and adjoining the site (i.e., whether it is urban, semi-urban or rural; whether there is any evidence of past or current livestock grazing, mowing, disking, or other vegetation management activities);
  - e. An analysis of any relevant, historical information concerning burrowing owl use or occupancy (breeding, foraging, over-wintering) on site or in the assessment area;
  - f. Vegetation type and structure (using Sawyer et al. 2009), vegetation height, habitat types and features in the surrounding area plus a reasonably sized (as supported with logical justification) assessment area; (Note: use caution in discounting habitat based on grass height as it can be a temporary condition variable by season and conditions (such as current grazing regime) or may be distributed as a mosaic).

- g. The presence of burrowing owl individuals or pairs or sign (see Appendix B);
- h. The presence of suitable burrows and/or burrow surrogates (>11 cm in diameter (height and width) and >150 cm in depth) (Johnson et al. 2010), regardless of a lack of any burrowing owl sign and/or burrow surrogates; and burrowing owls and/or their sign that have recently or historically (within the last 3 years) been identified on or adjacent to the site.

## Appendix D. Breeding and Non-breeding Season Surveys and Reports

Current scientific literature indicates that it is most effective to conduct breeding and non-breeding season surveys and report in the manner that follows:

### Breeding Season Surveys

*Number of visits and timing.* Conduct 4 survey visits: 1) at least one site visit between 15 February and 15 April, and 2) a minimum of three survey visits, at least three weeks apart, between 15 April and 15 July, with at least one visit after 15 June. Note: many burrowing owl migrants are still present in southwestern California during mid-March, therefore, exercise caution in assuming breeding occupancy early in the breeding season.

*Survey method.* Rosenberg et al. (2007) confirmed walking line transects were most effective in smaller habitat patches. Conduct surveys in all portions of the project site that were identified in the Habitat Assessment and fit the description of habitat in Appendix A. Conduct surveys by walking straight-line transects spaced 7 m to 20 m apart, adjusting for vegetation height and density (Rosenberg et al. 2007). At the start of each transect and, at least, every 100 m, scan the entire visible project area for burrowing owls using binoculars. During walking surveys, record all potential burrows used by burrowing owls as determined by the presence of one or more burrowing owls, pellets, prey remains, whitewash, or decoration. Some burrowing owls may be detected by their calls, so observers should also listen for burrowing owls while conducting the survey.

Care should be taken to minimize disturbance near occupied burrows during all seasons and not to “flush” burrowing owls especially if predators are present to reduce any potential for needless energy expenditure or burrowing owl mortality. Burrowing owls may flush if approached by pedestrians within 50 m (Conway et al. 2003). If raptors or other predators are present that may suppress burrowing owl activity, return at another time or later date for a follow-up survey.

Check all burrowing owls detected for bands and/or color bands and report band combinations to the Bird Banding Laboratory (BBL). Some site-specific variations to survey methods discussed below may be developed in coordination with species experts and Department staff.

*Weather conditions.* Poor weather may affect the surveyor’s ability to detect burrowing owls, therefore, avoid conducting surveys when wind speed is >20 km/hr, and there is precipitation or dense fog. Surveys have greater detection probability if conducted when ambient temperatures are >20° C, <12 km/hr winds, and cloud cover is <75% (Conway et al. 2008).

*Time of day.* Daily timing of surveys varies according to the literature, latitude, and survey method. However, surveys between morning civil twilight and 10:00 AM and two hours before sunset until evening civil twilight provide the highest detection probabilities (Barclay pers. comm. 2012, Conway et al. 2008).

*Alternate methods.* If the project site is large enough to warrant an alternate method, consult current literature for generally accepted survey methods and consult with the Department on the proposed survey approach.

*Additional breeding season site visits.* Additional breeding season site visits may be necessary, especially if non-breeding season exclusion methods are contemplated. Detailed information, such as approximate home ranges of each individual or of family units, as well as foraging areas as related to the proposed project, will be important to document for evaluating impacts, planning avoidance measure implementation and for mitigation measure performance monitoring.

Adverse conditions may prevent investigators from determining presence or occupancy. Disease, predation, drought, high rainfall or site disturbance may preclude presence of burrowing owls in any given year. Any such conditions should be identified and discussed in the survey report. Visits to the site in more than one year may increase the likelihood of detection. Also, visits to adjacent known occupied habitat may help determine appropriate survey timing.

Given the high site fidelity shown by burrowing owls (see Appendix A, Importance of burrows), conducting surveys over several years may be necessary when project activities are ongoing, occur annually, or start and stop seasonally. (See Negative surveys).

### **Non-breeding Season Surveys**

If conducting non-breeding season surveys, follow the methods described above for breeding season surveys, but conduct at least four (4) visits, spread evenly, throughout the non-breeding season. Burrowing owl experts and local Department staff are available to assist with interpreting results.

### **Negative Surveys**

Adverse conditions may prevent investigators from documenting presence or occupancy. Disease, predation, drought, high rainfall or site disturbance may preclude presence of burrowing owl in any given year. Discuss such conditions in the Survey Report. Visits to the site in more than one year increase the likelihood of detection and failure to locate burrowing owls during one field season does not constitute evidence that the site is no longer occupied, particularly if adverse conditions influenced the survey results. Visits to other nearby known occupied sites can affirm whether the survey timing is appropriate.

### **Take Avoidance Surveys**

Field experience from 1995 to present supports the conclusion that it would be effective to complete an initial take avoidance survey no less than 14 days prior to initiating ground disturbance activities using the recommended methods described in the Detection Surveys section above. Implementation of avoidance and minimization measures would be triggered by positive owl presence on the site where project activities will occur. The development of avoidance and minimization approaches would be informed by monitoring the burrowing owls.

Burrowing owls may re-colonize a site after only a few days. Time lapses between project activities trigger subsequent take avoidance surveys including but not limited to a final survey conducted within 24 hours prior to ground disturbance.

## **Survey Reports**

Report on the survey methods used and results including the information described in the Summary Report and include the reports within the CEQA documentation:

1. Date, start and end time of surveys including weather conditions (ambient temperature, wind speed, percent cloud cover, precipitation and visibility);
2. Name(s) of surveyor(s) and qualifications;
3. A discussion of how the timing of the survey affected the comprehensiveness and detection probability;
4. A description of survey methods used including transect spacing, point count dispersal and duration, and any calls used;
5. A description and justification of the area surveyed relative to the project area;
6. A description that includes: number of owls or nesting pairs at each location (by nestlings, juveniles, adults, and those of an unknown age), number of burrows being used by owls, and burrowing owl sign at burrows. Include a description of individual markers, such as bands (numbers and colors), transmitters, or unique natural identifying features. If any owls are banded, request documentation from the BBL and bander to report on the details regarding the known history of the banded burrowing owl(s) (age, sex, origins, whether it was previously relocated) and provide with the report if available;
7. A description of the behavior of burrowing owls during the surveys, including feeding, resting, courtship, alarm, territorial defense, and those indicative of parents or juveniles;
8. A list of possible burrowing owl predators present and documentation of any evidence of predation of owls;
9. A detailed map (1:24,000 or closer to show details) showing locations of all burrowing owls, potential burrows, occupied burrows, areas of concentrated burrows, and burrowing owl sign. Locations documented by use of global positioning system (GPS) coordinates must include the datum in which they were collected. The map should include a title, north arrow, bar scale and legend;
10. Signed field forms, photos, etc., as appendices to the field survey report;
11. Recent color photographs of the proposed project or activity site; and
12. Original CNDDDB Field Survey Forms should be sent directly to the Department's CNDDDB office, and copies should be included in the environmental document as an appendix. (<http://www.dfg.ca.gov/bdb/html/cnddb.html> ).

## **Appendix E. Example Components for Burrowing Owl Artificial Burrow and Exclusion Plans**

Whereas the Department does not recommend exclusion and burrow closure, current scientific literature and experience from 1995 to present, indicate that the following example components for burrowing owl artificial burrow and exclusion plans, combined with consultation with the Department to further develop these plans, would be effective.

### **Artificial Burrow Location**

If a burrow is confirmed occupied on-site, artificial burrow locations should be appropriately located and their use should be documented taking into consideration:

1. A brief description of the project and project site pre-construction;
2. The mitigation measures that will be implemented;
3. Potential conflicting site uses or encumbrances;
4. A comparison of the occupied burrow site(s) and the artificial burrow site(s) (e.g., vegetation, habitat types, fossorial species use in the area, and other features);
5. Artificial burrow(s) proximity to the project activities, roads and drainages;
6. Artificial burrow(s) proximity to other burrows and entrance exposure;
7. Photographs of the site of the occupied burrow(s) and the artificial burrows;
8. Map of the project area that identifies the burrow(s) to be excluded as well as the proposed sites for the artificial burrows;
9. A brief description of the artificial burrow design;
10. Description of the monitoring that will take place during and after project implementation including information that will be provided in a monitoring report.
11. A description of the frequency and type of burrow maintenance.

### **Exclusion Plan**

An Exclusion Plan addresses the following including but not limited to:

1. Confirm by site surveillance that the burrow(s) is empty of burrowing owls and other species preceding burrow scoping;
2. Type of scope and appropriate timing of scoping to avoid impacts;
3. Occupancy factors to look for and what will guide determination of vacancy and excavation timing (one-way doors should be left in place 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).
4. How the burrow(s) will be excavated. Excavation using hand tools with refilling to prevent reoccupation is preferable whenever possible (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);
5. Removal of other potential owl burrow surrogates or refugia on site;
6. Photographing the excavation and closure of the burrow to demonstrate success and sufficiency;

7. Monitoring of the site to evaluate success and, if needed, to implement remedial measures to prevent subsequent owl use to avoid take;
8. How the impacted site will continually be made inhospitable to burrowing owls and fossorial mammals (e.g., by allowing vegetation to grow tall, heavy disking, or immediate and continuous grading) until development is complete.

## **Appendix F. Mitigation Management Plan and Vegetation Management Goals**

### **Mitigation Management Plan**

A mitigation site management plan will help ensure the appropriate implementation and maintenance for the mitigation site and persistence of the burrowing owls on the site. For an example to review, refer to Rosenberg et al. (2009). The current scientific literature and field experience from 1995 to present indicate that an effective management plan includes the following:

1. Mitigation objectives;
2. Site selection factors (including a comparison of the attributes of the impacted and conserved lands) and baseline assessment;
3. Enhancement of the conserved lands (enhancement of reproductive capacity, enhancement of breeding areas and dispersal opportunities, and removal or control of population stressors);
4. Site protection method and prohibited uses;
5. Site manager roles and responsibilities;
6. Habitat management goals and objectives:
  - a. Vegetation management goals,
    - i. Vegetation management tools:
      1. Grazing
      2. Mowing
      3. Burning
      4. Other
    - b. Management of ground squirrels and other fossorial mammals,
    - c. Semi-annual and annual artificial burrow cleaning and maintenance,
    - d. Non-natives control – weeds and wildlife,
    - e. Trash removal;
  - a. Property analysis record or other financial analysis to determine long-term management funding,
  - b. Funding schedule;
7. Financial assurances:
  - a. Property analysis record or other financial analysis to determine long-term management funding,
  - b. Funding schedule;
8. Performance standards and success criteria;
9. Monitoring, surveys and adaptive management;
10. Maps;
11. Annual reports.

### **Vegetation Management Goals**

- Manage vegetation height and density (especially in immediate proximity to burrows). Suitable vegetation structure varies across sites and vegetation types, but should generally be at the average effective vegetation height of 4.7 cm (Green and Anthony 1989) and <13 cm average effective vegetation height (MacCracken et al. 1985a).
- Employ experimental prescribed fires (controlled, at a small scale) to manage vegetation structure;



- Vegetation reduction or ground disturbance timing, extent, and configuration should avoid take. While local ordinances may require fire prevention through vegetation management, activities like disking, mowing, and grading during the breeding season can result in take of burrowing owls and collapse of burrows, causing nest destruction. Consult the take avoidance surveys section above for pre-management avoidance survey recommendations;
- Promote natural prey distribution and abundance, especially in proximity to occupied burrows; and
- Promote self-sustaining populations of host burrowers by limiting or prohibiting lethal rodent control measures and by ensuring food availability for host burrowers through vegetation management.

Refer to Rosenberg et al. (2009) for a good discussion of managing grasslands for burrowing owls.

### **Mitigation Site Success Criteria**

In order to evaluate the success of mitigation and management strategies for burrowing owls, monitoring is required that is specific to the burrowing owl management plan. Given limited resources, Barclay et al. (2011) suggests managers focus on accurately estimating annual adult owl populations rather than devoting time to estimating reproduction, which shows high annual variation and is difficult to accurately estimate. Therefore, the key objective will be to determine accurately the number of adult burrowing owls and pairs, and if the numbers are maintained. A frequency of 5-10 years for surveys to estimate population size may suffice if there are no changes in the management of the nesting and foraging habitat of the owls.

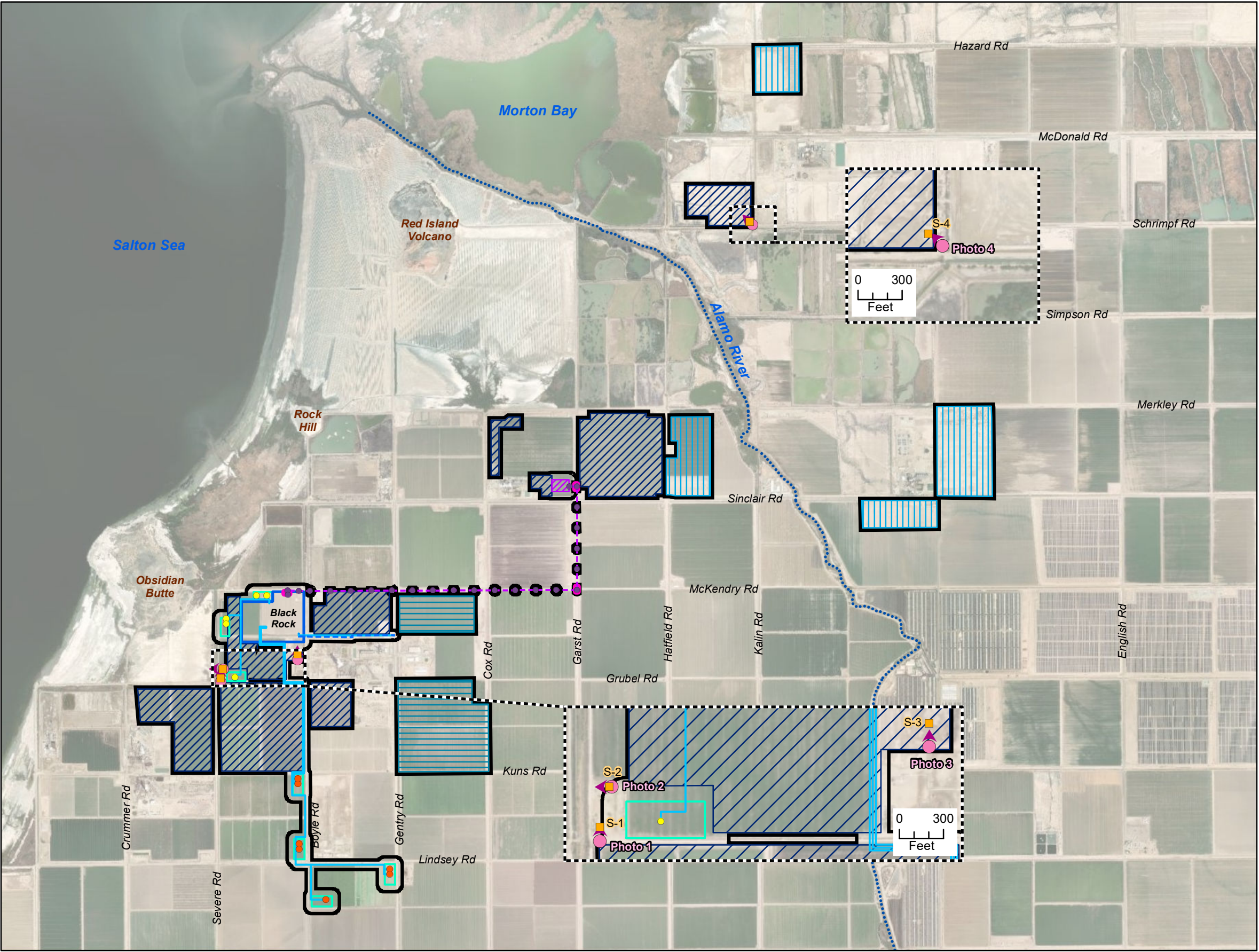
Effective monitoring and evaluation of off-site and on-site mitigation management success for burrowing owls includes (Barclay, pers. comm.):

- Site tenacity;
- Number of adult owls present and reproducing;
- Colonization by burrowing owls from elsewhere (by band re-sight);
- Evidence and causes of mortality;
- Changes in distribution; and
- Trends in stressors.

## **Appendix DA 5.2-2**

### **Aquatic Resource Delineation Results**



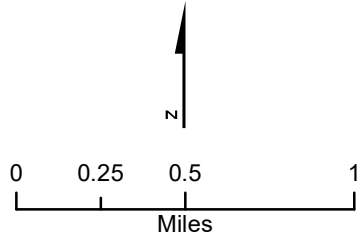


- Legend**
- Biological Study Area
  - Sample Point
  - Photo Point
  - Plant
  - Well Pad
  - Injection Well
  - Production Well
  - Pipeline
  - Water Supply Pipeline
  - Gen-Tie Line Pole
  - Gen-Tie Line
  - Pull Site
  - Switching Station
  - Borrow Pit
  - Construction Camp
  - Construction Laydown and Parking Areas

Notes:

<sup>a</sup> No wetland features were found within the Biological Study Area.

<sup>b</sup> A portion of the eastern borrow pit was removed from the project area.



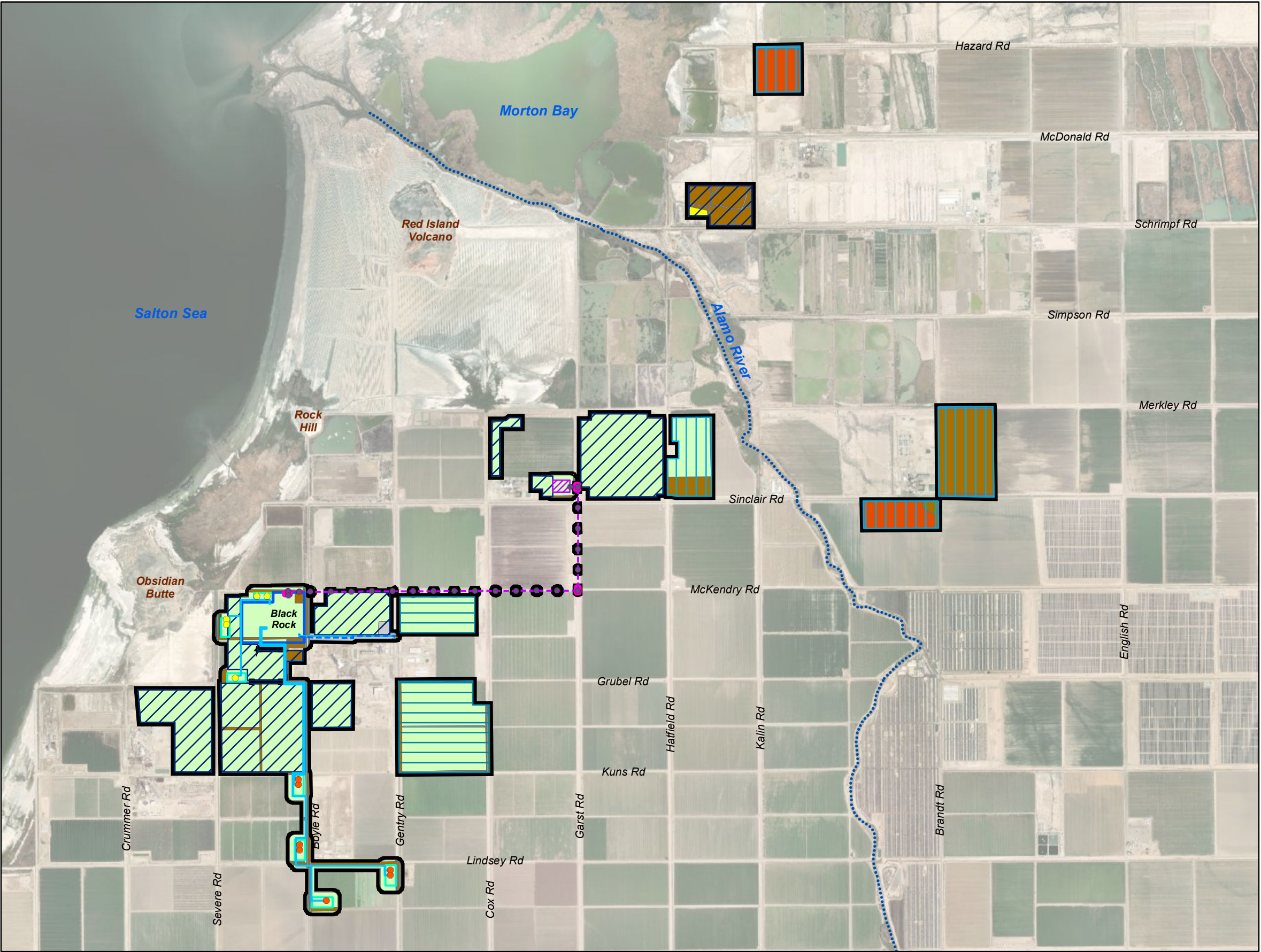
**Figure 5.2-2**  
**Aquatic Resource Delineation Results**  
**Black Rock Geothermal Project**  
Imperial County, California

## **Appendix DA 5.2-3a**

### **Land Cover and Vegetation Types**







**Legend**

- Biological Study Area
- Plant
- Well Pad
- Injection Well
- Production Well
- Pipeline
- Water Supply Pipeline
- Gen-Tie Line Pole
- Gen-Tie Line
- Pull Site
- Switching Station
- Borrow Pit
- Construction Camp
- Construction Laydown and Parking Areas

**Land Cover and Vegetation Types**

- Agriculture
- Canals and Drains
- Developed
- Disturbed with Vegetation
- Disturbed with No Vegetation
- Invasive Southwest Riparian Woodland and Shrubland
- North American Arid West Emergent Marsh
- North American Warm Desert Playa

**Notes:**

<sup>a</sup> Impacts to canals and drains are included for completeness; no IID infrastructure will be impacted by this Project.

<sup>b</sup> A portion of the eastern borrow pit was removed from the project area.

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Miles

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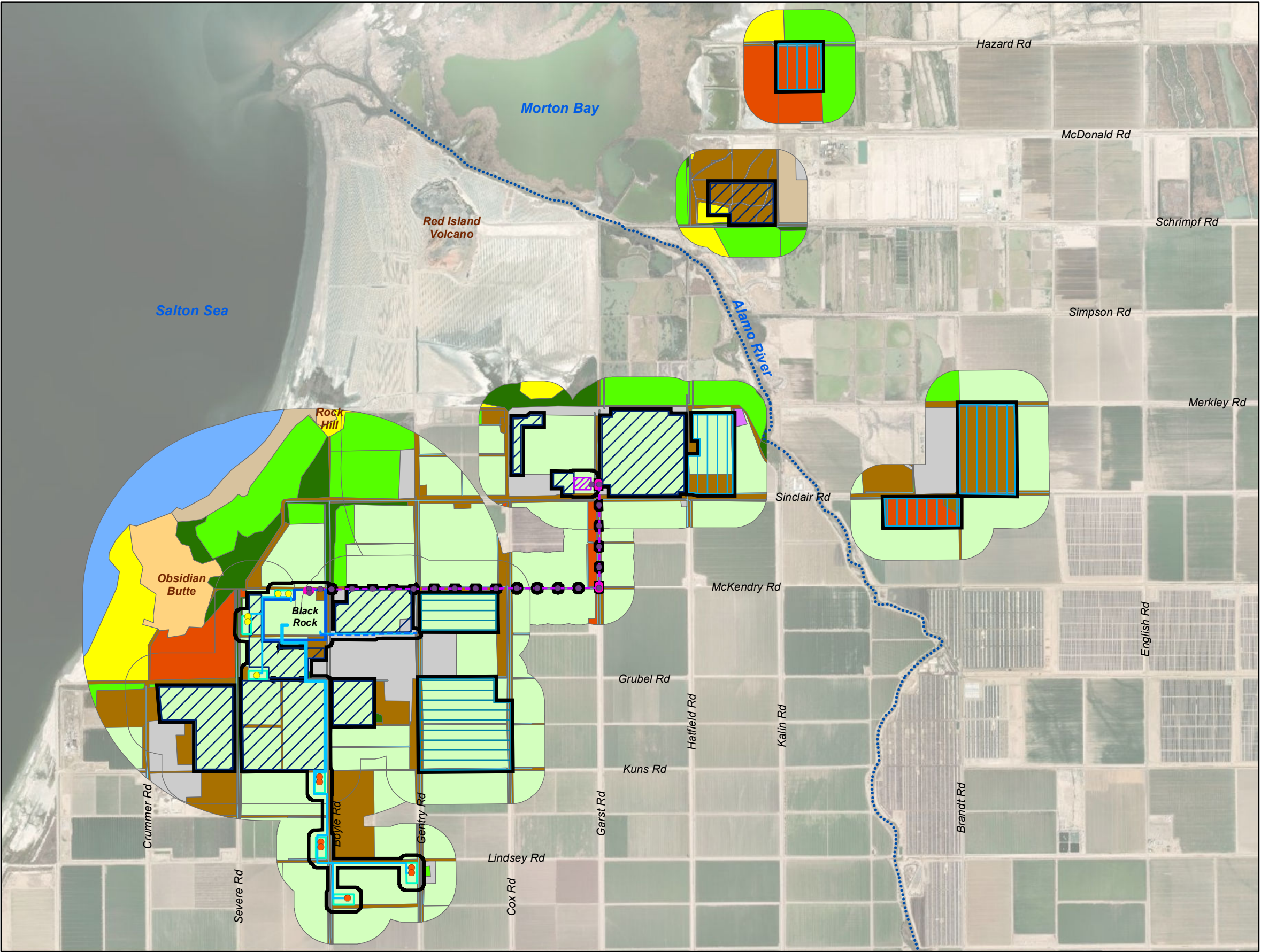
**Figure DA 5.2-3a**  
**Land Cover and Vegetation Types**  
**Black Rock Geothermal Project**  
Imperial County, California

## **Appendix DA 5.2-3b**

### **Land Cover and Vegetation Types in Biological Study Area Buffers**

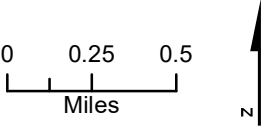






**Legend**

- Biological Study Area
  - Plant
  - Well Pad
  - Injection Well
  - Production Well
  - Pipeline
  - Water Supply Pipeline
  - Gen-Tie Line Pole
  - Gen-Tie Line
  - Pull Site
  - Switching Station
  - Borrow Pit
  - Construction Camp
  - Construction Laydown and Parking Areas
- Land Cover and Vegetation Types**
- Agriculture
  - Agriculture, Palm Species
  - Barren Lands
  - Canals and Drains
  - Developed
  - Disturbed with Vegetation
  - Disturbed, no vegetation
  - Invasive Southwest Riparian Woodland and Shrubland
  - North American Arid West Emergent Marsh
  - North American Warm Desert Playa
  - North American Warm Desert Volcanic Rockland
  - Open Water
- Notes:**
- <sup>a</sup> Impacts to canals and drains are included for completeness; no IID infrastructure will be impacted by this Project.
  - <sup>b</sup> A portion of the eastern borrow pit was removed from the project area.



**Figure DA 5.2-3b**  
**Land Cover and Vegetation Types in**  
**Biological Study Area Buffers**  
**Black Rock Geothermal Project**  
Imperial County, California

## **Appendix DA 5.2-4 Staff Resumes**







## Morgan King

### BIOLOGIST

Morgan serves as the technical lead on renewable energy projects and transmission line projects in California and the desert southwest. Client services include California Environmental Quality Act and National Environmental Policy Act compliance during pre-construction siting and licensing, construction, and operation of the facilities on private and federal lands.

Morgan is a U.S. Fish and Wildlife Service Authorized Biologist for clearance and handling of Mojave desert tortoise (*Gopherus agassizii*), a federally and California state threatened species. She has over 10,000 hours supervising and conducting monitoring and surveys for desert tortoise. She also has extensive survey, monitoring, and compliance experience with burrowing owl (*Athene cunicularia*), common raven (*Corvus corax*), desert kit fox (*Vulpes macrotis*), and birds protected by the Migratory Bird Treaty Act.

Morgan has led special-status plant and wildlife pre-construction surveys on thousands of acres in desert southwest. This includes project setup, execution in field, data management, and prompt reporting results to client and agencies. She has managed over 100 field staff on several projects.

Morgan is a qualified botanist for federally endangered Coachella Valley milk-vetch (*Astragalus lentiginosus* var. *coachellae*) and federally and California state endangered Bakersfield cactus (*Opuntia basilaris* var. *treleasei*). She has extensive botanical resource experience for special-status plants and noxious weeds. She has successfully implemented arid west revegetation efforts on short term disturbance.

Morgan is a biological and natural resource technical lead and project manager. She has writing experience with Biological Assessments, Biological Evaluations, Environmental Assessments, Application for Certification, and technical survey reports for habitat assessment and special-status plants and wildlife. Morgan has written compliance mitigation and monitoring plans for evaporation pond and avian mortality study. She also is technical lead for monthly and annual compliance reports submitted to California Energy Commission, Bureau of Land Management, U.S. Fish and Wildlife Service, and California Department of Fish and Wildlife Service

### Areas of Expertise

- U.S. Fish and Wildlife Service Authorized Biologist for Mojave Desert Tortoise
- Endangered Species Act compliance
- Endangered species surveys and monitoring
- Protocol-level surveys for plants and wildlife in desert southwest
- Arid West Preliminary U.S. Army Corps of Engineers wetland and Ordinary High Water Mark determinations
- Habitat and Biological Resource Assessment
- Technical writing and research

### EDUCATION/QUALIFICATIONS

B.S., Wildlife, Fish and Conservation Biology, University of California, Davis, CA, 2005

### MEMBERSHIPS AND AFFILIATIONS

Desert Tortoise Council, 2013 through present

### SPECIAL TRAININGS

40-Hour Basic Wetland Delineation, 2018

Site Safety Coordinator, Hazardous Waste, 2018

Site Safety Coordinator – Construction, 2011

Desert Tortoise Handling Workshop, Desert Tortoise Council 2010

40-Hour Hazardous Waste Emergency Response and Operations (HAZWOPER), 2006

### OTHER

- Length of service in the profession: 17 years
- Year joined Jacobs: 2006
- Office location: Henderson, NV

**Relevant Project Experience.****Ivanpah Solar Electric Generating System, Nipton, San Bernardino County, California**

**Client:** BrightSource Energy (siting, licensing, and construction); NRG Energy (operations)

**Title:** Lead Biologist and Project Manager

**Start/End Dates:** 2007 - Current

**Scope/Description:** Ivanpah Solar Electric Generating System (ISEGS) is a 3,600 acre solar electrical generating facility (concentrated solar power) with a combined net capacity of 377 megawatts (MW) located on Bureau of Land Management (BLM) land in San Bernardino County, California. The lead agency is California Energy Commission (CEC). Jacobs, formerly CH2M, has had over \$25 million dollars' worth of contracts on the \$2.2 billion-dollar project.

**Responsibilities:** Morgan has provided environmental compliance support at ISEGS for 15 years during siting, licensing, construction, and operations for two clients. BrightSource Energy was client during permitting from 2007 through 2010 and construction 2010 through 2013. NRG Energy took over operations of site in 2013 and is the current client.

*Siting and Licensing (BrightSource Energy: 2007 through 2010):* National Environmental Policy Act (NEPA) and California Environmental Quality Act CEQA permitting for ISEGS required both Environmental Impact Statement (BLM) and Application for Certification (CEC). Between 2007 and 2010, Morgan was the lead field biologist for pre-construction surveys of 3,600-acre site including linear project components such as transmission lines and access roads. In 2007, she conducted protocol-level floristic surveys of area. Due to inadequate levels of rainfall in 2007, surveys had to be repeated in 2008. Surveys were conducted in accordance with the U.S. Fish and Wildlife Services (USFWS) 1996 botanical inventories guidelines, California Department of Fish and Wildlife (CDFW) 2000 guidelines, as well as California Native Plant Societies (CNPS) 2001 survey guidelines. In addition to floristic surveys, Morgan conducted California Desert Native Plant Act (CDNPA) inventory of cacti and yucca and habitat assessment of the one mile buffer of the project site. Field lead tasks included developing project instructions, overseeing 40 botanists, managing GPS/GIS data, analyzing results and preparing reports supporting AFC and EIS. During AFC preparation, she was supported Data Responses regarding botanical, wildlife, invasive weed, barrel cactus, storm water runoff and waters of the U.S. inquiries. The Final EIS was published in July 2010 and the Commission Decision was finalized in September 2010.

*Construction (BrightSource Energy: 2010 through 2013):* During construction, Morgan was Jacobs (formerly CH2M) on-site representative providing BrightSource with environmental compliance support. Morgan assisted implementation of Biological Resource Mitigation Implementation and Monitoring Plan (BRMIMP), which included standalone permits such as

the USFWS's issued Biological Opinion for Mojave desert tortoise and other species specific avoidance and monitoring plans. She was also involved with environmental compliance with mitigation requirements, such as habitat acquisition, unauthorized route closure, and desert tortoise exclusion fence permitting and installation. Morgan prepared biological sections of eight Environmental Assessments (EA) required during construction.

**Mojave Desert Tortoise:** Over the course of ISEGS construction, the project encountered approximately 300 Mojave desert tortoise requiring over 150 full-time biological monitors. In April 2011, the project met the Mojave desert tortoise take limit which resulted in the reinitiation of the October 2010 Biological Opinion. The revised Biological Opinion was issued in June 2011. During this time, Morgan was approved by USFWS and BLM as Mojave desert tortoise Authorized Biologist to handle and conduct clearance surveys. She acquired approximately 5,000 hours of construction monitoring, presence/absence and clearance survey experience and observed at least 100 tortoises in wild. She assisted with radio-tracking, transmitter and iButton application.

Morgan conducted fieldwork, prepared documents, consulted with agencies, and implemented several desert tortoise mitigation requirements: habitat acquisition, closure 50-unauthorized BLM routes, and 50-miles of desert tortoise exclusion fence. This required preparing EAs, California Department of Transportation Natural Environmental Study minimal impact (NESmi), and Biological Assessment for formal Section 7 consultation.

**Special-status Plants and Noxious Weeds:** Morgan implemented and managed project specific botanical compliance plans. This included tasks such as establishing and maintaining environmentally sensitive areas for rare plants in solar field and mitigation areas, nursery maintenance, annual survivorship monitoring, weed surveys, seed collection, and rare plant and noxious weed surveys. In addition, she supported mitigation habitat acquisition and permitting.

**Revegetation:** Morgan managed and implemented the site-specific *Closure, Revegetation and Rehabilitation Plan*. She has successfully implemented 50 acres of arid west revegetation. She conducts native seed collection and revegetation compliance monitoring. Revegetation monitoring requires quantitative vegetation assessments using belt transects and relevé plots. Data collection includes perennial plant cover, richness, density, diversity, and survivorship to assess success criteria. During construction she prepared Monthly Compliance Reports and Annual Compliance Reports.

**Safety:** During construction, Morgan was Jacobs onsite safety representative overseeing health and safety requirements for 180 subconsultant biologists.

**Operations (NRG Energy: 2013 through present):** During operations phase of ISEGS, Morgan was approved as Qualified Botanist and took over management of all botanical related compliance tasks, special-status plants, weeds, and revegetation. She currently conducts annual compliance monitoring and prepares Annual Compliance Reports. 2021 will be her 15<sup>th</sup> year supporting ISEGS and she provides our client with valuable project history and records. In 2021 she took over project management of this program.

**Added Value (Challenges overcome):** The project had significantly more tortoises than the 2010 USFWS Biological Opinion anticipated (300 versus 30), which resulted in a 2/3 construction halt. In less than 2.5 months, Jacobs reinitiated formal consultation and had another Biological Opinion in place to continue construction. The number of tortoises required need of unanticipated husbandry program. Many gravid female tortoises were required to lay and hatch eggs in captivity which resulted in 150 hatchlings. These tortoises needed to be reared in captivity until adequate release size.

The CH2M subconsultants and lead Designated Biologists were terminated in 2012 upon discovery of falsifying data, illegally handling tortoise, and transporting tortoise across state-lines against agency direction. We were able to get agency approval and replacement Designated Biologists in place overnight.

During pre-construction surveys, botanists identified over 100 small and cryptic special-status cactus, desert pincushion (*Coryphantha chlorantha*). During desert tortoise clearance surveys (conducted at much narrower transect width and up to 7-times over an area), an additional 600 desert pincushion were located. This required use of adaptive management to salvage additional cactus according to common succulent regulations not laborious and costly special-status plant salvage requirements. A new long-term transplant nursery was established to house the additional cacti.

### **Three Confidential Geothermal Projects, Imperial County, California**

**Client:** Confidential Client

**Title:** Lead Biologist

**Start/End Dates:** 2022 - Current

**Scope/Description:** A confidential client plans to develop three new geothermal power plants in Imperial County, California. The proposed sites are located adjacent to the Salton Sea. Client hired Jacobs to prepare California Energy Commission Application for Certification (AFC) for construction and operation for each of the three geothermal units, totaling 350 megawatts in compliance with CEQA. Additional biological permits for client include Incidental take permit and biological assessment/biological opinion.

**Responsibilities:** Morgan is the subject matter expert for biology. She performed protocol-level botanical surveys on project features and performed reconnaissance level wildlife biological surveys. She mapped 17,000 acres of vegetation and land cover types to accommodate changes in project area and alternative alignments of transmission line and auxiliary features. She is the lead author of the AFC biological resources section and associated biological technical reports. Species of concern include western burrowing owl and Yuma Ridgway's rail (*Rallus obsoletus*).

### **Reid Gardner Generating Station, Moapa, Clark County, Nevada**

**Client:** NV Energy

**Title:** Lead Biologist

**Start/End Dates:** 2022

**Scope/Description:** NV Energy hired Jacobs to support the conceptual site model for the Reid Gardner Generating Station. In support of the ecological risk assessment, Jacobs conducted a reconnaissance-level biological resources survey of source area groups and areas of potential exposure pathways for contaminants of concern from source area groups to receptors.

**Responsibilities:** Morgan conducted reconnaissance-level biological survey of the 907-acre site focusing on land-cover and vegetation mapping and assessment of potentially suitable wildlife habitat. Surveys included all species identified during Nevada Natural Heritage Program query and potentially BLM-sensitive occurring species. Results were included in the conceptual site model.

**Red Rock Canyon National Conservation Area Trail and Road Intersections Improvements Project, Clark County, Nevada**

**Client:** Federal Highway Administration, Central Federal Lands Highway Division

**Title:** Botanist

**Start/End Dates:** 2020 through 2022

**Scope/Description:** The proposed 6-mile multi-use trail would connect trails in the City of Summerlin with the Red Rock Canyon National Conservation Area (RRCNCA). In 2020, biological surveys included two potential alignments for review during the Environmental Assessment and Biological Assessment submitted to BLM. The Biological Opinion and Environmental Assessment were issued in 2021 and geotechnical analysis was performed shortly thereafter.

**Responsibilities:** Morgan supported pre-construction permitting surveys and conducted biological monitoring for the geotechnical analysis. In 2020, Morgan conducted special-status plant surveys of the two-proposed alignments (417 acres). The only rare plant observed was yellow twotone beardtongue (*Penstemon bicolor* ssp. *bicolor*). Surveys included inventory of cacti and yucca and noxious weeds within the disturbance area. Mojave desert tortoise surveys occurred concurrently with rare plant surveys. Morgan recorded three off-transect observations of live individual tortoise to support wildlife surveys.

In 2021, Morgan was approved as BLM's Field Contact Representative (FCR) and lead biological monitor for geotechnical analysis. She was approved by USFWS as Authorized Biologist for desert tortoise and was issued a Special Purpose Permit for desert tortoise and Gila monster (*Heloderma suspectum*) by the Nevada Department of Wildlife.

**Confidential Project, Steptoe Slough Ely, White Pine County, Nevada**

**Client:** Confidential

**Title:** Lead Biologist

**Start/End Dates:** 2021 through present

**Scope/Description:** Confidential Steptoe Slough site is 6,670 acre site in

Great Basin Desert of White Pine County, Nevada. This is a former mill site for mineral (copper) extraction and processing, including a tailings storage facility.

**Responsibilities:** Morgan is Jacobs lead biologist conducting *Checklist for Ecological Assessment* to support Environmental Protection Agency's (EPA) ecological risk assessment/investigation process. This checklist compiles information on the physical and biological aspects of the site including, environmental setting, land use, potential contaminants, receptors and exposure pathways, special-status species, vegetation classification, and invasive species. Species of concern were relict dace (*Relictus solitarius*), greater sage-grouse (*Centrocercus urophasianus*), and several invertebrates endemic to the fresh water springs in Steptoe Valley.

#### **R-42 Potable Water Storage Tank, Henderson, Clark County, Nevada**

**Client:** City of Henderson

**Title:** Lead Biologist

**Start/End Dates:** 2021

**Scope/Description:** The City of Henderson selected Jacobs to design proposed new potable water storage tank designated as R-42 and a connection to the Las Vegas Valley Water District facilities in the west Henderson area. This project is located on Bureau of Land Management (BLM) property in Clark County. Biological support will be provided to City of Henderson to inform necessary permitting.

**Responsibilities:** Morgan conducted protocol-level plant and wildlife surveys on approximately 20 acres of BLM. Fieldwork included Mojave desert tortoise presence-absence, burrowing owl, and special-status plants surveys. Surveys included all species identified during Nevada Natural Heritage Program query and potentially BLM-sensitive occurring species.

#### **Confidential Solar Project, Mojave, Kern County, California**

**Client:** Confidential

**Title:** Lead Biologist

**Start/End Dates:** 2020 - Current

**Scope/Description:** Confidential client proposes to construct an approximately 2,200-acre, 1,000 megawatts (MW) (pending), photovoltaic (PV) solar and energy storage facility in Kern County, California. Jacobs was contracted to provide CEQA siting and licensing support.

**Responsibilities:** Morgan is the lead biologist for Solar Project. She conducts fieldwork and leads CEQA biological compliance. In fall 2020, CDFW accepted western Joshua tree (*Yucca brevifolia*) as candidate for listing under California Endangered Species Act. Morgan led reconnaissance-level Joshua tree survey to inform mitigation requirements for client. She also led protocol-level Mojave desert tortoise surveys and assessed habitat for Swainson's hawk (*Buteo swainsoni*; State Threatened [ST]), Mojave ground squirrel (*Spermophilus mohavensis*, ST) and other special-status species. Survey results will inform preparation of Incidental Take Permit (ITP) and Environmental Impact Report (EIR).



**Sagebrush Solar Storage Project, Willow Springs, Kern County, California**

**Client:** Sagebrush Solar, LLC (Terra-Gen Power)

**Title:** Lead Biologist

**Start/End Dates:** 2020 - 2021

**Scope/Description:** Sagebrush Solar, LLC a subsidiary of Terra-Gen Power proposes to construct an 800-acre, 200 megawatts (MW), photovoltaic (PV) solar and energy storage facility in Kern County, California. Jacobs was contracted to provide CEQA siting and licensing support.

**Responsibilities:** Morgan is the lead biologist for Sagebrush Solar Storage Project. She conducts fieldwork and leads CEQA biological compliance. In fall 2020, CDFW accepted western Joshua tree (*Yucca brevifolia*) as candidate for listing under California Endangered Species Act. Morgan led CDFW protocol-level Joshua tree surveys to inform mitigation requirements for client. She also led protocol-level Mojave desert tortoise surveys and assessed habitat for Swainson's hawk (*Buteo swainsoni*; State Threatened [ST]) and other special-status species. Survey results were intended to inform preparation of Incidental Take Permit (ITP) and Environmental Impact Report (EIR).

Due to Swainson's hawk nests in vicinity, the client is no longer pursuing development of Sagebrush Solar Project.

**Sanborn 2.0 Solar Project, Mojave, Kern County, California**

**Client:** Sanborn Solar, LLC (Terra-Gen Power)

**Title:** Lead Biologist

**Start/End Dates:** 2020 - 2022

**Scope/Description:** Sanborn Expansion Solar, LLC a subsidiary of Terra-Gen Power proposes to construct a 1,200-acre, 220 megawatts (MW), photovoltaic (PV) solar and energy storage facility in Kern County, California. Jacobs was contracted to provide CEQA siting and licensing support.

**Responsibilities:** Morgan is the lead biologist for Sanborn Expansion Solar Project. She conducts fieldwork and leads CEQA biological compliance. In fall 2020, CDFW accepted western Joshua tree (*Yucca brevifolia*) as candidate for listing under California Endangered Species Act. Morgan led reconnaissance-level Joshua tree survey to inform mitigation requirements for client. She also led protocol-level botanical surveys and Mojave desert tortoise surveys and assessed habitat for Swainson's hawk (*Buteo swainsoni*; State Threatened [ST]), Mojave ground squirrel (*Spermophilus mohavensis*, ST) and other special-status species. Survey results will inform preparation of Incidental Take Permit (ITP) and Environmental Impact Report (EIR) Addendum to existing Sanborn Solar Project.

**U.S. Navy, Naval Air Weapons Station China Lake, Ridgecrest, Kern and San Bernardino Counties, California**

**Client:** U.S. Navy

**Title:** Lead Biologist

**Start/End Dates:** 2018 - Current

**Scope/Description:** NAWS China Lake is a 1.1-million-acre installation located in Western Mojave Desert. This installation provides facilities that develop and test weapons systems.

**Responsibilities:** Morgan is Jacobs lead biologist supporting various programs at NAWS China Lake. She has strong working relationship with base natural resources specialists and was approved by U.S. Fish and Wildlife (USFWS) as Mojave desert tortoise Authorized Biologist under 2019 Biological Opinion. She provides natural resources support of Environmental Protection Agency (EPA) investigation of early stage and late stage landfill sites (600 acres), completing numerous *Checklist for Ecological Assessment*. In addition, she provides oversight of natural resource compliance of Military Construction (MILCON) Earthquake Recovery Project (25 sites throughout installation). Compliance tasks includes protocol-level desert tortoise presence absence and clearance surveys, protocol-level burrowing owl surveys, Mohave ground squirrel (*Xerospermophilus mohavensis*; State Threatened [ST]) habitat assessment, and other wildlife and plant surveys.

**U.S. Army National Training Center Fort Irwin, San Bernardino County, California**

**Client:** U.S. Army

**Title:** Lead Biologist

**Start/End Dates:** 2017 – Current

**Scope/Description:** National Training Center Fort Irwin (Fort Irwin) is the U.S. Army's premier Combat Training Center, located in California's Mojave Desert (742,000 acres).

**Responsibilities:** Morgan is Jacobs lead National Environmental Policy Act (NEPA) biologist supporting various projects at Fort Irwin. She has strong working relationship with base natural resources specialists and environmental compliance staff.

*Project: Dense Urban Terrain:* Morgan was natural resource compliance and field lead for 1,400-acre survey focused on eight species of concern: desert tortoise, Mohave ground squirrel [ST]), burrowing owl, Lane Mountain milkvetch (*Astragalus jaegerianus*; FE), Barstow woolly sunflower (*Eriophyllum mohavense*), Clokey's cryptantha (*Cryptantha clokeyi*), desert cymopterus (*Cymopterus deserticola*), and Mojave monkeyflower (*Diplacus* [=Mimulus] *mohavensis*). The report was submitted to USFWS and used to inform the Environmental Assessment.

*Project: Multi-Purpose Range Complex:* Morgan was the natural resource lead for survey of the 2,899-acre complex.

Morgan was natural resource compliance and field lead for 2,899-acre survey focused on eight species of concern: desert tortoise, Mohave ground squirrel (ST), burrowing owl, Lane Mountain milkvetch (FE), Barstow woolly sunflower, Clokey's cryptantha, desert cymopterus, and Mojave



monkeyflower. The report was submitted to USFWS and used to inform the Environmental Assessment.

**Southwest Gas (in partnership with Ameresco) located on U.S. Army National Training Center Fort Irwin, San Bernardino County, California**

**Client:** Ameresco

**Title:** Natural Resource Project Lead

**Start/End Dates:** 2019 – 2020

**Scope/Description:** Southwest Gas, in partnership with Ameresco, identified a set of beneficial energy security and energy conservation measures to be implemented by the U.S. Army. A 6-inch (15-centimeter)-diameter steel pipeline would be installed to transport natural gas from an existing Kern River natural gas transmission line at the southeastern boundary of Fort Irwin into the cantonment area, where it would be metered by Southwest Gas. The pipeline alignment is 22 miles. The gas line would be entirely contained within Department of Defense land, with the exception of approximately 75 feet of pipeline that would extend across an existing BLM designated utility corridor from the Kern River transmission line to the boundary of Fort Irwin. Morgan was the lead biologist for natural resource surveys of 315-acres along the proposed pipeline.

**Responsibilities:** Morgan was field lead for California Environmental Quality Act (CEQA) plant and wildlife surveys. Biologists conducted protocol level desert tortoise (ST, FT) surveys, protocol level floristic surveys, and camera trapping for Mohave ground squirrel (ST). Other species included in surveys but not limited to included burrowing owl and desert kit fox. Morgan also ensured compliance with Desert Renewable Energy Conservation Plan (DRECP) requirements. The report was submitted to U.S. Army, BLM and USFWS and used to inform the Environmental Assessment.

**Northern Corridor, St. George, Washington County, Utah.**

**Client:** Utah Department of Transportation and Washington County

**Title:** Botanist

**Start/End Dates:** 2020

**Scope/Description:** The Northern Corridor is proposed roadway in St. George, Washington County, Utah through BLM's Red Cliffs National Conservation Area (Red Cliffs Desert Reserve). Biological surveys of three alternatives supported preparation of Environmental Impact Statement (EIS).

**Responsibilities:** Morgan, BLM approved botanist, used BLM's Assessment, Inventory, and Monitoring (AIM) protocols to conduct vegetation inventory at long-term monitoring plots (46 total). Sampling methods included floristic identification to species, richness, point-line intercept, height classifications, and soils. Data was collected in BLM specific program, Database for Inventory, Monitoring and Assessment (DIMA). Survey results were used to inform EIS.

Concurrently with AIM surveys, Jacobs biologists also conducted protocol-level Mojave desert tortoise surveys. Morgan provided incidental off-transect observations of tortoise and sign to support surveys.

**Verde Connect, Cottonwood to Camp Verde, Yavapai County, Arizona**

**Client:** Yavapai County and Federal Highway Administration

**Role:** Botanist

**Start/End Dates:** 2020

**Scope/Description:** Verde Connect is proposed roadway in Verde Valley from SR-260 to Cornville Road, between Cottonwood and Camp Verde, Yavapai County, Arizona. Biological surveys were used to inform Biological Assessment and Biological Evaluation.

**Virgin River Bridge #1 Reconstruction, Beaver Dam to Littlefield, Mohave County, Arizona**

**Client:** Arizona Department of Transportation and Federal Highways Administration

**Title:** Botanist

**Start/End Dates:** 2020

**Scope/Description:** Arizona Department of Transportation (ADOT) plants to rehabilitate Virgin River Bridge #1 to better accommodate truck volume and traffic on Interstate 15. Wetland fieldwork is to support update to 404 Permit and Mitigation Plan.

**Responsibilities:** Morgan conducted wetland and upland vegetation mapping to account for flooding changes that occurred after jurisdictional delineation was submitted. This data informed jurisdictional delineation revision, 404 permit, and riparian mitigation monitoring plan.

**Added Value:** Jacobs was able to reduce ADOT's liable wetland impact costs by providing current vegetation conditions.

**Freeport Four Corners Uranium Federal Lands Project, Utah and Colorado**

**Client:** Freeport Minerals Corporation

**Title:** Project Biologist

**Start/End Dates:** 2019 - Current

**Scope/Description:** The Freeport Four Corners Uranium Federal Lands Project supports the Historic Mine Opening Safety Program throughout the Four Corners area on the Colorado Plateau. Tasks include researching historic mining claims, investigating habitat at historic mining locations, reporting to client and BLM/U.S. Forest Service (USFS), and permitting the mine closures. Annual budget approximately \$3.5 million.

**Responsibilities:** During the initial historic mine field investigation, Morgan conducted biological resource and waters surveys. She assessed potentially suitable habitat and recorded incidental observations of species listed by Endangered Species Act, BLM-Sensitive species, USFS Sensitive species, and other special-status species as necessary. Prior to mine closure

construction, she supported protocol-level rare plant surveys.

**Added Value:** Field surveys were conducted in extremely remote locations and in challenging terrain. Field team has an exemplary safety record. At end of 2019 (5 years), there were no recordable incidents, 75,000 safe hours worked, and nearly 300,000 safe miles driven.

**Four Corners Uranium Project – Tribal Lands, New Mexico and Arizona**

**Client:** Cyprus Amax Minerals Company (Freeport McMoran Inc.)

**Title:** Lead Biologist

**Start/End Dates:** 2018 – Current

**Scope/Description:** The Four Corners Uranium Project - Tribal Lands is a Site Remediation Initial Investigation project at 94 abandoned uranium mines (approximately 600 acres) on Navajo Nation in Arizona and New Mexico. Navajo Nation and Cyprus Amax Minerals Company entered into a Consent Decree. The initial phase of the project is to submit Remedial Site Evaluations to U.S. Environmental Protection Agency (EPA) and Navajo Nation EPA to direct further remediation actions. The annual budget is approximately \$4 million.

**Responsibilities:** Morgan is lead biologist for Four Corners Uranium Project Tribal Lands. Prior to Remedial Site Evaluations, she performs habitat assessments for biological resources such as, species listed by Navajo Endangered Species List, species listed by federal Endangered Species Act, birds protected by Migratory Bird Treaty Act and other biological resources as necessary. Morgan ensures compliance with Navajo Nation Department of Fish and Wildlife Service and holds active Biological Investigation Permit valid throughout Navajo Nation. Morgan conducts fieldwork and monitoring for plant and wildlife species, such as Mexican Spotted Owl (*Strix occidentalis lucida*; FT), Mesa Verde cactus (*Sclerocactus mesae-verde*; FT), and golden eagle (*Aquila chrysaetos*). This includes formal consultation with Navajo Nation Department of Fish and Wildlife.

**Ruby Pipeline, Wyoming, Utah, Nevada and Oregon**

**Client:** Kinder Morgan

**Title:** Lead Field Biologist

**Start/End Dates:** April 2012 and August 2018

**Scope/Description:** Ruby Pipeline is a 42-inch diameter natural gas pipeline owned and operated by Kinder Morgan. The 680-mile pipeline spans four states; Wyoming, Utah, Nevada, and Oregon.

**Responsibilities:** Morgan was the field team lead botanist for restoration vegetation monitoring along Nevada sections of the pipeline right-of-way during two seasons.

**Siskiyou Telephone Happy Camp to Somes Bar Fiber Connectivity Project, Siskiyou County, California**

**Client:** Siskiyou Telephone Company

**Title:** Biologist

**Start/End Dates:** 2019

**Scope/Description:** Siskiyou Telephone Company received authorization to construct the 17-mile fiber optic broadband facility cable along State Highway 96 in Siskiyou County, California by the California Public Utilities Commission (CPUC). The California Department of Fish and Wildlife (CDFW) issued a Streambed Alteration Agreement (SAA) requiring biological monitoring support during construction.

**Responsibilities:** Morgan, CPUC approved biological monitor, conducted surveys, monitoring, and reporting to comply with SAA and approved Mitigation and Monitoring Plan. Biological compliance included providing worker environmental training, delineating environmentally sensitive areas, nesting bird surveys, monitoring and avoidance, and weekly and monthly reporting. Biologists also ensured compliance with U.S. Forest Service Klamath National Forest biological requirements with oversight from Happy Camp Oak-Knoll Ranger District. Active oprey (*Pandion haliaetus*) and bald eagle (*Haliaeetus leucocephalus*) nests were avoided and monitored. Biological monitors implemented avoidance measures to Northern Spotted Owl (*Strix occidentalis caurina*) Core areas in Klamath National Forest.

**Aquatic Resources Delineation on State Highway 75, Ketchum, Blaine County, Idaho**

**Client:** Idaho Department of Transportation

**Title:** Biologist

**Start/End Dates:** 2019

**Scope/Description:** Idaho Transportation Department is proposing to repair deficient pavement and replace culverts on a 7-mile segment of State Highway 75 from Ketchum north to the North Fork Campground in Blaine County, Idaho. Fieldwork was conducted to support Aquatic Delineation Report for submittal to U.S. Army Corps of Engineers, Walla Walla District.

**Responsibilities:** Morgan conducted fieldwork under a lead Wetland Scientist to identify aquatic resources and conduct jurisdictional delineation of survey area.

**Sevenmile Creek Wetland Mitigation, Fishlake National Forest, Sevier County, Utah**

**Client:** Federal Highway Administration, Central Federal Lands Highway Division (CFLHD)

**Title:** Botanist

**Start/End Dates:** 2018-2019

**Scope/Description:** The CFLHD established a mitigation site along Sevenmile Creek to compensate for impacts to wetlands and waters from reconstruction of Utah Forest Highway 39. Sevier County on the Fishlake National Forest. Mitigation monitoring satisfies requirements in the Section 404 permit.

**Responsibilities:** Morgan conducted vegetation and hydrological mitigation monitoring for two seasons at Sevenmile Creek Wetland Mitigation area. Monitoring including transects and Daubenmire plots to assess percent cover for woody and herbaceous vegetation. In addition, protocol requires inventory of woody vegetation survival, presence of noxious weeds, and hydrological monitoring.

**Needles 3MT Railroad Improvement, Needles to Goffs, San Bernardino County, California**

**Client:** Burlington Northern Santa Fe Railroad Company (BNSF)

**Title:** Biologist

**Start/End Dates:** 2018

**Scope/Description:** The Needles 3MT project was to improve approximately 30 miles of existing BNSF railway.

**Responsibilities:** Morgan conducted protocol-level desert tortoise presence absence surveys using linear project protocol over approximately 30 miles of existing railway.

**Equipment Concentration Site on Marine Corps Logistics Base Barstow, Yermo Annex, San Bernardino County, California**

**Client:** U.S. Army Reserve

**Title:** Biologist

**Start/End Dates:** 2018

**Scope/Description:** The Marine Corps Logistics Base in Barstow is a supply and maintenance installation occupying 2,400 acres in San Bernardino County, California. The U.S. Army Reserve proposed to construct and operate an Equipment Concentration Site.

**Responsibilities:** Morgan conducted protocol-level desert tortoise presence absence survey on 46-acre site. Her biological report was used to inform a Biological Evaluation and Environmental Assessment.

**U.S. Air Force, Nellis Air Force Base, Las Vegas, Nevada**

**Client:** U.S. Air Force

**Title:** Natural Resource Project Manager

**Start/End Dates:** 2017

**Scope/Description:** Fence to Fence contract implemented between 2016 and 2020 for Nellis Air Force Base (AFB).

**Responsibilities:** Morgan is the natural resources project manager for the Fence to Fence contract implemented between 2016 and 2020 for Nellis AFB. This includes revisions to the Integrated Natural Resource Management Plan (INRMP), and tasks applying to federally threatened desert tortoise, special-status plants and weeds as the Natural Resource Manager directs.

**Doble 33-kilovolt Distribution Line Rebuild Project, San Bernardino County, California**

**Client:** Southern California Edison

**Title:** NEPA Biological Resources Lead

**Start/End Dates:** 2016 - 2017

**Scope/Description:** Doble 33-kilovolt (kV) Distribution Line Rebuild is a replacement of a 15-mile transmission line that spans from Lucerne Valley to Holcomb Valley in San Bernardino County, CA. Currently in permitting phase.

**Responsibilities:** Morgan is the lead NEPA biologist for this project. Work includes coordination with lead agency, U.S. Forest Service, in preparation of EA and Biological Assessment/Biological Evaluation. A portion of this project goes through BLM land which is under Desert Renewable Energy Conservation Plan (DRECP) requirements. Morgan prepared DRECP checklist and ensured project compliance with DRECP regulations.

Morgan was also involved with both the desert tortoise and botanical surveys in support of these documents. This project occurs on two sensitive natural communities, Carbonate Soils and Pebble Plains which provide habitat for several federally listed plant species: Cushenbury oxytheca (*Acanthoscyphus parishii* var. *goodmaniana*; Federally Endangered [FE]), Cushenbury milkvetch (*Astragalus albens*; FE), Ash-grey paintbrush (*Castilleja cinerea*; federally threatened [FT]), Bear Valley sandwort (*Eremogone ursina*; FT), Parish's daisy (*Erigeron parishii*; FT), Southern mountain wild buckwheat (*Eriogonum kennedyi* var. *austromontanum*; FT), Cushenbury buckwheat (*Eriogonum ovalifolium* var. *vineum*; FE), California taraxacum (*Taraxacum californicum*; FE), and San Bernardino bluegrass (*Poa atropurpurea*; FE). Other listed or sensitive wildlife species that occur in project vicinity include Mojave desert tortoise (FT and ST), Golden Eagle (*Aquila chrysaetos*), California spotted owl (*Strix occidentalis occidentalis*), and Nelson's bighorn sheep (*Ovis canadensis nelsoni*).

**Environmental Compliance for Union Pacific Railroad, various locations in western U.S.**

**Client:** Union Pacific Railroad

**Title:** Project Manager and Biologist

**Start/End Dates:** 2014 - Current

**Scope/Description:** Union Pacific Railroad (UPRR) operates over 32,000 route miles over 23 western states. Jacobs has a Master Services Agreement to provide environmental compliance support, as necessary.

**Responsibilities:** Since 2014, Morgan has provided UPRR program with environmental compliance support in California and Wyoming.

**BLM Reclamation Plan (Wyoming):** Morgan is the Project Management to prepare Reclamation Plans for BLMs Rawlins Field Office under BLM and UPRR Right-of-Way grants.

**Mud Pot (Yuma Substation, Niland, Imperial County, California):** In 2018, a moving geothermal anomaly, "mud pot," threatened to impact UPRR's east-west mainline railway for Port of Los Angeles. Morgan was called in to support State of California Emergency status. Jacobs provided

environmental compliance and other permitting support during this emergency response. Compliance support included assessing permitting constraints (404, 401, 402) and biological and aquatic resources. In record time, Jacobs secured U.S. Army Corps of Engineers 404 permit, Imperial Irrigation District encroachment permit, Regional Water Quality Control Board 401 and surface water discharge permits and Imperial County boring and well permits. Morgan was integral in setting up real-time photo logs that could be exported to client daily. UPRR commended Morgan in her emergency response role. UPRR requested that Morgan manage all agency communication and escorts at field site.

Between 2018 and 2020, the mud pot slowly migrated through and past UPRR's mainline railway. The mud pot has also impacted Kinder Morgan pipeline and Caltrans emergency services highway.

*Special-status Species Compliance (Yuma Substation, Palm Springs, Riverside County, California):* UPRR follows avoidance and minimization guidance in the Coachella Valley Multiple Species Habitat Conservation Plan (CVMSHCP). Morgan conducts surveys to avoid impacts to Coachella Valley milkvetch (*Astragalus lentiginosus* var. *coachellae*; FE), Coachella Valley fringe-toed lizard (*Uma inornata*; FT, SE), and Mojave desert tortoise.

*Desert tortoise and Migratory Bird Treaty Act Compliance (Riverside and San Bernardino counties, California):* Morgan provides UPRR with as-needed biological monitoring and training support in southern California. In desert tortoise habitat, she provides required Worker Environmental Awareness Program. She provides monitoring support when maintenance or emergency work is conducted in desert tortoise habitat. She performs nest surveys for species protected by Migratory Bird Treaty Act.

#### **U.S. Air Force, Edwards Air Force Base, Rosamond, Kern County, California**

**Client:** U.S. Air Force

**Title:** Biologist

**Start/End Dates:** January 2016-September 2017

**Scope/Description:** Edwards Air Force Base is 250,000 acre installation home to the Air Force Test Center, Test Pilot School, and National Aeronautics and Space Administration's (NASA) Armstrong Flight Research Center.

**Responsibilities:** Morgan supported the natural resources staff as USFWS Authorized Biologist for Mojave desert tortoise. She provided fieldwork in support of various ground disturbing activities.

#### **Mojave Solar Project, Hinkley, San Bernardino County, California**

**Client:** Abengoa Solar

**Title:** Designated Biologist

**Start/End Dates:** 2013 –2015

**Scope/Description:** The 1,800-acre Mojave Solar Project is a solar-thermal electric generating facility (solar trough) with a combined gross electrical output of 280 MW. Annual budget \$1.5 million.



**Responsibilities:** Morgan served as the CEC's lead Designated Biologist which required that she was also permitted as a USFWS Authorized Biologist for desert tortoise. The Designated Biologist acts as the liaison between the CEQA and NEPA agencies and client for compliance with biological resource permits. This required daily interactions with client and agencies. The lead CEQA agency was the CEC followed by the CDFW and the lead NEPA agency was Department of Energy. This included overseeing biological compliance for several species; Mojave Desert tortoise (FT, ST), Mojave ground squirrel (ST), federally and state protected western burrowing owl, and several state protected special-status plants. She also managed and ensured project compliance with other biological resource requirements including invasive weed plan, common raven plan, evaporation pond plan, avian mortality study, and the Biological Resource plan, Biological resource Mitigation Implementation and Monitoring Plan (BRMIMP). She acted as the technical lead for Evaporation Pond Monitoring and Adaptive Management Plan and Bird Monitoring Study (as part of the USFWS Bird and Bat Conservation Strategy) looking at impacts to species protected under the Migratory Bird Treaty Act. She also maintained the USFWS MBTA special-purpose utility permit (SPUT) for collecting and managing carcasses and partial remains of birds protected by the MBTA.

During these tasks, she also oversaw a team of 30 biological monitors which requires training on all applicable biological resource compliance plans. Morgan was Jacobs (formerly CH2M's) onsite health and safety program representative.

**Added Value (Challenging overcome):** Our client, Abengoa, was a Spanish based company that staffed with Spain individuals. Spain does not have rigorous environmental regulations. Jacobs was hired to provide third-party oversight to their environmental compliance permits. The role of Designated Biologist was defined to report directly to agencies. It was extremely challenging to work with a company that has cultural biases against following environmental regulations. Abengoa has contracted several different consultants because their resistance to following required environmental permits. Out of 5 known consultants to support this client, Jacobs lasted the longest at 3-years. When Jacobs was replaced, Abengoa had to hire 5 individuals to replace Morgan alone.

Our client point-of-contact was fired in 2014 for sexual harassment claims against several Jacobs employees and subconsultants.

**Topock Compressor Station, Needles, San Bernardino County, California**

**Client:** Pacific Gas & Electric

**Title:** Lead Botanist

**Start/End Dates:** January 2011-December 2012

**Scope/Description:** Topock Compressor Station is a Pacific Gas & Electric (PG&E) operated natural gas compressor station.

**Responsibilities:** Morgan performed summer/fall floristic surveys with a focus on potential for special-status plants, indigenous plants, and mature vegetation.



**Pit River 3, 4, 5, Burney and Big Bend, Shasta County, California****Client:** Pacific Gas & Electric**Title:** Co-Botany Lead**Start/End Dates:** January 2010-December 2010

**Scope/Description:** Pit 3, 4, 5 is a hydroelectric system including four dams, four reservoirs, three powerhouses, and other associated features. Combined normal operated capacity is 325 MW.

**Responsibilities:** Morgan conducted 2010 botanical resource monitoring for compliance with Federal Energy Regulatory Commission's (FERC) requirements. Pit 3, 4, 5 is located on both private and Shasta Trinity National Forest lands. She was a co-leader in the botanical surveys of Pit River along Dams 3, 4, 5 which included Lake Britton. Surveys covered approximately 4,000 acres over 37 miles between elevations 1,400 and 2,800 feet. She assisted in preparing the Botanical Resource report (including special-status species and invasive weeds) and the Vegetation Management Strategies for Invasive Weeds report.

**Alta Infill, Alta Phase 2, and Sun Creek, Kern County, California****Client:** Terra-Gen Power**Title:** Lead Botanist**Start/End Dates:** January 2010-December 2010

**Scope/Description:** Terra-Gen operates eleven wind power facilities for a 1,248 MW capacity on approximately 3,000 acres.

**Responsibilities:** Morgan performed spring and summer botanical surveys on the Alta Infill, Alta Phase 2, and Sun Creek project areas between Mojave and Tehachapi. These surveys used the California Native Plant Society (CNPS) and USFWS's 1996 protocols for conducting floristic inventories. During the Infill surveys, she was the field leader and managed crews of 40 field staff. She was also responsible for botanical resource survey report for Alta Infill. She also conducted protocol level botanical surveys for federally and state endangered Bakersfield cactus (*Opuntia basilaris* var. *treleasei*), and is a qualified botanist. Reports included vegetation mapping, invasive weed analysis, Joshua tree mapping and occurrences of special-status plants.

**Devers-Palo Verde No. 2 Transmission Line, Riverside County, California****Client:** Southern California Edison**Title:** Biological Field Lead**Start/End Dates:** January 2010 - December 2010

**Scope/Description:** Southern California Edison (SCE) constructed and operates the 500 kV Devers to Palo Verde No. 2 (DPV2) transmission line. The transmission line is 150 miles long and crosses, BLM and private land.

**Responsibilities:** Morgan analyzed locations for permanent and temporary construction locations as pertains to state or federally listed plants and wildlife, sensitive vegetation communities, and waters of the U.S. She

compiled and prepared technical report of the Devers-Colorado section of DPV2 line including reconnaissance level plant, wildlife, California Desert Native Plant Act (CDNPA), weed, vegetation mapping, and habitat assessments for pre-identified target species. She was also approved by USFWS as a qualified botanist for federally endangered Coachella Valley milk-vetch (*Astragalus lentiginosus* var. *coachellae*). She also assisted in preparing the project's Coachella Valley Milk-vetch Mitigation and Monitoring Plan, which included protection and salvage guidelines.

**Black Rock Energy, Imperial County, California**

**Client:** CE Obsidian Energy LLC

**Title:** Biologist

**Start/End Dates:** 2009- 2010

**Scope/Description:** Black Rock Energy is a geothermal generating facility with a 159 MW net generating capacity located on 80 acres.

**Responsibilities:** Morgan performed floristic-level survey focusing on special-status species occurrences, burrowing owl surveys, and one mile buffer reconnaissance-level survey for CEQA compliance. This task also included updating vegetation mapping performed in 2009 due to land use changes. She also prepared sections of the AFC for submittal to the CEC and compliance with CEQA.

**Trilobite Solar Electric Generating Project, Amboy, San Bernardino County, California**

**Client:** Pacific Gas & Electric

**Title:** Biological Field Lead

**Start/End Dates:** January 2009-December 2009

**Scope/Description:** Pacific Gas & Electric (PG&E) began permitting phase of 5,300-acre Trilobite solar electric generating project on BLM lands. The project was never constructed after permitted phase.

**Responsibilities:** Morgan was the crew leader for 40 staff conducting floristic surveys in accordance with the USFWS's 1996 botanical inventories guidelines, CDFW's 2000 guidelines, as well as CNPS's 2001 survey guidelines. These surveys were used for CEQA required AFC preparation for submittal to the CEC. These surveys included rare plants, invasive weed, identify cactus for salvage, and a habitat assessment of the one-mile buffer of the project site. She was also responsible for training staff to use and managing data collected on Trimble Global Positioning System (GPS).

**Broadwell Solar Energy, Barstow, San Bernardino County, California**

**Client:** BrightSource Energy

**Title:** Lead Biologist

**Start/End Dates:** January 2009 - December 2009

**Scope/Description:** The Broadwell solar electric generating project was proposed on 8,600 acres. The project was never constructed after permitted phase.

**Responsibilities:** Morgan organized the field effort for this project through developing project instructions, GPS/Global Information System (GIS) protocol, and field schedules.

**Solar Facilities, Clark County, Nevada**

**Client:** Renewable Energy Systems

**Title:** Lead Biologist

**Start/End Dates:** January 2009 - December 2009

**Scope/Description:** Renewable Energy Systems (RES) performed initial scoping of three potential solar facilities in Clark County, 300 acres. None were ever permitted or constructed.

**Responsibilities:** Morgan was involved with the biological constraint analysis of three potential solar facilities in the Ivanpah Valley and the Amargosa Valley, Nevada.

**Cadiz Solar Electric Generating Projects and Imperial Valley Solar Electric Generating Project, Imperial County, California**

**Client:** Iberderola/PPM

**Title:** Lead Biologist

**Start/End Dates:** January 2009 - December 2009

**Scope/Description:** The proposed Cadiz and Imperial solar electric generating projects were combined 13,300 acres.

**Responsibilities:** Morgan organized the field effort for three rare plant surveys, two in the Cadiz Valley and one in Imperial Valley. This included organizing crews through developing project instructions, GPS/GIS protocol, and field schedules. Due to early special status plant blooming periods, PPM decided to survey in 2010 instead of 2009 and did not hire Jacobs formerly CH2M to conduct these surveys.

**Travis Air Force Base Tree Inventory, Fairfield, California**

**Client:** U.S. Air Force

**Title:** Lead Botanist

**Start/End Dates:** January 2009 – December 2009

**Scope/Description:** Jacobs formerly CH2M provides natural resource support to Travis AFB staff as necessary

**Responsibilities:** Morgan conducted initial tree surveys for the Resource Management Plan. This data was used to scope the effort needed to conduct a tree inventory of the base. She also prepared a photographic guide to all the ~350 species present on the base.

**Mormon Mesa Solar Energy Generating System, Overton, Clark County, Nevada**

**Client:** BrightSource Energy

**Title:** Lead Botanist

**Start/End Dates:** January 2008 – December 2008

**Scope/Description:** BrightSource proposed to build the 800 MW Mormon Mesa solar electric generating facility (concentrated solar power) on 10,000 acres. The project never went to construction after permitting phase.

**Responsibilities:** Morgan conducted protocol level floristic surveys in accordance with USFWS's 1996 botanical inventory guidelines. She was also responsible for managing 40 field staff through developing project instructions, GPS/GIS protocol, schedules, managing crews in the field, analyzing data, and preparing the Rare Plant Report. The requirements for surveying BLM land in Nevada involved mapping barrel cactus for salvage, invasive weed inventory, habitat assessment of the one-mile buffer of the site and the rare plant survey. Morgan was also involved with transmission line and road surveys that access the site.

#### **Potential Solar Facilities, California and Nevada**

**Client:** Solar Millennium

**Title:** Lead Biologist

**Start/End Dates:** January 2008 – December 2008

**Scope/Description:** Solar Millennium was analyzing constraints for six potential solar power facility locations in desert southwest. One went through permitting phase, but has not been constructed.

**Responsibilities:** Morgan performed six reconnaissance-level surveys on potential solar facility locations to analyze the potential for constraints from special status plants, special status wildlife and waters of the U.S. During each survey, Morgan worked with botanical and wildlife specialists to analyze the potential species or issues that could affect permitting or construction. Each location had different constraints ranging from a desert dry lake, large drainages (30 feet deep), BLM sensitive communities, migration corridors, restrictions on water rights, etc.

#### **Potential Solar Facilities, Arizona, New Mexico, Nevada**

**Client:** Iberderola Energy/PPM

**Title:** Lead Biologist

**Start/End Dates:** January 2008 – December 2008

**Scope/Description:** Iberderola/PPM was analyzing constraints for seven potential solar power facility locations in desert southwest.

**Responsibilities:** Morgan performed seven reconnaissance-level surveys for PPM to analyze biological constraints for potential solar facility locations. Biological constraints included special status plants, special status wildlife, and waters of the U.S. During each survey, she worked with a botanical and wildlife specialist to analyze the potential species or issues that could affect permitting or construction. Each location had different constraints ranging from 100-year flood plain, desert wildlife management area, BLM sensitive species, migration corridors, cactus salvage, etc.

#### **Potential Solar Facilities, Nevada**

**Client:** Ausra Solar

**Title:** Lead Biologist

**Start/End Dates:** January 2008 – December 2008

**Scope/Description:** Ausra Solar was analyzing constraints for two potential solar power facility locations in Nevada.

**Responsibilities:** Morgan performed two reconnaissance-level surveys to analyze the potential for constraints from special status plants, special status wildlife and waters of the U.S. on development of solar facilities and respective transmission lines. Morgan worked with botanical and wildlife specialists to analyze the potential species or issues that could affect permitting or construction.

**Santa Susan Field Laboratory, Simi Hills, California**

**Client:** U.S. Department of Energy, Boeing, National Aeronautics and Space Administration

**Title:** Hazardous Waste Survey Lead

**Start/End Dates:** January 2008 – December 2009

**Scope/Description:** According to the CEQA, Department of Toxic Substances Control, Jacobs formerly CH2M was hired for the environmental investigation and cleanup of chemical contamination at the Santa Susana Field Laboratory.

**Responsibilities:** Morgan was involved with a hazardous waste survey over the 2,850 acre mountainous sandstone terrain. This involved walking transects spaced 50 feet apart and documenting potentially contaminated waste with a Trimble GPS.

**Geothermal Incorporated Landfill, Middletown, California**

**Client:** Pacific Gas & Electric (PG&E)

**Title:** Biologist

**Start/End Dates:** January 2006 – December 2008

**Scope/Description:** Provide an overview of the project, including project type, completion status, size and cost

**Responsibilities:** Morgan was involved with the five year vegetation monitoring of mitigation wetlands including fieldwork and preparing Wetland Vegetation Monitoring Reports. Fieldwork included percent coverage of vegetation in wetland and upland plots. According to Army Corps of Engineers permit, she also performed and documented an Informal Wetland Delineation.

**California Department of Transportation State Routes, North and South Bay Area, California**

**Client:** California Department of Transportation (Caltrans)

**Title:** Biologist

**Start/End Dates:** January 2006 – December 2007; January 2009

**Scope/Description:** Caltrans State Routes (SR) biological and water support in North and South Bay Area

**Responsibilities:** Morgan was involved with botanical, wetland and waters of the U.S. fieldwork and document preparation as pertains to Caltrans projects in the North and South Bay area. Project specific tasks included;

- **Jameson Canyon SR 12/29 Interchange** Participated in several projects on the Jameson Canyon 12/29 Interchange including fieldwork, data analysis and preparation of the Natural Environmental Study, Biological Assessment, Rare Plant Report, Tree survey, and Wetland Delineation. The tree survey verified and corrected data collected by Caltrans on over 2000 trees along eight miles of SR 12/29. This included an inventory and mapped location of the tree locations within the Right of Way using a Trimble GPS.
- **Caldecott Tunnel Hwy 24** Assisted in preparation of the Natural Environmental Study and Tree survey.
- **Sonoma Hwy 116** Involvement with the fieldwork and preparation of habitat assessment, Habitat Quality Evaluation, Biological Assessment, and Rare Plant Report.
- **Hemet SR 79** Contributed to the Rare Plant Report, habitat assessment, and Wetland Delineation Report.
- **Sonoma Hwy 12** Participated in Rare Plant Report and Wetland Delineation verification.
- **Stagegulch SR 121** Performed the Wetland Delineation verification and the 401 and 404 permit applications.
- **Duhig SR 121** Involved in the Wetland Delineation, 401 and 404 permit applications.
- **SR 121** Reconnaissance-level habitat assessment for Biological Assessment. Morgan surveyed two bridge expansion projects along SR 121 in preparation for the Biological Assessment for Section 7 consultation. This effort involved a constraints analysis for special status plants and wildlife.

#### **Lompoc Wind Energy Project, Santa Barbara County, California**

**Client:** Acciona Wind Energy USA LLC

**Title:** Lead Botanist

**Start/End Dates:** 2006

**Scope/Description:** Lompoc Wind Energy is a proposed 120 MW output wind farm.

**Responsibilities:** Morgan performed a species specific rare plant survey along proposed transmission line and wind turbine locations for the federally and state endangered Gaviota Tarplant (*Deinandra increscens* ssp. *villosa*). She also verified habitat suitability for other special status plant species that could not be identified due to the timing of survey.

#### **Publications**

King, M., and M. Walsh. 2008. Environmental Bibliography of Muscongus Bay. Quebec Labrador Foundation, Atlantic Center for the Environment.

Ipswich, MA. Accessed at:  
[http://www.qlf.org/publication\\_files/MBP\\_Bibliogaphy\\_%2008.pdf](http://www.qlf.org/publication_files/MBP_Bibliogaphy_%2008.pdf)



## Rachel E. Newton

### BOTANIST AND WETLAND SCIENTIST

Rachel Newton is a botanist and wetland scientist with Jacobs Engineering, Inc., in Boise, Idaho. She has over 15 years of experience in botanical studies, including rare plant and noxious and invasive weed surveys; vegetation monitoring design and implementation; habitat mapping; environmental assessment documentation; and wetland delineation. She has worked in upland and wetland plant communities across the West, including the Rocky Mountains, the Great Basin, the Central California Coast, and the Mojave Desert. She has delineated wetlands and other waters of the US using the following USACE regional supplements: Alaska; Arid West; Great Plains; Midwest; and Western Mountains, Valleys, and Coasts. Rachel has assisted the U.S. Forest Service and the Bureau of Land Management with special status plant management by conducting pre- and post-treatment monitoring and formulating recommendations based on results. Rachel's comprehensive background in landscape and vegetation ecology and monitoring protocols ensures efficient, targeted data collection, accurate results, and thorough analysis.

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#### Key Skills | Areas of Expertise

- Evaluates project-related impacts to federally and state-listed sensitive species and other biological resources in support of Endangered Species Act consultation
- Delineates aquatic resources in support of Clean Water Act consultation
- Surveys and monitors sensitive and invasive plant species throughout the Intermountain West, Desert Southwest, Pacific Northwest, and Great Plains
- Develops planting and monitoring plans for restoration efforts
- Analyzes monitoring data to inform adaptive management recommendations

#### Education | Qualifications

- M.S., Botany, University of Wyoming, 2008

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### Relevant Project Experience

#### Red Rock Canyon Trail and Intersections Improvements Project; Red Rock Canyon National Conservation Area, Las Vegas, Nevada; March 2020 to 2021

**Client:** Federal Highway Administration – Central Federal Lands Highway Division (FHWA – CFLHD)

**Role:** Botanist and Wetland Scientist

**Responsibilities:** Delineated desert washes waters of the U.S. within the 615.18-acre study area in accordance with the Corps of Engineers Wetlands Delineation Manual (Environmental Laboratory 1987), the ordinary high water mark (OHWM) Regulatory Guidance Letter No. 05-05 (USACE 2005), the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region Version 2.0 (USACE, 2008), A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States (Lichvar and McColley, 2008), and the Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States (Curtis and Lichvar, 2010). Prepared aquatic resources delineation report (ARDR) following the Minimum Standards for Acceptance of Aquatic Resources Delineation Reports and Updated Map and Drawing Standards for the South Pacific Division Regulatory Program, prepared by the U.S. Army Corps of Engineers (USACE)-Sacramento District (2016). Performed cactus and yucca species inventory and noxious weed



survey within potential impact area boundary. Surveyed for Bureau of Land Management (BLM) – sensitive species yellow two-tone beardtongue (*Penstemon bicolor* ssp. *bicolor*) and Blue Diamond cholla (*Cylindropuntia multigeniculata*) within area of potential effect (APE).

### Wild Rivers Back Country Byway Entrance Road and Loop Road Projects; Taos County, New Mexico; May 2020 to 2023

**Client:** Federal Highway Administration – Central Federal Lands Highway Division (FHWA – CFLHD)

**Role:** Wetland Scientist

**Responsibilities:** Delineated potential wetlands and other waters of the U.S. within the 178.42-acre study area in accordance with the Corps of Engineers Wetlands Delineation Manual (Environmental Laboratory 1987), the ordinary high water mark (OHWM) Regulatory Guidance Letter No. 05-05 (USACE 2005), the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region Version 2.0 (USACE 2010), A Guide to Ordinary High Water Mark (OHWM) Delineation for Non-Perennial Streams in the Western Mountains, Valleys, and Coast Region of the United States (Mersel and Lichvar 2014), the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region Version 2.0 (USACE, 2008), A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States (Lichvar and McColley 2008), and the Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States (Curtis and Lichvar 2010). Prepared aquatic resources delineation report (ARDR) following the Minimum Standards for Acceptance of Aquatic Resources Delineation Reports and Updated Map and Drawing Standards for the South Pacific Division Regulatory Program, prepared by the U.S. Army Corps of Engineers (USACE)–Sacramento District (2016).

### Muir Woods Road and Bridge Replacement; Marin County, California; April 2020 to 2023

**Client:** Federal Highway Administration – Central Federal Lands Highway Division (FHWA – CFLHD)

**Role:** Wetland Scientist

**Responsibilities:** Delineated potential wetlands, other waters of the U.S., and waters of the state within the 16.19-acre study area in accordance with the Corps of Engineers Wetlands Delineation Manual (Environmental Laboratory 1987), the ordinary high water mark (OHWM) Regulatory Guidance Letter No. 05-05 (USACE 2005), the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region Version 2.0 (USACE, 2008), A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States (Lichvar and McColley, 2008), the Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States (Curtis and Lichvar, 2010), and State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State (State Water Resources Control Board, 2019). Prepared aquatic resources delineation report (ARDR) following the Minimum Standards for Acceptance of Aquatic Resources Delineation Reports and Updated Map and Drawing Standards for the South Pacific Division Regulatory Program, prepared by the U.S. Army Corps of Engineers (USACE)–Sacramento District (2016).

### Pierce Point Road Project; Point Reyes National Seashore, Marin County, California; December 2019 to ongoing

**Client:** Federal Highway Administration – Central Federal Lands Highway Division (FHWA – CFLHD)

**Role:** Wetland Scientist

**Responsibilities:** Delineated potential wetlands, other waters of the U.S., and waters of the state within the 113.13-acre study area in accordance with the Corps of Engineers Wetlands Delineation Manual (Environmental Laboratory 1987), the ordinary high water mark (OHWM) Regulatory Guidance Letter No.

05-05 (USACE 2005), the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region Version 2.0 (USACE, 2008), A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States (Lichvar and McColley, 2008), the Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States (Curtis and Lichvar, 2010), and State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State (State Water Resources Control Board, 2019). Prepared aquatic resources delineation report (ARDR) following the Minimum Standards for Acceptance of Aquatic Resources Delineation Reports and Updated Map and Drawing Standards for the South Pacific Division Regulatory Program, prepared by the U.S. Army Corps of Engineers (USACE)–Sacramento District (2016).

### Pastoria Solar Project; Kern County, California; May 2019 to September 2019

**Client:** Pastoria Solar Energy Company, LLC

**Role:** Botanist

**Responsibilities:** Performed literature and desktop reviews to determine likelihood of ESA-listed and California Endangered Species Act (CESA)-listed plant species, California Department of Fish and Wildlife (CDFW) sensitive plant species, and California Rare Plant Rank (CRPR) Rank 1 or 2 species to occur on 650-acre study site. Led protocol-level surveys in accordance with California Native Plant Society Botanical Survey Guidelines (CNPS 2001) and Protocols for Surveying and Evaluating Impacts to Special Status Native Populations and Sensitive Natural Communities (CDFW 2018). Described the potential for encountering botanical resources and potential impacts to them during construction and operation of the proposed Pastoria Solar Project in botanical resources survey report.

### Fort Irwin Multi-Purpose Range Complex Desert Tortoise and Rare Plant Survey, Fort Irwin, California; 2017

**Client:** Department of Defense, California

**Role:** Botanist

**Responsibilities:** Conducted floristic inventory of proposed range complex. Surveyed for desert tortoise (*Gopherus agassizii*), Mohave ground squirrel (*Xerospemophilus mohavensis*), burrowing owl (*Athene cunicularia*), Lane Mountain milkvetch (*Astragalus jaegerianus*), Barstow woolly sunflower (*Eriophyllum mohavense*), Clokey's cryptantha (*Cryptantha clokeyi*), desert cymopterus (*Cymopterus deserticola*), and Mojave monkeyflower (*Diplacus [=Mimulus] mohavensis*).

### Doble 33kV Line Replacement Draft Environmental Impact Statement; California; 2017

**Client:** Southern California Edison

**Role:** Botanist

**Responsibilities:** Provided QA/QC support for special status plant species occurrence probability table. Surveyed for federally and state-listed status carbonate soil endemic species Cushenbury oxytheca (*Acanthoscyphus parishii* var. *goodmaniana*), Cushenbury milk-vetch (*Astragalus albens*), purplenerve springparsley (*Cymopterus multinervatus*), Parish's daisy (*Erigeron parishii*), Cushenbury buckwheat (*Eriogonum ovalifolium* var. *vineum*), San Bernardino mountains bladderpod (*Physaria kingii* ssp. *bernardina*), and Latimer's woodland gilia (*Saltugilia latimeri*) in support of draft environmental impact statement. Surveyed for cactus and yucca species within proposed construction footprint.

### Yellow Twotone Beardtongue (*Penstemon bicolor* ssp. *bicolor*) Survey at Red Rocks Canyon Natural Conservation Area; Nevada; 2015

**Client:** Bureau of Land Management

## Resume

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**Role:** Botanist

**Responsibilities:** Conducted roadside surveys for yellow twotone beardtongue (*Penstemon bicolor* ssp. *bicolor*) in areas affected by proposed road improvements and expansion.

### Technical Lead, Field Team Lead, Report Coauthor; Ruby Pipeline Post-Restoration Monitoring; Nevada, Utah, and Wyoming; 2012 to Ongoing

**Client:** Kinder Morgan INC

**Role:** Botanist

**Responsibilities:** Negotiating protocol changes and developing recommendations with client and federal land agencies. Monitoring revegetation plots and surveying for noxious weeds along right-of-way and access roads. Analyzing current year's results and synthesizing with previous year's results from more than 450 monitoring sites for preparation of spring, fall, and annual reports for client, agencies (BLM, USFS, and USFWS), and Federal Energy Regulatory Commission (FERC).

### Sevier Playa Project; Utah; 2013, 2015

**Client:** Peak Minerals

**Role:** Botanist

**Responsibilities:** Surveyed for giant four-wing saltbush (*Atriplex canescens* var. *gigantea*), Neese narrowleaf penstemon (*Penstemon angustifolius* var. *dulcis*), and sand-loving buckwheat (*Eriogonum nummularia* var. *ammophilum*) in project area. Performed desktop analysis of vegetation and rare plants within project area. Ground-truthed Southwest Regional Gap (SWReGAP) analysis of vegetation community.

### Saylor Creek and Juniper Butte Range Monitoring; 2012 to 2013

**Client:** Mountain Home Air Force Base

**Role:** Botanist; Task Lead, Project Manager

**Responsibilities:** Conducted field inventories of slickspots and Federally Threatened slickspot peppergrass (*Lepidium papilliferum*), and monitored surrounding habitat at Juniper Butte Range. Developed and implemented long-term vegetation monitoring plan to assess efficacy of post-fire rehabilitation efforts at Saylor Creek Range, and recommending further actions to the client based on the results. Monitored long-term plots at Juniper Butte Range to evaluate range condition.

### Washington Pipeline Expansion; 2012 to 2013

**Client:** Williams Northwest Pipeline GP

**Role:** Botanist

**Responsibilities:** Provided desktop analysis of vegetation and rare plants potentially impacted by proposed pipeline expansion. Prepared vegetation impact and mitigation sections of Resource Report 3 for FERC filing. Prepared discussion of potentially affected federally listed plant species, conservation measures, and potential mitigation for Biological Assessment.

### Kyle Canyon Highway Expansion; Federal Highway Administration, Nevada; 2012

**Client:** Bureau of Land Management, and United States Forest Service

**Role:** Botanist

**Responsibilities:** Conducted roadside surveys for rare plants, noxious weeds, and cactus and yucca species in area affected by proposed highway expansion. Developed restoration plan for affected area.

**Robert Hernandez****BIOLOGIST**

Mr. Hernandez is a project biologist in Jacob's Southern California office. He has more than 23 years of experience conducting a variety of wildlife surveys and wetland delineation throughout California, Nevada, Arizona, and Utah. He has experience with identifying Northern and Southern California flora and fauna. He has conducted focused surveys for desert tortoise, least Bell's vireo, western snowy plover, burrowing owl, northern spotted owl, northern goshawk, Del Norte salamander, and terrestrial mollusks. He is experienced in remote sensing such as photogrammetry, topographic map interpretation, radio telemetry, photographic bait stations, sooted track-plates, geographic information systems (GIS), and use of global positioning systems (GPS) with sub-meter accuracy. Mr. Hernandez is also well versed in environmental regulations and policies and in the preparation of state and federal permit application process for the U.S. Army Corps of Engineers, Regional Water Quality Control Board, and California Department of Fish and Wildlife. Mr. Hernandez has several years of experience serving as an environmental compliance monitor on large scale construction projects.

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| <b>Key Skills   Areas of Expertise</b> | <ul style="list-style-type: none"><li>▪ Field team lead, ornithology, jurisdictional waters delineation.</li></ul>  |
| <b>Education   Qualifications</b>      | <ul style="list-style-type: none"><li>▪ B.S., Wildlife Management; Minor in Natural Resources, Humboldt State University, 2000</li></ul>  |
| <b>Years of Experience</b>             | <ul style="list-style-type: none"><li>▪ 23+ years</li></ul>   |
| <b>Year Joined Jacobs</b>              | <ul style="list-style-type: none"><li>▪ 2001</li></ul>  |
| <b>Specialized Computer Skills</b>     | <ul style="list-style-type: none"><li>▪ ArcGis 9.1</li><li>▪ Arview 3.2</li><li>▪ Pathfinder 3.10</li></ul>   |
| <b>Training</b>                        | <ul style="list-style-type: none"><li>▪ Utah Prairie Dog Survey Protocol Training – Utah Division of Wildlife/BLM, 2009</li><li>▪ Advanced Jurisdictional Wetland Hydrology – Wetland Training Institute, 2006</li><li>▪ Advanced Hydric Soils - Wetland Training Institute, 2005</li><li>▪ Bat Ecology and Field Techniques – The Wildlife Society, 2005</li><li>▪ Surveying, Monitoring, and Handling Techniques Workshop – The Desert Tortoise Council, 2004</li><li>▪ Southwestern Willow Flycatcher Workshop – Friends of the Kern River Preserve 2004</li><li>▪ Wetland Delineation Training - Wetland Training Institute, 2004</li><li>▪ Marbled Murrelet Survey Workshop – Mad River Biologist, 1998, 1999, 2000</li><li>▪ Western Snowy Plover Survey Workshop – Mad River Biologist, 1999</li></ul> |
| <b>Languages</b>                       | <ul style="list-style-type: none"><li>▪ Fluency in Spanish</li></ul>  |

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## Relevant Project Experience

### West of Devers Upgrade Project, Riverside and San Bernardino Counties, California, April 2018 – Current

**Client:** Southern California Edison / Barnard Construction

**Role:** Field Contact Representative (FCR), Biological Construction Monitor, Environmental Compliance Lead.

**Responsibilities:** As the FCR for Segments 1, 2, 3, and 4 of the West of Devers Upgrade Project, Mr.

Hernandez was tasked with scheduling biological construction monitors for compliance with the biological mitigation measures, applicant proposed measures, and other federal, state, and local permit conditions. He facilitated compliance through communication and coordination with client, construction, and environmental resource personnel. Mr. Hernandez tracked construction progress and reported compliance issues via daily reporting and in accordance with the client communication plan. He also helped to refine the general monitoring approach for all segments of the project and trained additional monitors as the project progressed. In addition, other tasks included identifying new active nests and updating nest status, establishing an environmentally sensitive area and buffers, providing Worker Environmental Awareness Program (WEAP) training, conducting pre-construction surveys and riparian bird surveys.

**Scope/Description:** The project includes new and upgraded transmission line infrastructure along 47.5 miles of existing transmission line corridor extending south from the San Bernardino Substation in San Bernardino County, east of Vista Substation in Riverside County, and west of Devers Substation in San Bernardino County.

### Avian Pre-Construction Surveys, North of Magunden Project, California; March 2017 – April 2018

**Client:** Kern and Tulare Counties

**Role:** Lead Biological Construction Monitor

**Responsibilities:** As the Lead Biological Construction Monitor for Segments 1 and 2 of the North of Magunden Project, Mr. Hernandez was tasked with scheduling biological construction monitors for compliance with the biological mitigation measures, applicant proposed measures, and other federal, state, and local permit conditions. He facilitated compliance through communication and coordination with client, construction, and environmental resource personnel. Mr. Hernandez tracked construction progress and reported compliance issues via daily reporting and in accordance with the client communication plan. He also helped to refine the general monitoring approach for all segments of the project, and trained additional monitors as the project progressed. In addition, other tasks included identifying new active nests and updating nest status, establishing an environmentally sensitive area and buffers.

**Scope/Description:** The project includes new and upgraded transmission line infrastructure along 65 miles of existing transmission line corridor extending south from the Rector Substation in southern Tulare County to Magunden Substation in Southern Kern County.

### Biological Construction Monitoring Remedial Investigation, Installation Restoration Program Site 6, South Ravine, San Pedro, California; August 2017 – October 2017

**Client:** Department of the Navy Defense Fuel Support Point San Pedro

**Role:** Lead Field Biologist

**Responsibilities:** As the Lead Field Biologist, Mr. Hernandez was tasked to identify and protect host plants and construction monitoring for the endangered Palos Verdes Blue Butterfly and suitable habitat for the Coastal California Gnatcatcher occurring at the project site. Other tasks included biological construction monitoring of vegetation mowing, monitoring investigation activities such as trenching and drilling, and supporting sampling activities.

## Resume

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**Scope/Description:** The project involved remedial investigation at Installation Restoration Program Site 6, South Ravine at Defense Fuel Support Point for the Department of the Navy for the presence of semivolatile organic compounds and metals in soil at concentrations above applicable screening criteria.

### Biological Pre-Construction Surveys, Antelope to Magunden Project, Kern and Los Angeles Counties, California; August 2017

**Client:** Southern California Edison

**Role:** Lead Field Biologist

**Responsibilities:** As the Lead Field Biologist for Segment 3, Mr. Hernandez was tasked with leading a general biological pre-construction survey of proposed work areas and buffers which included identifying new bird nests, updating nest status on existing nests, and establishing an environmentally sensitive area for jurisdictional surface waters and sensitive vegetation communities.

**Scope/Description:** The project includes new and upgraded transmission line infrastructure along 59 miles of existing transmission line corridor extending south from the Magunden Substation in southern Kern County to Antelope Substation in northern Los Angeles County.

### Jurisdictional Waters Delineations, Chiquita Canyon Landfill, Valencia, California; July 2002 – Current

**Client:** Republic Services Inc.

**Role:** Biologist

**Responsibilities:** Conducted jurisdictional waters and wetland delineation of the 592-acre Chiquita Canyon Landfill. Other responsibilities include habitat mapping, vegetation sampling, literature review, and report writing.

**Scope:** The project would extend the waste footprint of the landfill, better utilize the landfill's remaining and potential disposal capacity, and allow for the disposal of all non-hazardous wastes acceptable at a Class III solid waste disposal landfill.

### Tehachapi Renewable Transmission Line Project (TRTP), Los Angeles, San Bernardino, and Kern Counties, California; July 2010 to November 2016

**Client:** Southern California Edison

**Role:** Environmental Compliance Monitor

**Responsibilities:** As the Environmental Compliance Monitor for Segments 6, 7, 8, and 11 of TRTP, Mr. Hernandez monitored construction activities for compliance with the general environmental mitigation measures, applicant proposed measures, and other federal, State, and Local permit conditions. He facilitated compliance through communication and coordination with client, construction, regulatory, and environmental resource personnel. Among other matters within his purview, Mr. Hernandez worked closely with construction staff to improve the stormwater pollution prevention plan best management practices implemented during what was a significant rainy season, and provided oversight of project stormwater pollution prevention plan logs. Mr.

Hernandez tracked construction progress and reported compliance issues via daily reporting and in accordance with the client communication plan. He also helped to refine the general monitoring approach for all segments of the project, and trained additional monitors as the project progressed.

In addition to environmental compliance monitoring, Mr. Hernandez also conducted 4 days of protocol-level desert tortoise surveys and burrowing owl surveys on Segment 6B.

**Scope:** TRTP includes new and upgraded transmission line infrastructure along 173 miles of new and existing transmission line corridor extending south from the Tehachapi Wind Resource Area in southern Kern County,

through the Angeles National Forest, to substations in Los Angeles and San Bernardino Counties. In addition to upgrading the existing transmission infrastructure, TRTP serves to increase transmission capacity to accommodate transmission of renewable energy from the Tehachapi Wind Resource Area in support of the California Renewable Portfolio Standards.

### U.S. Environmental Protection Agency HALACO Superfund Site, Oxnard, California; May 2010 and 2011

**Client:** U.S. Environmental Protection Agency

**Role:** Principal Biologist

**Responsibilities:** Responsibilities included pre-activity nesting bird survey, rare plant survey, tidewater goby sampling; and monitoring of soil/sediment sampling activities within occupied western snowy plover habitat. Other activities included GPS/GIS mapping, and report writing.

**Scope:** The project included characterization of large quantity of solid and liquid wastes, which consisted of residual metals, salts added during the smelting process, and other materials Halaco produced during its 40 years of operation.

### Terra Genn ALTA Wind, Mohave, California; October 2009 – December 2010

**Client:** Terra Genn

**Role:** Principal Biologist

**Responsibilities:** Responsibilities included construction monitoring, jurisdictional waters delineation, Section 1600 permitting, construction monitoring, habitat assessment and mapping, GPS/GIS mapping, and report writing.

**Scope:** The project involved the construction and operation of a wind energy generation facility on approximately 9,300 acres in the Mohave Desert.

### PG&E, Trilobite, California; April 2009 – May 2009

**Client:** Pacific Gas and Electric Company

**Role:** Field Biologist/Site Safety Coordinator

**Responsibilities:** Conducted protocol-level desert tortoise surveys, bird surveys, special-status wildlife and rare plant species surveys. Responsibilities also included being the project site safety coordinator and GPS mapping. Twenty-six days project-related field experience surveying for desert tortoise.

**Scope:** Bright Source Energy Inc. had proposed an approximately 5,130 acre 500-megawatt solar power-generation project near Broadwell Lake, but withdrew the proposal in 2009.

### Hinkley Project, San Bernardino County, California; August 2002 and October 2003

**Client:** Pacific Gas and Electric Company

**Role:** Field Biologist

**Responsibilities:** Conducted focused protocol-level surveys for desert tortoise and other sensitive and special-status wildlife and plant species. Responsibilities also included report writing. Three days project-related field experience surveying for desert tortoise.

**Scope:** The project involved addressed chromium in groundwater in the community of Hinkley under the oversight of the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) through well installation, pipeline installation, and treatment facility installation.



### Topock IM3 Project, San Bernardino County, California; November 2003 – Current

**Client:** Pacific Gas and Electric Company

**Role:** Field Biologist

**Responsibilities:** Conducted focused protocol level surveys for desert tortoise and other sensitive and special-status wildlife species. Responsibilities also included southwestern willow flycatcher clearance surveys, jurisdictional waters and wetland delineation, environmental construction monitoring, biological sensitivity training, and report writing. Fifty days project related field experience surveying and construction monitoring for desert tortoise.

**Scope:** The project involved addressed chromium in groundwater at the Topock Compressor Station under the oversight of the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) through well installation, pipeline installation, treatment facility installation, Colorado River sampling, and road maintenance.

### Santa Susana Field Laboratory, Santa Susana, California; February 2008– February 2009

**Client:** Boeing/NASA

**Role:** Field Lead Biologist

**Responsibilities:** Conducted field surveys and environmental sampling at Field Laboratory using GPS units with sub-meter accuracy. Responsibilities also included, reconnaissance level biological surveys and quality assurance/quality control of lab samples.

**Scope:** The project involved characterization of contamination in groundwater and soil at the 2,600 acre Santa Susana Field Lab under the oversight of the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) through soil sampling, vapor probe sampling, groundwater sampling, and facility demolition.

### Utah Forest Highway 29 Northern Goshawk Survey, Beaver, Utah; July 2004, 2005, 2006, 2008, 2010, and 2012

**Client:** Federal Highways Administration

**Role:** Principal Biologist

**Responsibilities:** Conducted protocol level surveys for northern goshawk along Highway 29 for road improvements. Other responsibilities include habitat mapping, wetland delineation, and report writing.

**Scope:** The project involved highway improvements along Beaver to Junction Forest Highway (FH) 29/Utah Department of Transportation (UDOT) State Route 153 (SR 153),

### Bright Source Energy, Mormon Mesa, Nevada; April 2008

**Client:** Bright Source Energy

**Role:** Field Biologist

**Responsibilities:** Conducted biological surveys for special-status plants. Responsibilities also included habitat mapping, GPS/GIS mapping.

**Scope:** Bright Source Energy Inc. had proposed an approximately 2,400 acre 400-megawatt solar power-generation project in Clark County Nevada, but withdrew the proposal.



**Bright Source Energy Biological Surveys, Ivanpah Valley, California; December 2006, May 2007, May 2008**

**Client:** Bright Source Energy

**Role:** Field Biologist

**Responsibilities:** Conducted biological surveys for sensitive and special- status wildlife species, including desert tortoise, burrowing owl and rare plants. Responsibilities also included jurisdictional waters delineation, habitat mapping, GPS/GIS mapping and report writing. Ten days project- related field experience surveying for desert tortoise.

**Scope:** Bright Source Energy Inc. proposed an approximately 2,400 acre 400-megawatt solar power-generation project in Clark County Nevada, but withdrew the proposal.

**United Engineering Group, Jurisdictional Waters Delineations, Mohave Desert; November 2005 – August 2007**

**Client:** United Engineering Group Inc.

**Role:** Principal Biologist

**Responsibilities:** Conducted jurisdictional waters and wetland delineation of four large sites within the Mojave Desert for future development. Other responsibilities include GIS/GPS mapping, literature review, report writing and client coordination.

**Scope:** United Engineering Group and McRae Properties proposed a master-plan featuring a mix of residential densities. The purpose of the survey was to determine the limits of any waters of the U.S., including wetlands, that may fall under the jurisdiction of the United States Army Corp of Engineers (USACE) under Section 404 of the CleanWater Act and California Department of Fish and Game (CDFG) under Section 1600 et seq. of the California Fish and Game Code.

**Sun Valley Energy Center Project, Romoland, California; April 2006 – January 2007**

**Client:** Valle del Sol Energy, LLC

**Role:** Field Biologist

**Responsibilities:** Conducted focused protocol level burrowing owl surveys of the proposed power plant project study area. Responsibilities also include authoring reports and GPS/GIS mapping.

**Scope:** Valle del Sol Energy, LLC (VSE), a wholly-owned subsidiary of Edison Mission Energy, proposed to construct, own, and operate an electrical generating plant near the unincorporated community of Romoland, Riverside County, California. The Sun Valley Energy Project (SVEP) is a natural gas-fired, simple-cycle electrical generating facility rated at a nominal net generating capacity of 500 megawatts (MW) on 20-acres.

**Whittier Narrows Operable Unit Remedial Action, Los Angeles County, California; July 2001 – April 2006**

**Client:** U.S. Environmental Protection Agency

**Role:** Principal Biologist

**Responsibilities:** Conducted preconstruction surveys and construction monitoring for least Bell's vireo, California gnatcatcher and other sensitive species in South El Monte for a groundwater remediation project for Environmental Protection Agency. Mr. Hernandez's other tasks include environmental oversight of construction activities in environmentally sensitive habitats, and environmental mitigation monitoring of construction practices, and preparation of revegetation and exotic plant species eradication plans.

**Scope:** The U.S. Environmental Protection Agency (EPA) implemented a groundwater cleanup remedial action in the Whittier Narrows Operable Unit (OU) of the San Gabriel Superfund Site. The remedial action constructed a groundwater treatment plant and associated pipelines on land located within and adjacent to

Whittier Narrows Nature Center and Wildlife Refuge (WNWC), located in South El Monte, County of Los Angeles, California.

### California City Prison Project, California City, California; July 2006

**Client:** Correction Corporation of America

**Role:** Field Biologist

**Responsibilities:** Conducted protocol level surveys for sensitive and special-status wildlife species, including desert tortoise, Mojave ground squirrel, and burrowing owl. Responsibilities also included habitat mapping, GPS/GIS mapping and report writing. Two days project-related field experience surveying for desert tortoise.

**Scope:** Corrections Corporation of America proposed to design, construct, and operate a 550-bed stand-alone secure prison facility on approximately 35 acres of a 320-acre site in the City of California City in response to California Department of Corrections and Rehabilitation Male Bed Expansion Request for Proposal (RFP) in the City of California City, Kern County, California, directly south of the existing California City Correctional Facility.

### State Route 79, Riverside County, California; February 2005 – June 2006

**Client:** Riverside County Transportation Commission

**Role:** Field Biologist

**Responsibilities:** Conducted jurisdictional waters and wetland delineation and rare plant surveys of the approximately 15,000-acre project study area. Other responsibilities include, use of GPS technology to map sensitive resources such as wetlands, vernal pools, rare plant populations, and sensitive wildlife observations.

**Scope:** The Riverside County Transportation Commission (RCTC), in cooperation with the California Department of Transportation (Caltrans or Department) District 8, the Federal Highway Administration (FHWA), the County of Riverside, the City of San Jacinto, and the City of Hemet, initiated a study for the improvement of State Route (SR) 79 (Project) in the vicinity of the Cities of Hemet and San Jacinto within the County of Riverside, California. The improvement proposed to occur between Newport Road and Gilman Springs Road, a distance of approximately 30 kilometers (km) (19 miles [mi]).

### U.S. Air Force Plant 42 Biological Surveys, Palmdale, California; May 2006

**Client:** U.S. Air Force

**Role:** Field Biologist

**Responsibilities:** Conducted focused protocol level surveys for desert tortoise and other sensitive and special-status wildlife species including Mojave ground squirrel, and burrowing owl. Responsibilities also included habitat mapping, GPS/GIS mapping and report writing. Three-day project related field experience surveying for desert tortoise.

**Scope:** Based on the former skeet area operations at Plant 42, soil may be impacted by metals from the gun shot and polynuclear aromatic hydrocarbons (PAHs) from the skeet targets, also called clay pigeons. Various constituents may be present in soil at the areas of empty cans, because the former contents of these containers are not known. The primary objective of the field investigation is to assess whether shallow soil in and around the skeet area and empty cans at Area of Concern (AOC) 3 has been impacted. Soil samples were collected and data used to evaluate potential health risks while ensuring compliance with the Federal Endangered Species Act (FESA) and other applicable regulations.

### On-Call Biological Support, San Diego County; February 2005 – February 2006.

**Client:** County of San Diego Department of Public Works

**Role:** Principal Biologist

**Responsibilities:** Conducted preconstruction surveys for sensitive and special-status wildlife species on an on-call basis. Responsibilities also included jurisdictional waters and wetland delineation, habitat mapping, GPS/GIS mapping and report writing.

**Scope:** On-call support included the preparation of a wetland delineation and biological technical report for the preparation of a Mitigated Negative Declaration (MND), 401, 404, and 1602 permit applications.

### State Route 39 Bighorn Sheep Study, Los Angeles County, California; April – December 2005

**Client:** California Department of Transportation

**Role:** Principal Field Biologist

**Responsibilities:** Conducted field surveys for bighorn sheep along closed portion of State Route 39 during preconstruction phase. Responsibilities also include data management and reporting.

**Scope:** The California Department of Transportation (Caltrans) proposed improvements for State Route (SR) 39 that include reopening the highway to the public and constructing cross drains with larger pipe capacity, down drains and rock slope protection for the major slide located along the highway. The portion of SR 39 between Crystal Lake and the Angeles Crest Highway (SR 2) has been restricted to vehicular traffic by the public for over 20 years. It was necessary that a wildlife corridor study be conducted along this segment of roadway because this segment of SR 39 is used by Nelson bighorn sheep (*Ovis canadensis nelsoni*).

### Fairmont Wind Project, Fairmont, California; June 2002 – May 2005

**Client:** PacifiCorp Power Marketing Energy

**Role:** Field Biologist

**Responsibilities:** Conducted field surveys of a proposed wind farm project study area for biological resources, including surveys for avian species, burrowing owl, and vegetation characterization. Responsibilities also include mapping, database management, literature review, report writing.

**Scope:** PacifiCorp Power Marketing Energy, Inc. proposed to develop a wind energy facility located in the vicinity of Fairmont, California. The proposed project would include installing approximately 63 wind turbines, underground cables, transmission line corridors, and turbine access roads.

### Camp Pendleton Delineations, Oceanside, California; October 2004 – February 2005

**Client:** U.S. Marine Corps

**Role:** Field biologist

**Responsibilities:** Conducted jurisdictional waters and wetland delineation of Red-Beach and Las Flores Creek. Other responsibilities include, use of GPS technology to map sensitive resources such as wetlands, vernal pools, and sensitive wildlife observations.

**Scope:** Provide an overview of the project, including project type, completion status, size and cost

### Clinton Keith Road Project, Murrieta, California; November 2002 – March 2006

**Client:** Riverside County Transportation Department

**Role:** Field Biologist

**Responsibilities:** Conducted focused protocol level burrowing owl surveys, California gnatcatcher clearance surveys, jurisdictional waters delineation, habitat mapping, and environmental construction monitoring of the proposed road expansion project study area.

**Scope:** The Riverside County Transportation Department, in cooperation with the City of Murrieta, proposed construction of a six-lane urban arterial in the City of Murrieta and unincorporated Riverside County. The proposed Clinton Keith Road Extension Project needed to provide an east-west urban arterial between Antelope Road, near Interstate (I)-215, and State Route (SR) 79.

### Lockheed Martin Plant 10 Biological Surveys, Palmdale, California; May 2004

**Client:** Lockheed Martin

**Role:** Field Biologist

**Responsibilities:** Conducted biological surveys for sensitive and special-status wildlife species, including desert tortoise, Mojave ground squirrel, and burrowing owl. Responsibilities also included habitat mapping, GPS/GIS mapping and report writing. Three days project-related field experience surveying for desert tortoise.

**Scope:** The objective of the biological resources survey of Plant 10 was to identify and document endangered, threatened, and special-status plant and wildlife species and sensitive habitats. The goal was to ensure compliance with the Federal Endangered Species Act (ESA), Lockheed Martin Aero company requirements, and other applicable regulations. As required by the ESA, federal agencies and their contractors must ensure that their activities do not jeopardize the continued existence of endangered or threatened flora and fauna.

### Burbank Trunk Line, Encino, California; August – December 2001

**Client:** Los Angeles Department of Water and Power

**Role:** Field Biologist

**Responsibilities:** Conducted preconstruction surveys for sensitive and special-status wildlife species on a proposed pipeline replacement route in Los Angeles County for the Los Angeles Department of Water and Power. Responsibilities included breeding bird surveys, seine-netting for sensitive fish, night eye-shine surveys for special-status amphibians, and environmental monitoring during construction phase.

**Scope:** The Burbank Boulevard Trunk line Project was conducted to replace the existing Ventura Trunk Line with a new trunk line under Burbank Boulevard and other area streets. The replacement trunk line consisted of a 54-inch-diameter pipeline to connect the Encino Reservoir service area with the Stone Canyon Reservoir Inlet Line.

### West Mojave Plan, Bureau of Land Management, Imperial Sand Dunes; July – August 2001

**Client:** Bureau of Land Management

**Role:** Field Biologist

**Responsibilities:** Conducted GIS analyses on potential route closure designation as they pertain to environmentally sensitive habitats.

**Scope:** Analyses for potential route closure designation as they pertain to environmentally sensitive habitats at the Imperial Sand Dunes for the U.S. Department of the Interior's Bureau of Land Management (BLM).

## Experience Prior to Jacobs

### Bureau of Land Management, Arcata Field Office, Arcata, California; 1998 – 2000

**Client:** Bureau of Land Management

**Role:** Field Biologist

**Responsibilities:** Responsibilities included conducting protocol level surveys for threatened and endangered species such as marbled murrelet, northern spotted owl, western snowy plover, northern goshawk,

## Resume

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Swainson's hawk, Pacific fisher/Humboldt marten, Del Norte salamander, and terrestrial mollusks in addition to general biological and botanical surveys.

**Scope:** Regulatory agency internship, providing support for special status species protocol level surveys, development of EIR/EIS, Biological Opinions, and Permits.

### California Department of Fish and Game, Eureka, California; 1997

**Client:** California Department of Fish and Game

**Role:** Field Biologist

**Responsibilities:** Responsibilities included conducting nest searches for osprey, heron and egret and monitoring to determining nesting success.

**Scope:** Regulatory agency internship, providing support for special status species protocol level surveys and general wildlife surveys.

## Rebecca John

BIOLOGIST

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### Personal Details

**Length of service in the profession:** 12+ years

**Year joined Jacobs:** July 2018

**Jacobs office location:** Colorado Springs, Colorado

### Summary Biography

Rebecca is a versatile biologist with over 12 years of experience with environmental/biological consulting, biological surveys, and habitat assessments. Rebecca has experience teaching field classes, organizing outreach programs, and conducting research at accredited Universities. At Jacobs, Rebecca has served as a Biological/Environmental Monitor and Field Lead for transmission line, railroad, mining, pipeline, solar, and transportation projects. Rebecca is familiar with and understands project mitigation/compliance for wildlife species including but not limited to: desert tortoise, Coachella Valley fringe-toed lizard, Coachella Valley milk-vetch, Flat-tailed horned lizard, California red-legged frog, Western pond turtle, California tiger salamander, Arroyo Toad, Bats, and Nesting Birds (Migratory Bird Treaty Act). Rebecca has conducted research on herpetofauna, bats, botany, small mammals, passerines and raptors, fish, and large mammals. She has experience analyzing data, publishing peer reviewed articles, and presenting research at national and regional conferences.

Rebecca is highly independent and has travelled regularly for work. She understands the complexities of field work and the need to be flexible. Rebecca learns quickly, is organized, and reliable. She has a strong work ethic and aims to provide quality products and good working relationships.

### Key Skills and Areas of Expertise

- Provide Endangered Species Act Section 7 and Section 10 compliance consultations and perform mitigation actions as necessary.
- Oversee daily project activities and manage logistic to ensure the activities and staffing levels are in accordance with biological opinions.
- Work directly with the contractor to find appropriate solutions to project problems and the strategies to implement the solutions.
- Participate in desert tortoise clearances and surveys as USFWS Authorized Desert Tortoise Biologist.
- Perform biological surveys for threatened, endangered and sensitive species (federal and state-listed species of concern), including botanical surveys, nesting birds, and protected cactus species.
- Provide Migratory Bird Treaty Act compliance consultations and perform mitigation actions as necessary.
- Provide compliance management and designated biologist activities in accordance with the Incidental Take Permit and Mitigation Measures.

### Education and Qualifications

- Master of Science, Wildlife Sciences, Auburn University, 2017
- Bachelor of Arts, Environmental Science and Biology, University of California, Santa Cruz, 2010

### Registrations and Certifications

- Wilderness First Responder, NOLS, 2022, Expires Sept 2024
- Wetland Identification and Delineations, Richard Chinn Environmental, 2022
- MSHA 24 hour New Surface Miner Training, A&M Safety and Environment, 2022, Expires June 2023
- HAZWOPER, Compliance Solutions, 2021, Expires July 2023
- Qualified Preparer of Storm Water Pollution Prevention Plans and Qualified Compliance Inspector of

- Stormwater, Stormwater One, 2014, Expired 2018
- California ATV Institute Certification Program, ATV Safety Institute, 2011
- ESRI Geoprocessing Certificate: ArcGIS, University of California, Santa Cruz, 2010

## Additional Trainings

- Amphibian and Reptile Workshop Baja California, Fauna Del Noroeste, 2023
- Safety Liaison (Construction and HAZWOPER), Jacobs, 2021
- California Environmental Quality Act, UCLA, 2020
- Reptiles and Amphibians of the Sierra Nevada Workshop, Sierra Nevada Field Campus, 2019
- Arroyo Toad Workshop, The Wildlife Society, 2019
- Bat Rehabilitation, Long Beach Animal Hospital, 2018
- Venomous Snake Handling Workshop, Jacobs, 2018
- Water Bacteriological Sampling Workshop, Alabama Water Watch, 2017
- Alabama Bee Identification Workshop, Auburn University, 2016
- Modelling Patterns and Dynamics of Species Occurrence Workshop, South Dakota State University, 2015
- Hunting Awareness and Conservation Education, Conservation Leaders for Tomorrow, 2015
- Field Survey Techniques Workshop, Bat Conservation and Management, 2014
- Rare Pond Species Survey Workshop, Leguna de Santa Rosa Foundation, 2014
- Bird Banding of Passerines and Near Passerines Workshops: Beginning and Advanced courses, Star Ranch Bird Observatory, 2014
- Flat-tailed Horned Lizard Workshop, Southwest Partners in Amphibian and Reptile Conservation, 2013
- Desert Flora, University of California, Riverside extension program, 2012
- Desert Tortoise Council Surveying, Monitoring, and Handling Techniques Workshop, Desert Tortoise Council, 2011

## Selected Project Experience

### Various Projects, Boardman, Arlington, and Grass Valley, OR (March 2023 to June 2023)

**Client:** Confidential

**Role on project:** Avian Biologist/WGS Biologist/Field Team Lead/Safety Liaison

**Responsibilities:** Rebecca leads field team efforts and conducts protocol preconstruction surveys for an Oregon State Endangered species (Washington Ground Squirrels, WGS; Federal candidate) and raptors in addition to habitat assessments of the work areas.

**Scope:** Several projects solar projects and a wind project are constructing new facilities and transmission lines in northeast Oregon.

### Second Creek Interceptor Project, Commerce City, CO (Jan 2023 to April 2023)

**Client:** HDR/Garvey Construction

**Role on project:** Avian Biologist

**Responsibilities:** Rebecca monitors crews for biological and environmental compliance based on project mitigation measures (understands and communicates biological protocols with client as needed), conducts biological avian monitoring, and completes daily monitoring reports.

**Scope:** Garvey is constructing a Metro Wastewater Reclamation District project, constructing a new 17.5 mile long sanitation sewer from Denver to Commerce City, CO.

### PFAS Site Inspection, Fallbrook, CA (December 2022)

**Client:** Naval Facilities Engineering Systems Command

**Role on project:** Small Mammal and Avian Qualified Biologist

**Responsibilities:** Rebecca attended tailboards, conducted avian and small mammal preconstruction surveys

for Federally endangered and threatened species in habitat, monitored crews for biological and environmental compliance based on project mitigation measures (understood and communicated biological protocols with client), provided required environmental training to all personnel on site, conducted avian and small mammal monitoring for Federally endangered and threatened species during construction, and completed daily monitoring reports.

**Scope:** The U.S. Navy contracted MR Drilling and Jacobs to inspect site locations for harmful Per- and Polyfluoroalkyl substances on the Naval Weapons Station Seal Beach Fallbrook Detachment in Fallbrook, CA.

## **Newmont Cripple Creek & Victor (CC&V) Gold Mine Stormwater Review, Cripple Creek, CO (June to October 2022)**

**Client:** Newmont Corporation

**Role on project:** Ecological Assessor

**Responsibilities:** On site visit to collect data on root depth, plant composition, and restoration progress of about 106 acres of CC&V restoration sites. Wrote ecological assessment for sites. Rebecca is MSHA surface mining trained.

**Scope:** Jacobs was tasked with determining most likely erosion causes on CC&V restoration sites and recommending best management practices to eliminate further erosion risk.

## **Third Main Track, Needles, CA (January 2022 to present)**

**Client:** Burlington Northern Santa Fe (BNSF)

**Role on project:** Biological Surveyor/Authorized Desert Tortoise Biologist

**Responsibilities:** Rebecca attends tailboards, provides clarification of protocols and mitigation measures, conducts biological USFWS protocol preconstruction surveys, conducts clearance sweeps of yards and work areas, monitors crews for biological and environmental compliance based on project mitigation measures, and completes daily monitoring reports. Rebecca also excavates possible desert tortoise burrows, relocates desert tortoises as needed, and constructs artificial burrows for relocations.

**Scope:** BNSF contracted HDR and Granite Construction to construct a third rail track along approximately 29 miles of existing BNSF rail corridor from west of Needles to Goff, CA. Part of the construction requires 91 structures built, including 52 new bridges, 36 culvert extensions, and three arch structure extensions.

## **Four Corners Uranium Project, Grand Junction, CO (July 2021 to present)**

**Client:** Freeport McMoran

**Role on project:** Biologist/Group Lead/Safety Liaison/Wilderness First Responder

**Responsibilities:** Conducting mining claims investigation, gamma mapping and soil sampling, claim verification, biological surveys (habitat assessments, NEPA nesting bird and bat surveys, waterbody gamma mapping), cultural survey oversight, physical hazard closure oversight, and annual closure monitoring. Rebecca has HAZWOPER, Wilderness First Responder, MSHA, Safety Liaison (Construction and HAZWOPER) training. She also trains annually for safe UTV operating and trailer hauling. Rebecca has also assisted with reviewing SOPs for claims research, field investigation, data collection and management, field verification activities, and report writing. Rebecca was also tasked as Group Lead and Field Team Lead (of multiple groups) for field efforts.

**Scope:** Freeport McMoran is tasked with assessing public hazard (physical and radiological) from historical uranium mining claims. The project supports the Historic Mine Opening Safety Program throughout the Four Corners area on the Colorado Plateau. The Jacobs team research historic mining claims and maps them in ArcGIS, investigates habitat and locations of historic mines in the field, reports to client and BLM, pursues permitting the closure of mines and works with BLM to determine required pre-construction surveys and implemented survey efforts. Jacobs serves as a liaison between client and BLM, and large-scale planning with an annual budget that averaged \$3.5 million through 2019.



## **Enterprise Solar and Sanborn 2.0 Solar Projects, Mojave, CA (April 2021 to April 2022)**

**Client:** Confidential

**Role on project:** Biologist

**Responsibilities:** Rebecca and team were tasked with conducting Desert Tortoise and rare plant preconstruction surveys. Desert tortoise data was collected and recorded via standard USFWS protocol. Rebecca wrote the wildlife report for April 2021 surveys.

**Scope:** Confidential client proposes to construct two photovoltaic (PV) solar and energy storage facility in Kern County, California totally approximately 9,000 acres. Jacobs was contracted to provide CEQA siting and licensing support.

## **Eldorado-Lugo-Mohave Upgrade Project, Hesperia, CA (October 2020 to April 2022)**

**Client:** Barnard Construction (Southern California Edison)

**Role on project:** Field Contact Representative/Biological and Environmental monitor/Authorized desert tortoise biologist

**Responsibilities:** Rebecca managed monitors for biological, cultural, and environmental compliance throughout the project as well as third party monitored additional environmental contractors. Rebecca attended tailboards, coordinated between clients and biological monitors, coordinated between clients and agency personnel, provided clarification of protocols and mitigation measures, scheduled resource appropriate monitors (biologists, environmentalists, palaeontologists, tribal monitors, cultural monitors), conducted USFWS protocol preconstruction surveys for desert tortoise and other sensitive species, clearance sweeps of yards and work areas, monitored crews for compliance based on project mitigation measures, created and updated biological resources in FRED database and AGOL maps, completed and edited daily monitoring reports in FRED.

**Scope:** Barnard Construction was tasked by SCE to replace OPGW line on existing 500 kV transmission lines about 180 miles from Lugo Substation (Hesperia, CA) to Mohave Substation (Laughlin, NV). Scope was completed on time within budget.

## **West of Devers Upgrade Project, Redlands, CA (July 2018 to July 2022)**

**Client:** Barnard Construction (Southern California Edison)

**Role on project:** Field Contact Representative/Biological and Environmental monitor

**Responsibilities:** Rebecca managed monitors for biological, cultural, and environmental compliance throughout the project. Rebecca attended tailboards, coordinated between clients and biological monitors, coordinated between clients and agency personnel, provided clarification of protocols and mitigation measures, scheduled resource appropriate monitors (biologists, environmentalists, palaeontologists, tribal monitors, cultural monitors), conducted USFWS protocol preconstruction surveys for desert tortoise and other sensitive species, clearance sweeps of yards and work areas, monitored crews for compliance based on project mitigation measures, created and updating biological resources in FRED database and AGOL maps, completed and edited daily monitoring reports in FRED.

**Scope:** Barnard Construction was tasked by SCE to remove existing four 12 kV and 66 kV transmission lines and build two new 250 kV transmission lines about 45 miles from Devers Substation (Palm Springs, CA) to San Bernardino Substation (San Bernardino, CA) and Vista Substation (Grand Terrace, CA). Scope completed ahead of time within budget.

## **Upper Corridor Project, St. George, UT (March 2020)**

**Client:** Utah Department of Transportation

**Role on project:** Biological Surveyor

**Responsibilities:** Rebecca was a biologist conducting vegetation community surveys and Desert Tortoise presence/absence preconstruction surveys in the Red Cliffs National Conservation Area. Data was collected and recorded via standard USFWS protocol.

**Scope:** Project proposes a four-mile highway through the Red Hills Conservation Area in St. George, Utah.

## **Fort Irwin Dense Urban Training, Fort Irwin, CA (November 2019)**

**Client:** Fort Irwin US Army Garrison

**Role on project:** Desert Tortoise biologist

**Responsibilities:** Rebecca was a biologist conducting Desert Tortoise preconstruction surveys at Fort Irwin. Data was collected and recorded via standard USFWS protocol.

**Scope:** Fort Irwin plans to expand military training facilities area.

## **Devers-Colorado River Substation No. 1 500-kilovolt Transmission Line Rating Remediation Project, Palm Springs, CA (September 2018 to February 2019)**

**Client:** Southern California Edison

**Role on project:** Construction Lead Monitor/Biological and Environmental monitor

**Responsibilities:** Rebecca managed biologists and cultural monitors, attended tailboards, facilitated coordination between clients and biological monitors, provided clarification of protocols and mitigation measures, scheduled resource appropriate monitors (biologists, environmentalists, tribal, and cultural monitors), conducted USFWS protocol preconstruction surveys for desert tortoise, Coachella Valley Fringe-toed lizards and other sensitive species, conducted clearance sweeps of yards and work areas, monitored crews for compliance based on project mitigation measures, created and updated biological resources in FRED data base, completed and edited daily monitoring reports in FRED.

**Scope:** The SCE project completed construction to reconductor approximately 111 miles of existing 550-Kv electrical transmission line and replace the hardware on 374 existing structures within timeframe and budget.

## **El Cajon Pass OPGW Upgrade project, Cajon, CA (March 2019 to April 2019)**

**Client:** Southern California Edison

**Role on project:** Construction Lead Monitor/Biological and Environmental monitor

**Responsibilities:** Rebecca attended tailboards, provided coordination between clients and construction, clarification of protocols and mitigation measures, conducted biological USFWS protocol preconstruction surveys for Arroyo Toad, conducted clearance sweeps of helicopter landing zones and work areas, monitored crews for compliance based on project mitigation measures, and completed daily monitoring reports.

**Scope:** SCE required OPGW upgrade between 2 miles of existing 500 kV transmission line over Hwy 15 and BNSF railroad in the El Cajon Pass.

## **\*Mountain View Acres and Amethyst Basin Projects, Victorville, CA (October 2013 to May 2014)**

**Client:** San Bernardino County Flood Control District

**Role on project:** Biological and Environmental monitor

**Responsibilities:** Rebecca attended tailboards, provided clarification of protocols and mitigation measures, monitored for desert tortoise, conducted clearance sweeps of work areas, monitored crews for compliance based on project mitigation measures, and completed daily monitoring reports.

**Scope:** San Bernardino County Flood Control District updated several storm drains from residential into surrounding environment.

## **\*Cochran Solar Project, Cochran, CA (May 2014)**

**Client:** Kings County

**Role on project:** Biological surveyor

**Responsibilities:** Rebecca conducted biological assessments for western pond turtle habitat, completed daily reports, and updated biological resources. Rebecca conducted USFWS protocol surveys for western pond

turtles and burrowing owl.

**\*Devers to Palo Verde-2, Palm Springs, CA (November 2011 to June 2013)**

**Client:** Southern California Edison

**Role on project:** Field Contact Representative/Biological and Environmental monitor

**Responsibilities:** Rebecca managed biological and environmental monitors, attended tailboards, provided coordination between clients and biological monitors, clarification of protocols and mitigation measures, conducted USFWS protocol preconstruction surveys for desert tortoise, Coachella Valley Fringe-toed lizards and other sensitive species, conducted clearance sweeps of yards and work areas, monitored crews for compliance based on project mitigation measures, created and updated biological resources in FRED data base, and completed daily monitoring reports in FRED.

**Scope:** The DPV2 Project funded by SCE included a new 230-mile 500 kV line from the Harquahala Substation (in Arizona, near the Palo Verde nuclear power plant) to SCE's Devers Substation (in North Palm Springs, California). The 500 kV portion follows the existing SCE 500 kV transmission line, Devers–Palo Verde No. 1 (DPV1).

**\*Line 3000 pipeline repair, Needles, CA (April 2011 to October 2011)**

**Client:** PG&E

**Role on project:** Biological monitor

**Responsibilities:** Rebecca attended tailboards, provided clarification of protocols and mitigation measures, conducted USFWS protocol preconstruction surveys for desert tortoise and other sensitive species, conducted clearance sweeps of yards and work areas, monitored crews for compliance based on project mitigation measures, GPS tracking of work, completed daily monitoring reports. UTV use and training required. Rebecca was tasked with relocating desert tortoise as required for the project with supervision of authorized biologists.

## COURTNEY J. CONWAY

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### EDUCATION

B.S., Wildlife Biology, Colorado State University, Ft. Collins, CO, 1985  
M.S., Zoology and Physiology, University of Wyoming, Laramie, WY, 1990  
Ph.D., Organismal Biology & Ecology, University of Montana, Missoula, MT, 1998

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### CURRENT EMPLOYMENT

**Director**, U.S. Geological Survey's Idaho Cooperative Fish & Wildlife Research Unit,  
University of Idaho, Moscow, ID (Jul. 2011-present).  
**Professor**, Department of Fish & Wildlife Sciences, University of Idaho, Moscow, ID (Jul.  
2011-present).

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### PEER-REVIEWED PUBLICATIONS († postdocs, \*graduate students & \*\* undergrads whom I mentored)

- Lundblad\*, C. G., and C. J. Conway. 2023. Investing in a nest egg: Intraspecific variation in the timing of egg-laying across a latitudinal gradient. *Oecologia*, in press.
- Allison\*, A. Z. T., A.E. Morris\*, and C. J. Conway. 2023. Why hibernate? Tests of four hypotheses to explain intraspecific variation in hibernation phenology. *Functional Ecology*, in press.
- Stevens†, B. S., S. B. Roberts, C. J. Conway, and D. K. Englestead. 2023. Effects of large-scale disturbance on animal space use: Functional responses by greater sage-grouse after megafire. *Ecology and Evolution* 13:ece3.9933.
- Stevens†, B. S., C. J. Conway, J. M. Knetter, S. B. Roberts, and P. Donnelly. 2023. Multi-scale effects of land cover, weather, and fire on Columbian sharp-tailed grouse. *Journal of Wildlife Management* 87(2):e22349.
- Lachman\*, D. A., C. J. Conway, K. T. Vierling, T. Matthews, and D. Evans Mack. 2022. Drones and bathymetry show the importance of optimal water depth for nest placement within breeding colonies of Western and Clark's Grebes. *Wetlands* 42:1-10.
- Goldberg\*, A. R., D. E. Biggins, S. Ramakrishnan, J. W. Bowser, C. J. Conway, D. A. Eads, and J. Wimsatt. 2022. Deltamethrin reduces survival of non-target small mammals. *Wildlife Research* 49:698-708.
- Stevens†, B. S., C. J. Conway, K. Luke, A. Weldon, C. Hand, A. Schwarzer, F. Smith, C. Watson, and B. D. Watts. 2022. Large-scale distribution models for optimal prediction of Eastern black rail habitat within tidal ecosystems. *Global Ecology and Conservation* 38:e02222.
- Allison\*, A. Z. T., and C. J. Conway. 2022. Daily foraging activity of an imperiled ground squirrel: effects of hibernation, thermal environment, body condition, and conspecific density. *Behavioral Ecology and Sociobiology* 76:28. IP-126309.
- LaRoche, D. D., C. J. Conway, and C. Kirkpatrick. 2022. Small-scale variation in trap placement affects arthropod capture rates on sticky traps in riparian woodlands. *Southwestern Naturalist* 66:275-279.

- Macías-Duarte\*, A., and C. J. Conway. 2021. Geographic variation in dispersal of western burrowing owl (*Athene cunicularia hypugaea*) populations. *Behavioral Ecology* 32:1339-1351.
- Barbosa†, S., K. R. Andrews, A. R. Goldberg\*, D. Singh-Gour, P. A. Hohenlohe, C. J. Conway, and L. P. Waits. 2021. The role of neutral and adaptive genomic variation in population diversification and speciation in two ground squirrel species of conservation concern. *Molecular Ecology* 30:4673–4694.
- Harry\*, E. J., L. E. Michael, and C. J. Conway. 2021. Sexual dimorphism in morphology and plumage of endangered Yuma Ridgway's Rails: a model for documenting sex of captured rails. *Journal of Fish and Wildlife Management* 12:464-474.
- Stevens†, B. S., and C. J. Conway. 2021. Mapping habitat quality and threats for eastern black rails. *Waterbirds* 44:245-256.
- Goldberg\*, A. R., C. J. Conway, and D. E. Biggins. 2021. Effects of experimental flea removal and plague vaccine treatments on survival of northern Idaho ground squirrels and two coexisting sciurids. *Global Ecology and Conservation* 26:e01489.
- Lundblad\*, C.G., and C. J. Conway. 2021. Intraspecific variation in incubation behaviours along a latitudinal gradient is driven by nest microclimate and selection on neonate quality. *Functional Ecology* 35:1028-1040.
- Lundblad\*, C.G., and C. J. Conway. 2021. Ashmole's hypothesis and the latitudinal gradient in clutch size. *Biological Reviews* 96:1349-1366.
- Dillon\*, K. G., & C. J. Conway. 2021. Habitat heterogeneity, temperature, and primary productivity drive elevational gradients in avian species diversity. *Ecology and Evolution* 11:5985-5997.
- Goldberg\*, A. R., and C. J. Conway. 2021. Hibernation behavior of a federally-threatened ground squirrel: climate change and habitat selection implications. *Journal of Mammalogy* 102:574-587.
- Lundblad\*, C.G., and C. J. Conway. 2021. Nest microclimate and limits to egg viability explain avian life-history variation across latitudinal gradients. *Ecology* 102:e03338.
- Lundblad\*, C.G., C. J. Conway, K. Cruz-McDonnell, D. Doublet, M. J. Desmond, C J. Navis, and K. Ongman. 2021. Long-term population fluctuations of a burrowing owl population on Kirtland Air Force Base, New Mexico. *Journal of Raptor Research* 55:241-254.
- Riley\*, I. P., C. J. Conway, B. S. Stevens†, and S. Roberts. 2021. Survival of greater sage-grouse broods: survey method affects disturbance and age-specific detection probability. *Journal of Field Ornithology* 92:88-102.
- Riley\*, I. P., C. J. Conway, B. S. Stevens†, and S. Roberts. 2021. Aural and visual detection of greater sage-grouse leks: Implications for population trend estimates. *Journal of Wildlife Management* 85:508-519.
- Helmstetter\*\*, N. A., C. J. Conway, B. S. Stevens†, and A. R. Goldberg\*. 2021. Balancing transferability and complexity of species distribution models for rare species conservation. *Diversity and Distributions* 27:95-108.
- Connelly, J. W., and C. J. Conway. 2021. Managing wildlife at landscape scales. Pages 143-157 in *Wildlife Management and Landscapes: Principles and Applications* (W.F. Porter, C.J. Parent, R.A. Stewart, and D.M. Williams, eds.). Johns Hopkins University Press in affiliation with The Wildlife Society, Baltimore, MD, USA.

- Garton, E. O., J. L. Aycrigg, C. J. Conway, and J. S. Horne. 2020. Research and experimental design. Pages 1-39 in *The Wildlife Techniques Manual, Volume 1: Research*, 8th Edition (N. J. Silvy, ed.). Johns Hopkins University Press, Baltimore, MD.
- Eddleman, W. R., and C. J. Conway. 2020. Ridgway's Rail (*Rallus obsoletus*), version 1.0. The Birds of the World. (P.G. Rodewald, ed.). Cornell Lab of Ornithology, Ithaca, NY, USA.
- Conway, C. J., C. P. Nadeau\*\*, and M. A. Conway. 2020. Broadcasting regional call dialects has little influence on the effectiveness of call-broadcast surveys for marsh birds. *Wetlands* 40:2055-2059.
- Dornak†, L. L., J. L. Aycrigg, J. Sauer, and C. J. Conway. 2020. Assessing the efficacy of protected and multiple-use lands for bird conservation in the U.S. *PLOS One* 5:e0239184.
- Macías-Duarte\*, A., C. J. Conway, and M. Culver. 2020. Agriculture creates subtle genetic structure among migratory and non-migratory populations of Burrowing Owls throughout North America. *Ecology and Evolution* 2020;10:10697–10708.
- Goldberg\*, A. R., C. J. Conway, D. Evans Mack, and G. Burak. 2020. Winter versus summer habitat selection in a threatened ground squirrel. *Journal of Wildlife Management* 84:1548–1559.
- Lachman\*, D. A., C. J. Conway, K. T. Vierling, and T. Matthews. 2020. Drones provide a better method to find nests and estimate nest survival for colonial waterbirds: a demonstration with western grebes. *Wetlands Ecology and Management* 28:837–845.
- Harrity\*, E. J., and C. J. Conway. 2020. Satellite transmitters reveal previously unknown migratory behavior and wintering locations of Yuma Ridgway's Rails. *Journal of Field Ornithology* 91:300-312.
- Riley\*, I. P., and C. J. Conway. 2020. Methods for estimating vital rates of greater sage-grouse broods: A review. *Wildlife Biology* 2020:wlb.00700.
- Harrity\*, E.J., B.S. Stevens†, and C.J. Conway. 2020. Keeping up with the times: mapping range-wide habitat suitability for endangered species in a changing environment. *Biological Conservation* 250:108734.
- Goldberg\*, A. R., C. J. Conway, D. Tank, K. R. Andrews, D. S. Gour, and L. Waits. 2020. Diet of a rare herbivore based on DNA metabarcoding of feces: selection, seasonality, and survival. *Ecology and Evolution* 2020;10:7627–7643.
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- Lundblad\*, C.G., and C. J. Conway. 2020. Testing four hypotheses to explain partial migration: balancing reproductive benefits with limits to fasting endurance. *Behavioral Ecology and Sociobiology* 74(2):26.
- Goldberg\*, A. R., C. J. Conway, and D. E. Biggins. 2020. Flea sharing among sympatric rodent hosts: implications for potential plague effects on a threatened sciurid. *Ecosphere* 11(2):e03033.
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- Goldberg\*, A.R., C. J. Conway, D. E. Biggins, G. Burak, and D. Evans Mack. 2018. Yersinia pestis, fleas, sylvatic plague, and persistence of a federally threatened ground squirrel. *The Vector* 12: 2-7.
- Conway, C. J. 2018. Spatial and temporal patterns in population trends and burrow usage of Burrowing Owls in North America. *Journal of Raptor Research* 52:129-142.
- Dillon\*, K. G., and C. J. Conway. 2018. Nest predation risk explains variation in avian clutch size. *Behavioral Ecology* 29:301–311.
- Glisson, W. J., C. J. Conway, C. P. Nadeau\*\*, and K. L. Borgmann\*. 2017. Habitat models to predict wetland bird occupancy influenced by scale, anthropogenic disturbance, and imperfect detection. *Ecosphere* 8:1-18.
- McCullough\*\*, J. M., and C. J. Conway. 2017. Breeding behavior of northern saw-whet owls in Oregon. *Northwest Science* 91:222-227.
- Borgmann\*, K. L., and C. J. Conway. 2015. Wildlife Habitat Restoration. Pages 157-167 in *Wildlife Habitat Conservation: Concepts, Challenges, and Solutions*. (M. L. Morrison and H. A. Mathewson, eds.). John Hopkins University Press, Baltimore, Maryland.
- Nadeau\*\*, C. P., C. J. Conway, and N. Rathbun. 2015. Depth of burrowing owl nest boxes affects thermal suitability and occupancy. *Journal of Field Ornithology* 86:288-297.
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### **Completed Theses/Dissertations by Past Graduate Students**

- Lundblad, C.G. 2020. Life-history Evolution, Abiotic Constraints, and Climate Adaptability of Burrowing Owls (*Athene cunicularia*) Breeding Along a Latitudinal Gradient. Ph.D. Dissertation, Department of Fish & Wildlife Sciences, University of Idaho, Moscow, ID.
- Lachman, D.A. 2020. Behavioral and environmental factors affecting nest-site selection and nest survival in a colonial-nesting waterbird. M.S. Thesis, Department of Fish & Wildlife Sciences, University of Idaho, Moscow, ID.
- Riley, I.P. 2019. M.S. Student, Wildlife Sciences, University of Idaho, Sampling methods for lek and brood counts of greater sage-grouse: accounting for imperfect detection. M.S. Thesis, Department of Fish & Wildlife Sciences, University of Idaho, Moscow, ID..
- Harry, E.J. 2019, Remotely sensed metrics help map range-wide habitat suitability and identify habitat restoration priorities for an endangered marsh bird. M.S. Thesis, Department of Fish & Wildlife Sciences, University of Idaho, Moscow, ID.
- Goldberg, A.R. 2018. Diet, disease, and hibernation behavior of northern Idaho ground squirrels. Ph.D. Dissertation, Department of Fish & Wildlife Sciences, University of Idaho, Moscow, ID.
- Swearingen, Z. J. 2015. Effectiveness of Management Actions Intended to Benefit Wildlife Populations on the Craig Mountain Wildlife Management Area. M.S. Thesis, Department of Fish & Wildlife Sciences, University of Idaho, Moscow, ID.
- Lundblad, C. G. 2014. Altitudinal migration in birds: tests of four mechanistic hypotheses in Yellow-eyed Juncos (*Junco phaeonotus*). M.S. Thesis, School of Natural Resources and the Environment, University of Arizona, Tucson, AZ.
- Garcia, M. G. 2014. Why is the Burrowing Owl breeding range contracting? M.S. Thesis, School of Natural Resources and the Environment, University of Arizona, Tucson, AZ.
- Dillon, K. 2013. Ecological causes of elevational gradients in avian clutch size. M.S. Thesis, School of Natural Resources and the Environment, University of Arizona, Tucson, AZ.
- Macías-Duarte, A. 2011. Change in Migratory Behavior as a Possible Explanation of Burrowing Owl Population Declines in Northern Latitudes. Ph.D. Dissertation, School of Natural Resources and the Environment, University of Arizona, Tucson, AZ.
- Borgmann, K. L. 2010. Mechanisms underlying intra-seasonal variation in the risk of avian nest predation: implications for breeding phenology. Ph.D. Dissertation, School of Natural Resources and the Environment, University of Arizona, Tucson, AZ.

- Decker, K. D. 2009. Seasonal decline in avian clutch size: a test of six alternative hypotheses. M.S. Thesis, School of Natural Resources, University of Arizona, Tucson, AZ.
- Steckler, S. E. 2009. Effects of vocal behavior on brood parasitism of Arizona Bell's Vireo (*Vireo bellii arizonae*). M.S. Thesis, School of Natural Resources, University of Arizona, Tucson, AZ.
- Ogonowski, M. S. 2007. Factors influencing migratory decisions of western Burrowing Owls. M.S. Thesis, School of Natural Resources, University of Arizona, Tucson, AZ.
- Hughes, K. M. 2007. Habitat selection of band-tailed pigeons. M.S. Thesis, School of Natural Resources, University of Arizona, Tucson, AZ.
- Boyle, W. A. 2006. Why do birds migrate? The role of food, habitat, predation, and competition. Ph.D. Dissertation, Department of Ecology and Evolutionary Biology, University of Arizona, Tucson, AZ.
- Garcia, V. 2005. Effects of food and ectoparasites on age of natal dispersal in burrowing owls. M.S. Thesis, School of Natural Resources, University of Arizona, Tucson, AZ.
- Lantz, S. J. 2005. Nesting ecology and habitat selection of western burrowing owls (*Athene cunicularia hypugaea*) in the Thunder Basin National Grassland, northeastern Wyoming, M.S. Thesis, Dept of Zoology & Physiology, University of Wyoming, Laramie WY.
- Smith, M. D. 2004. Function of manure-scattering behavior of burrowing owls (*Athene cunicularia*). M.S. Thesis, School of Natural Resources, Univ. of Arizona, Tucson, AZ.

## PROFESSIONAL AFFILIATIONS & SERVICE

### The Wildlife Society

- past President, Southwest Section
- Associate Editor Journal of Wildlife Management
- elected Fellow 2019

### American Ornithological Society

- Chair of scientific committee for national conference for 3 years
- elected Fellow in 2015
- elected to Executive Council in 2020

### Wilson Ornithological Society

### Association of Field Ornithologists

### Sigma Xi

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## EDUCATION

### Texas A&M University-Kingsville, Kingsville, Texas

*Master of Science, May 2021*

Department of Rangeland and Wildlife Sciences

**Major:** Range and Wildlife Management

**Advisor:** Randy W. DeYoung

**Committee:** David G. Hewitt, Jeremy A. Baumgardt, J. Alfonso Ortega-S., and John A. Goolsby

**Thesis:** Nilgai Movement Ecology: Implications for Management of Cattle Fever Ticks in South Texas

### Delaware Valley University, Doylestown, Pennsylvania

*Bachelor of Science, May 2015, Cum Laude*

Department of Animal Biotechnology and Conservation

**Major:** Conservation and Wildlife Management

**Minors:** Animal Science and Environmental Science

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## PROFESSIONAL EXPERIENCE

### Research Scientist

March 2022–Present

*Idaho Cooperative Fish & Wildlife Research Unit, University of Idaho, Moscow, ID*

- Trap, band, and attach GPS transmitters to Yuma Ridgway's rails (16) and Light-footed Ridgway's rails (14 wild-caught; 28 captive-bred)
- Collect biological samples (blood, feather, fecal) and morphometric measurements of rails
- Conducted secretive marsh bird surveys for a long-term monitoring project along the Lower Colorado River
- Conducted surveys for the endangered Yuma Ridgway's rail for a clearance survey
- Write up annual reports
- Analyze data using Program R and ArcGIS
- Supervise technicians in the field

### Research Associate

June 2021–March 2022

*Caesar Kleberg Wildlife Research Institute, Kingsville, TX*

- Conduct research on nilgai antelope (large, free-ranging, exotic ungulate)
  - Prepare manuscripts for publication in peer-reviewed journals
  - Analyze movement data from GPS-collared nilgai, habitat data, and photos from wildlife trail cameras
  - Maintain large databases and distribute data as needed to project supervisors
  - Aid in preparation of technical reports for USDA-ARS
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- Supervise 3 undergraduate workers and assist workers with side research projects to present at scientific meetings
- Regularly use Access, Excel, ArcGIS, and R programs to analyze data
- Perform genetic analysis on collected tissue (nilgai) and blood samples (pygmy owls)
- Extract DNA from biological samples using a DNeasy blood and tissue kit
- Perform PCR using a thermal cycler
- Use a DNA sequencer to analyze microsatellite markers
- Analyze sequencer output using GeneMapper and Geneious programs
- Assist with data analysis and laboratory work as needed for other ongoing projects

### **Graduate Research Assistant**

August 2018–May 2021

*Caesar Kleberg Wildlife Research Institute, Kingsville, TX*

- Wrote and published Master's thesis using Journal of Wildlife Management guidelines
- Conducted capture of nilgai antelope using the helicopter net-gun technique: safely restrained nilgai, collected ear notches, ticks, and morphometric data, and attached ear tags and satellite GPS-collars (85 unique individuals, 142 total individuals captured)
- Organized and supervised technicians and volunteers during nilgai captures
- Managed, maintained, and analyzed large databases including ~8 million trail camera photos and GPS location data from collared nilgai
- Analyzed data using Program R, ESRI ArcGIS, SAS, and Microsoft Office
- Conducted analyses and created maps in ArcGIS
- Supervised 2 undergraduate workers and assisted workers with side research projects to present at scientific meetings
- Aided with preparation of technical reports and monthly project updates for USDA-ARS
- Prepared a popular article for a general audience based on my research
- Presented research at scientific, stakeholder, and landowner meetings
- Conducted research on private land and maintained good rapport with landowners
- Used aerial photos, remote sensing techniques, and landscape ecology to determine vegetation type, nilgai habitat selection, and resource availability
- Maintained supplemental feeders to determine if nilgai could be treated for ticks through feed (regular lifting of 50 lb bags of feed)
- Extracted DNA from tissue samples to characterize the major histocompatibility complex alleles for nilgai to determine immune response to ticks
- Aided in the collection of samples of culled white-tailed deer (300) and nilgai (250) as part of a population reduction; duties included euthanasia using a bolt gun, tooth extraction and tooth wear and replacement for aging, tick collection, fetus measurements, and blood collection
- Occasional statewide travel to conduct field research and present at conferences
- Assisted peers with the capture and data collection of ~800 white-tailed deer
- Assisted other graduate students with research including: turkey captures, genetic analysis, helicopter surveys, and vegetation sampling

**Wildlife/Habitat Technician**

April–July 2018

*Oregon State University, Riley, OR*

- Collected density of sagebrush-obligate songbird species and nest success data by conducting nest transect surveys and point counts
- Monitored songbird nests, maintained wildlife trail cameras, and performed vegetation surveys at fledged nest sites
- Applied utilization treatments to marked plants and collected visual obscuration and vertical vegetation density measurements
- Gathered vegetation biomass samples within plot frames to monitor grazing to determine cattle utilization of the study pastures
- Monitored vegetation using line-point intercept, belt transect, density frames and visual obscuration methods

**Carnivore/Deer Wildlife Technician**

August 2017–March 2018

*Michigan Predator-Prey Project, Mississippi State University, Baraga, MI*

- White-tailed deer: checked survival of collared fawns biweekly using telemetry; set-up and maintained clover traps to catch deer; assisted in deer capture: used chemical immobilization, collected biological samples (blood/hair/teeth) and morphometric data, used an ultrasound to check for pregnancy, attached ear tags and a GPS-collar, and inserted a VIT (vaginal implant transmitter) in pregnant does (61); captured 120 unique fawns and yearlings that were tagged and released; investigated deer mortality sites (performed necropsies as needed) and collected deer heads for CWD surveillance
- Bobcat: conducted bobcat hair snare surveys at 52 sites: constructed corrals, baited sites, monitored trail cameras, and collected 570 hair samples from deployed snares; set-up and maintained bobcat traps
- Black bear: used GPS-collar locations and handheld telemetry to locate black bear den sites; assisted in black bear den checks: collected biological samples and morphometric data, monitored vitals, replaced worn collars, and conducted a bioelectrical impedance analysis (BIA)
- Wolf: assisted in wolf capture: collected blood samples and morphometric data, monitored vitals, and attached ear tags and a GPS-collar
- Handled and worked safely around antibiotics and immobilizing/reversal drugs
- Participated in other population surveys including coyote howl surveys, aerial beaver surveys, and indexed thousands of deer photos from baited and non-baited camera sites
- Packaged and properly stored biological samples (blood/hair/teeth)
- Worked cooperatively and safely in small teams while handling potentially dangerous wildlife in extreme conditions
- Collected data as part of a long-term (12-year) predator-prey study
- Worked primarily outside in all conditions including rain, snow, and below freezing temperatures using 4x4 ATV's, UTV's, snowmobiles, trucks, and trailers

**Pheasant Research Technician II**

January–July 2017

*NE Cooperative Fish & Wildlife Research Unit, University of Nebraska-Lincoln, Culbertson, NE*

- Assembled basic information on ring-necked pheasant populations including habitat use, seasonal movement, home range, breeding ecology, sex, age structure, and population abundance

- Used truck-mounted telemetry to triangulate (in under 5 minutes) the daily location of approximately 100 pheasants during morning foraging, loafing, nighttime foraging, and roosting
- Located and collected mortality collars and found nests using handheld telemetry
- Captured, banded, collared (VHF), and measured 30 pheasants
- Trained new technicians to use telemetry equipment, input data, and other tasks
- Conducted vegetation surveys at roost site locations to research habitat characteristics of use sites, nonuse sites, and randomly generated points
- Visited pheasant nests, measured and floated eggs to determine incubation progress, and monitored successful broods
- Collected and entered data accurately and efficiently
- Wing-banded and released 200 pen-raised hatchlings
- Conducted field work on private/public land while maintaining positive relationships with landowners
- Aided PhD student with capture and banding of bobwhite quail
- Occasional overnight travel to other field sites

#### **Hunter Survey Technician I**

October–December 2016

*NE Cooperative Fish & Wildlife Research Unit, University of Nebraska-Lincoln, Culbertson, NE*

- Collected 65 GPS-tracks of hunters during pheasant season using Garmin GPS watches at 6 public access sites
- Surveyed hunters in the field using SNAP Mobile Software
- Programed and maintained approximately 40 trail cameras on public and private land, using power tools and a ladder
- Interacted and worked respectfully with private landowners and hunters
- Worked independently and safely in a rural area on public access land around firearms and dogs
- Familiar with rangeland ecology and management and hunting practices

#### **Biological Science Technician (GS-04)**

March–July 2016

*Padre Island National Seashore: Division of Sea Turtle Science and Recovery, National Park Service, Corpus Christi, TX*

- Patrolled 70 miles of beach in a Utility Transport Vehicle (UTV) looking for Kemp's ridley sea turtle (critically endangered species) tracks, false crawls, nesting females, and stranded or dead turtles
- Applied PIT and metal tags, collected biopsy samples and measurements from actively nesting turtles
- Excavated new nests and transported eggs to the corral/lab for incubation
- Supervised volunteers on patrol, in the field, and during public hatchling releases
- Assisted in attaching a satellite transmitter and accelerometer on a nesting turtle

#### **Conservation/Education Intern**

August–December 2015

*Bald Head Island Conservancy, Bald Head Island, NC*

- Led a variety of environmental education programs based around topics such as marine ecosystems, endangered species, and natural resource conservation

- Conducted conservation monitoring programs such as invasive vegetation removal, dune transect measurements, water quality monitoring, wildlife population studies, and wildlife necropsies as needed
- Excavated loggerhead sea turtle (endangered species) nests, accurately recorded nest data, and handled and released hatchlings back into the ocean
- Responded to wildlife calls from the wildlife hotline: captured injured or displaced wildlife species and coordinated with off-island rehabilitator as needed
- Conducted 4 shorebird surveys and monitored for red knot and piping plover (threatened species) nesting

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## WORKSHOPS, CERTIFICATIONS AND TRAININGS

### **IACUC General Regulation Training** (expires January 2023)

- Collaborative Institutional Training Initiative (CITI Program)

### **Motorboat Operator Certification Course** (March 2022)

- Department of Interior

### **Analysis of Resource Selection by Animals Workshop** (December 17–19, 2018)

- Ryan Long, PhD, Assistant Professor of Wildlife Sciences, University of Idaho

### **Chemical Immobilization Course** (December 10, 2018)

- Clay Hilton, DMV, Wildlife Veterinarian, Caesar Kleberg Wildlife Research Institute

### **Hunter-Trapper Education Course** (October 2013)

- Conducted by the Pennsylvania Game Commission
- 

## AWARDS AND SCHOLARSHIPS

Philip M. Plant Graduate Scholarship, \$1200 (2021)

Houston Safari Club Foundation, Dan L. Duncan Scholarship, \$3000 (2020)

South Texas Quail Coalition Scholarship, \$3500 (2019-2021)

2<sup>nd</sup> Place, Don Pendleton Memorial Graduate Poster Competition, TSSRM (2019)

Cum Laude, DVU Class of 2015 (2015)

Founder's Day Award Top Six, Delaware Valley University (2015)

RA Above and Beyond Award, DVU's Residence Life Department (2015)

RA Rookie of the Year, DVU's Residence Life Department (2013)

Dean's List, DVU School of Life and Physical Sciences (2011-2015)

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## PUBLICATIONS

### *In Print*

**Sliwa, K. M.** 2021. Nilgai movement ecology: implications for management of cattle fever ticks in South Texas. Thesis, Texas A&M University-Kingsville, Kingsville, USA.

### ***In Review***

**Sliwa, K. M.,** J. A. Baumgardt, R. W. DeYoung, J. A. Ortega-S., D. G. Hewitt, J. A. Goolsby, and K. H. Lohmeyer. Movement ecology of exotic nilgai antelope: a threat to the re-emergence of cattle fever ticks in the southern U.S. *Ecosphere*.

Baumgardt, J. A., A. M. Foley, **K. M. Sliwa,** R. W. DeYoung, J. A. Ortega-S., D. G. Hewitt, J. A. Goolsby, and K. H. Lohmeyer. Effects of helicopter net gunning on the survival and spatial behavior of nilgai. *Wildlife Research*.

### ***In Preparation***

**Sliwa, K. M.,** J. A. Baumgardt, R. W. DeYoung, J. A. Ortega-S., D. G. Hewitt, J. A. Goolsby, and K. H. Lohmeyer. Multiscale habitat selection of nilgai antelope in South Texas. (Target journal: PLoS ONE)

**Sliwa, K. M.,** D. Navarro, J. A. Baumgardt, R. W. DeYoung, M. Ohnishi, J. A. Ortega-S., D. G. Hewitt, J. A. Goolsby, and K. H. Lohmeyer. Immune system variation in nilgai antelope. (Target journal: Ecology and Evolution)

**Sliwa, K. M.,** J. A. Baumgardt, R. W. DeYoung, J. A. Ortega-S., D. G. Hewitt, J. A. Goolsby, and K. H. Lohmeyer. Sociospatial organization of nilgai antelope in South Texas. (Target journal: Journal of Mammalogy)

**Sliwa, K. M.,** J. A. Baumgardt, R. W. DeYoung, J. A. Ortega-S., D. G. Hewitt, J. A. Goolsby, and K. H. Lohmeyer. Fence crossing behavior of nilgai antelope in South Texas. (Target journal: Journal of Wildlife Diseases)

Baumgardt, J. A., **K. M. Sliwa,** R. W. DeYoung, J. A. Ortega-S., D. G. Hewitt, J. A. Goolsby, and K. H. Lohmeyer. Conditioning free-ranging nilgai antelope to feeders as a potential mode of treatment to eradicate cattle fever ticks. (Target journal: Journal of Wildlife Diseases)

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### **POPULAR ARTICLES**

**Sliwa, K. M.,** R. W. DeYoung, J. A. Baumgardt, J. A. Ortega-S., D. G. Hewitt, J. A. Goolsby, and A. A. Pérez de León. Movement patterns and behavior of nilgai antelope: Implications for management of cattle fever ticks in South Texas. Caesar Kleberg Tracks. Spring 2021. (<https://www.ckwri.tamuk.edu/publications/newsletter/caesar-kleberg-tracks-spring-2021>)

## **Appendix DA 5.2-5**

### **Agency Record of Communications**



## USFWS Communication Regarding BHE Renewables

|                      |  |                           |
|----------------------|--|---------------------------|
| <b>Date:</b>         | May 22, 2023                             | <b>Jacobs</b>             |
| <b>Project name:</b> | Black Rock, Elmore North, and Morton Bay | 2485 Natomas Park Drive   |
| <b>Prepared by:</b>  | Morgan King/Biologist, Jacobs            | Suite 600                 |
| <b>Location:</b>     | Banning, California                      | Sacramento, CA 95833-2937 |
| <b>Participants:</b> | Vincent James/Division Supervisor USFWS  | United States             |
| <b>Document no:</b>  | 1  | T +1.916.920.0300         |
| <b>Duration:</b>     | 8:35 – 8:46 AM                           | F +1.916.920.8463         |
| <b>Copies to:</b>    | Jerry Salamy/Jacobs, Sarah Madams/Jacobs |                           |

| Notes   | Action  |
|---|---|
| Vincent James/USFWS has agreed to be point of contact for BHE Renewables geothermal sites. He has three staff, who will also be supporting and assigned to each project as necessary.   | NA  |
| Felicia Sirchia is the desert pupfish specialist in the USFWS Palm Springs office. Unfortunately, Felicia is out on leave and expected to return after May 30 <sup>th</sup> .   | NA  |
| Vincent will coordinate with Felicia to provide most recent desert pupfish survey data to us.   | NA  |
| Morgan King will be the biologist assigned to BHE Renewables three geothermal facilities  | NA  |
| Vincent – without being a desert pupfish specialist and without knowing the recent location data, he did believe that terrestrial effects to desert pupfish from noise and vibration should be addressed in a Biological Assessment (Morton Bay) or Habitat Conservation Plan (Black Rock and Elmore North). He indicated that likely we could get by with a low-effect HCP | NA  |
| Vincent – indicated surveys may be necessary but would depend on location data from Felicia   | Requirements for protocol surveys undetermined at this time                 |
| Vincent requested that when an U.S. Army Corps of Engineers point of contact for Biological Assessment was identified please provide to USFWS so they can coordinate directly.  | BHE Renewables – provide USFWS with USACOE point of contact when identified |
| Vincent will respond directly to Morgan with data and information from Felicia  | NA  |

## CDFW Communication Regarding Burrowing Owls BHE Renewables

|                      |  |                           |
|----------------------|--|---------------------------|
| <b>Date:</b>         | June 1, 2023   | <b>Jacobs</b>             |
| <b>Project name:</b> | Black Rock, Elmore North, and Morton Bay   | 2485 Natomas Park Drive   |
| <b>Prepared by:</b>  | Morgan King/Biologist, Jacobs  | Suite 600                 |
| <b>Location:</b>     | Banning, California  | Sacramento, CA 95833-2937 |
| <b>Participants:</b> | Magdalena Rodriguez/CDFW, Rose Banks/CDFW, Jerry Salamy/Jacobs, Christy Payne/Jacobs, Lindsey Xayachack/Jacobs | United States             |
|                      |  | T +1.916.920.0300         |
| <b>Document no:</b>  | 1  | F +1.916.920.8463         |
| <b>Duration:</b>     | Conference call 9:30-10:30 AM  |                           |
| <b>Copies to:</b>    | Jerry Salamy/Jacobs, Sarah Madams/Jacobs   |                           |

| Notes  | Action  |
|--|---|
| Morgan provided a summary of 2022 wildlife reconnaissance-level surveys specifically the burrowing owl methods and results   | NA  |
| Jerry provided an overview of CEQA CEC process, specifically Data Adequacy and Data Response. Preliminary Staff Assessment (CEC) is scheduled to be issued February 2024.  | NA  |
| Christy discussed burrowing owl breeding season survey methods for 2023 and 2024. Requested feedback from CDFW regarding any methods or specifics for survey to make it acceptable.  | NA  |
| Magdalena provided survey recommendations, such as driving slowly along all access roads to be able to see full extent of canals/drains. Active agriculture is not suitable burrowing location except some features, such as concrete structures or pipes, may be suitable and surveyors should investigate. | Jacobs will use CDFW's recommended methods during breeding season survey  |
| Jacobs requested CDFW concurrence that the burrowing owl presence determined during 2022 surveys would satisfy CEC Data Adequacy.  | NA  |
| Magdalena requested a written summary of 2022 survey methods/results as well as methods for proposed 2023 and 2024 breeding season surveys.  | Jacobs will prepare a technical memorandum for CDFW summarizing the 2022 surveys and proposed 2023/2024 methods for concurrence |



## CDFW, USFWS, Jacobs Communication Regarding Desert Pupfish and Yuma Ridgway's Rail BHE Renewables

|                      |  |  |
|----------------------|--|--|
| <b>Date:</b>         | June 7, 2023   | <b>Jacobs</b>  |
| <b>Project name:</b> | Black Rock, Elmore North, and Morton Bay   | 2485 Natomas Park Drive  |
| <b>Prepared by:</b>  | Morgan King/Biologist, Jacobs  | Suite 600  |
| <b>Participants:</b> | Magdalena Rodriguez/CDFW, Rose Banks/CDFW, Jerry Salamy/Jacobs, Dave Rasmussen/Jacobs, Lindsey Xayachack/Jacobs, Maria Davydova-Flores/CDFW, Charley Land/CDFW, Brett Daniels/CDFW, Stephanie Menjivar/USFWS, Kent Kowalski/USFWS, Felicia Sirchia/USFWS | Sacramento, CA 95833-2937<br>United States<br>T +1.916.920.0300<br>F +1.916.920.8463 |
| <b>Document no:</b>  | 1  |  |
| <b>Duration:</b>     | Conference call 1:00-2:00 PM   |  |

| Notes   | Action  |
|---|---|
| Morgan provided a summary of three proposed geothermal projects   | NA  |
| Jerry provided an overview of CEQA CEC process and summary of call with CEC on June 6, 2023, indicating they had already met with agencies and concurred that we could presume desert pupfish presence  | NA  |
| Jacobs asked agencies to confirm that desert pupfish can be presumed present and no surveys are necessary   | Both CDFW and USFWS confirmed that desert pupfish are present and no surveys are necessary    |
| Jacobs confirmed that project features within drains (Elmore North well pad to far west) would be moved to avoid impact to drains   | NA  |
| Agencies requested that desert pupfish impact analysis include more than permanent effects to drains/canals, such as: <ul style="list-style-type: none"> <li>Quantify the loss of irrigation water runoff into if agricultural lands are converted to other use</li> <li>Well pads</li> <li>Changes in hydrology</li> </ul> | Jacobs will analyze all potential impacts. Jacobs will contact IID for data.                  |
| Agencies requested a copy of the rail survey report   | Jacobs will send the final rail report to group   |
| Agencies questioned whether suitable YRRA habitat is present NW of Black Rock   | Agencies will contact Refuge biologist to request recent survey data and provide it to Jacobs |
| Agencies indicated that recent data on YRRA show they disperse at night and collide with fences and transmission lines. Requested undergrounding transmission lines and potentially night time lighting   | Jacobs will analyze feasibility of YRRA avoidance and minimization measures                   |

**From:** [Keeney, Sharon@Wildlife](mailto:Keeney.Sharon@Wildlife)  
**To:** [Davydova-Flores, Maria@Wildlife](mailto:Davydova-Flores, Maria@Wildlife); [King, Morgan](mailto:King, Morgan); [Land, Charles@Wildlife](mailto:Land, Charles@Wildlife); "[Felicia\\_Sirchia@fws.gov](mailto:Felicia_Sirchia@fws.gov)"  
**Cc:** [Marshall, Tonya@Wildlife](mailto:Marshall, Tonya@Wildlife); [Daniels, Warner\(Brett\)@Wildlife](mailto:Daniels, Warner(Brett)@Wildlife)  
**Subject:** [EXTERNAL] RE: Salton Sea - Desert pupfish data?  
**Date:** Monday, June 5, 2023 3:48:27 PM  
**Attachments:** [image005.png](#)  
[image007.png](#)  
[image008.png](#)  
[image009.png](#)

---

Hi all,

A survey conducted last week yielded over 400 desert pupfish, mostly juveniles, in the main connector channel (south side, between the two drains) shown below. This area is obviously extremely important for desert pupfish.

Sharon Keeney  
Environmental Scientist/Fishery Biologist  
California Department of Fish and Wildlife  
78078 Country Club Drive, Suite 109  
Bermuda Dunes, CA 92203  
(760) 485-1836 (cell)  
[Sharon.Keeney@wildlife.ca.gov](mailto:Sharon.Keeney@wildlife.ca.gov)

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<https://www.wildlife.ca.gov/Tax-Donation>

---

**From:** Davydova-Flores, Maria@Wildlife <Maria.Davydova-Flores@Wildlife.ca.gov>  
**Sent:** Monday, June 5, 2023 3:20 PM  
**To:** King, Morgan <Morgan.King10@jacobs.com>; Keeney, Sharon@Wildlife <Sharon.Keeney@wildlife.ca.gov>; Land, Charles@Wildlife <Charles.Land@wildlife.ca.gov>  
**Cc:** Marshall, Tonya@Wildlife <Tonya.Marshall@Wildlife.ca.gov>  
**Subject:** Re: Salton Sea - Desert pupfish data?

Hello Morgan,

I realized that in my last email I did not point out an important desert pupfish occurrence: Red Hill Bay Drains, last confirmed 2023. I believe these are inactive remnant drains and I cannot find any official GIS lines for them, but here they are highlighted in orange by hand:



We can also discuss this at our meeting. Friday would work best for us, but I am also available to attend either of the other proposed times and coordinate with the team internally if Charley and/or Sharon are unable to join.

Maria Davydova-Flores  
Senior Environmental Scientist, Specialist  
California Department of Fish and Wildlife  
Inlands Deserts Region, R6  
Salton Sea Program  
(760) 220-7243

---

**From:** King, Morgan <[Morgan.King10@jacobs.com](mailto:Morgan.King10@jacobs.com)>

**Sent:** Thursday, June 1, 2023 6:11 AM

**To:** Keeney, Sharon@Wildlife <[Sharon.Keeney@wildlife.ca.gov](mailto:Sharon.Keeney@wildlife.ca.gov)>; Davydova-Flores, Maria@Wildlife <[Maria.Davydova-Flores@Wildlife.ca.gov](mailto:Maria.Davydova-Flores@Wildlife.ca.gov)>; Land, Charles@Wildlife <[Charles.Land@wildlife.ca.gov](mailto:Charles.Land@wildlife.ca.gov)>

**Cc:** Marshall, Tonya@Wildlife <[Tonya.Marshall@Wildlife.ca.gov](mailto:Tonya.Marshall@Wildlife.ca.gov)>

**Subject:** RE: Salton Sea - Desert pupfish data?

**WARNING:** This message is from an external source. Verify the sender and exercise caution when clicking links or opening attachments.

Hello Sharon,

Thank you for this information. Knowing the territory out there, I agree it would be challenging to survey.

Thanks again,  
Morgan

**Morgan King** | [Jacobs](#) | Biologist | M: +1.916.335.9141

---

**From:** Keeney, Sharon@Wildlife <[Sharon.Keeney@wildlife.ca.gov](mailto:Sharon.Keeney@wildlife.ca.gov)>  
**Sent:** Wednesday, May 31, 2023 5:25 PM  
**To:** Davydova-Flores, Maria@Wildlife <[Maria.Davydova-Flores@Wildlife.ca.gov](mailto:Maria.Davydova-Flores@Wildlife.ca.gov)>; King, Morgan <[Morgan.King10@jacobs.com](mailto:Morgan.King10@jacobs.com)>; Land, Charles@Wildlife <[Charles.Land@wildlife.ca.gov](mailto:Charles.Land@wildlife.ca.gov)>  
**Cc:** Marshall, Tonya@Wildlife <[Tonya.Marshall@Wildlife.ca.gov](mailto:Tonya.Marshall@Wildlife.ca.gov)>  
**Subject:** [EXTERNAL] RE: Salton Sea - Desert pupfish data?

Hello all,

This is to add that it hasn't been possible to survey some drains/shoreline pools because of accessibility issues. Even those drains/pools that I am able to survey, it can be difficult or impossible to survey the entire habitat if accessibility is poor due to abundance of cattails, tamarisk and/or other vegetation. Additionally, I haven't been able to survey some sites because of private property restrictions.

Sharon Keeney  
Environmental Scientist/Fishery Biologist  
California Department of Fish and Wildlife  
78078 Country Club Drive, Suite 109  
Bermuda Dunes, CA 92203  
(760) 485-1836 (cell)  
[Sharon.Keeney@wildlife.ca.gov](mailto:Sharon.Keeney@wildlife.ca.gov)

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---

**From:** Davydova-Flores, Maria@Wildlife <[Maria.Davydova-Flores@Wildlife.ca.gov](mailto:Maria.Davydova-Flores@Wildlife.ca.gov)>  
**Sent:** Tuesday, May 30, 2023 2:26 PM  
**To:** King, Morgan <[Morgan.King10@jacobs.com](mailto:Morgan.King10@jacobs.com)>; Land, Charles@Wildlife <[Charles.Land@wildlife.ca.gov](mailto:Charles.Land@wildlife.ca.gov)>  
**Cc:** Marshall, Tonya@Wildlife <[Tonya.Marshall@Wildlife.ca.gov](mailto:Tonya.Marshall@Wildlife.ca.gov)>; Keeney, Sharon@Wildlife <[Sharon.Keeney@wildlife.ca.gov](mailto:Sharon.Keeney@wildlife.ca.gov)>  
**Subject:** Re: Salton Sea - Desert pupfish data?

Good afternoon, Morgan,

Thank you for providing those maps earlier, and for the update regarding finding the 2020 kmz. Coincidentally, I also dug up that map last Friday afternoon and was working on comparing our latest survey data against that map before responding to you. Based on updates from our pupfish biologist Sharon Keeney, we just have one update for areas within 500 ft of the project polygons: Morton Bay had a positive DP occurrence as recently as 2022. Otherwise, the data in that 2020 kmz is the same as what we have for the area in question. Please be advised that since there has not been a systematic DP survey of all drains and other water bodies, and there are some drains that have not been surveyed at all, absence of a positive occurrence datum, or of a recent positive occurrence, does not suggest negative occurrence for any water body; even a negative occurrence datum does not prove absence. Sharon's schedule is very busy at the moment with surveys, so a meeting with her may be difficult to schedule for a while. However, I am available to consult with her and the rest of our team, so please reach out to me if you have any additional questions.

Maria Davydova-Flores  
Senior Environmental Scientist (Specialist)  
California Department of Fish and Wildlife  
Inlands Deserts Region, R6  
Salton Sea Program  
(760) 220-7243

---

**From:** King, Morgan <[Morgan.King10@jacobs.com](mailto:Morgan.King10@jacobs.com)>  
**Sent:** Tuesday, May 30, 2023 10:25 AM  
**To:** Land, Charles@Wildlife <[Charles.Land@wildlife.ca.gov](mailto:Charles.Land@wildlife.ca.gov)>  
**Cc:** Marshall, Tonya@Wildlife <[Tonya.Marshall@Wildlife.ca.gov](mailto:Tonya.Marshall@Wildlife.ca.gov)>; Keeney, Sharon@Wildlife <[Sharon.Keeney@wildlife.ca.gov](mailto:Sharon.Keeney@wildlife.ca.gov)>; Davydova-Flores, Maria@Wildlife <[Maria.Davydova-Flores@Wildlife.ca.gov](mailto:Maria.Davydova-Flores@Wildlife.ca.gov)>  
**Subject:** Salton Sea - Desert pupfish data?

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Good morning,

Please let me know if there is anything else you need to provide the desert pupfish location data. I appreciate your time and consideration!

FYI - On Friday last week, Felicia Sirchia/USFWS provided a \*.kmz of the 2020 desert pupfish occupied IID canals/drains. She was glad I was coordinating with your office since you have the most current survey data.

Thank you,  
Morgan

**Morgan King** | [Jacobs](#) | Biologist | Federal & Environmental Solutions | M: +1.916.335.9141

| [morgan.king10@jacobs.com](mailto:morgan.king10@jacobs.com)

---

**From:** Land, Charles@Wildlife <[Charles.Land@wildlife.ca.gov](mailto:Charles.Land@wildlife.ca.gov)>

**Sent:** Thursday, May 25, 2023 11:13 AM

**To:** King, Morgan <[Morgan.King10@jacobs.com](mailto:Morgan.King10@jacobs.com)>

**Cc:** Marshall, Tonya@Wildlife <[Tonya.Marshall@Wildlife.ca.gov](mailto:Tonya.Marshall@Wildlife.ca.gov)>; Keeney, Sharon@Wildlife <[Sharon.Keeney@wildlife.ca.gov](mailto:Sharon.Keeney@wildlife.ca.gov)>; Davydova-Flores, Maria@Wildlife <[Maria.Davydova-Flores@Wildlife.ca.gov](mailto:Maria.Davydova-Flores@Wildlife.ca.gov)>

**Subject:** [EXTERNAL] RE: Sonny Bono Wildlife Refuge

Hi Morgan,

Maria Davydova-Flores, SES Specialist (Regulatory) will help with the maps. She is a cc on this e-mail.

Thanks!

Charley Land  
Senior Environmental Scientist, Supervisor  
Salton Sea Program  
California Department of Fish and Wildlife Region 6  
78078 Country Club Drive Suite 109  
Bermuda Dunes, CA 92203  
(760) 218-0063 Cell

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---

**From:** King, Morgan <[Morgan.King10@jacobs.com](mailto:Morgan.King10@jacobs.com)>

**Sent:** Thursday, May 25, 2023 7:18 AM

**To:** Land, Charles@Wildlife <[Charles.Land@wildlife.ca.gov](mailto:Charles.Land@wildlife.ca.gov)>

**Cc:** Marshall, Tonya@Wildlife <[Tonya.Marshall@Wildlife.ca.gov](mailto:Tonya.Marshall@Wildlife.ca.gov)>; Keeney, Sharon@Wildlife <[Sharon.Keeney@wildlife.ca.gov](mailto:Sharon.Keeney@wildlife.ca.gov)>

**Subject:** RE: Sonny Bono Wildlife Refuge

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Good morning Charley,

As requested, here are figures of the three BHE Renewables projects:

- 1) Black Rock (south),
- 2) Elmore North (middle), and
- 3) Morton Bay (north)

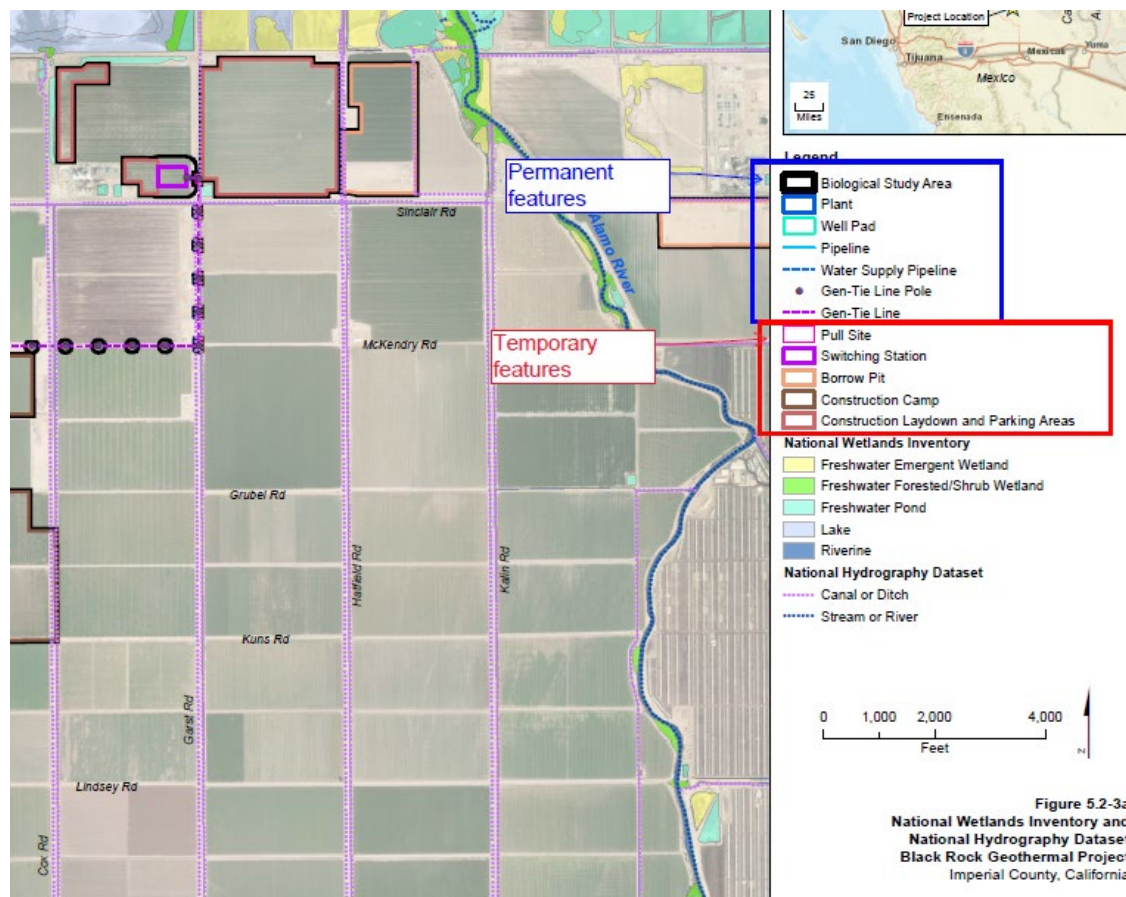
This background might be helpful? All three projects are being permitted separately (through California Energy Commission). They all share "auxiliary features" like laydown yards, parking lots, borrow pits, etc.



These auxiliary features are triple permitted between the three sites. I took a screenshot of the first Black Rock Figure (see below). I circled the permanent features (in blue) and temporary features (in red). But – to make it more confusing – we show that the project areas overlap the IID canals/drains, but the project **will not impact** any IID canals or drains.

Please let me know if you have any other questions. I'm happy to help,

Thank you,  
Morgan



**Morgan King** | [Jacobs](#) | Biologist | M: +1.916.335.9141

**From:** Land, Charles@Wildlife <[Charles.Land@wildlife.ca.gov](mailto:Charles.Land@wildlife.ca.gov)>

**Sent:** Monday, May 22, 2023 3:43 PM

**To:** King, Morgan <[Morgan.King10@jacobs.com](mailto:Morgan.King10@jacobs.com)>

**Cc:** Marshall, Tonya@Wildlife <[Tonya.Marshall@Wildlife.ca.gov](mailto:Tonya.Marshall@Wildlife.ca.gov)>; Keeney, Sharon@Wildlife <[Sharon.Keeney@wildlife.ca.gov](mailto:Sharon.Keeney@wildlife.ca.gov)>

**Subject:** [EXTERNAL] RE: Sonny Bono Wildlife Refuge

Hi Morgan,

These are helpful but we can't see from this information provided so far is what is being "covered/obscured/overlain" by the project overlays. In other words, the aerial imagery under the project outlines. If you can make the overlays transparent but retain the outlines and labelling, that we be most

helpful.

Thanks!

Charley Land  
Senior Environmental Scientist, Supervisor  
Salton Sea Program  
California Department of Fish and Wildlife Region 6  
78078 Country Club Drive Suite 109  
Bermuda Dunes, CA 92203  
(760) 218-0063 Cell

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**From:** King, Morgan <[Morgan.King10@jacobs.com](mailto:Morgan.King10@jacobs.com)>  
**Sent:** Monday, May 22, 2023 3:28 PM  
**To:** Land, Charles@Wildlife <[Charles.Land@wildlife.ca.gov](mailto:Charles.Land@wildlife.ca.gov)>  
**Cc:** Marshall, Tonya@Wildlife <[Tonya.Marshall@Wildlife.ca.gov](mailto:Tonya.Marshall@Wildlife.ca.gov)>; Keeney, Sharon@Wildlife <[Sharon.Keeney@wildlife.ca.gov](mailto:Sharon.Keeney@wildlife.ca.gov)>  
**Subject:** RE: Sonny Bono Wildlife Refuge

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Hello Charley,

The three projects will not impact Imperial Irrigation District's (IID) canals/drains due to the construction or operation. Impacts during construction are not expected to result in vibrational or noise impacts that will impact any IID canals and offsite project features have been located to avoid IID's canals (either supply or drainage canals). Any project feature that crosses an IID canal (pipelines or overhead electrical lines) will occur on an existing roadway that crosses the canal or be constructed to avoid aquatic habitats by locating poles outside of riparian corridors. The implementation of Best Management Practices will eliminate the potential of impacting IID canals during construction. The operation of the power plants will not impact aquatic habitats.

I am attaching three Figures that show canal/drain in proximity to three projects. Although the three projects are being permitted separately, they all share auxiliary features: borrow pit, construction camp, construction laydown and parking areas. You'll see those areas are duplicated in each figure.

On short notice, I cannot provide the APN numbers. Would the shapefiles of the IID canals/drains be useful?

Thank you,  
Morgan



**Morgan King** | [Jacobs](#) | Biologist | M: +1.916.335.9141

---

**From:** Land, Charles@Wildlife <[Charles.Land@wildlife.ca.gov](mailto:Charles.Land@wildlife.ca.gov)>

**Sent:** Monday, May 22, 2023 3:02 PM

**To:** King, Morgan <[Morgan.King10@jacobs.com](mailto:Morgan.King10@jacobs.com)>

**Cc:** Marshall, Tonya@Wildlife <[Tonya.Marshall@Wildlife.ca.gov](mailto:Tonya.Marshall@Wildlife.ca.gov)>; Keeney, Sharon@Wildlife <[Sharon.Keeney@wildlife.ca.gov](mailto:Sharon.Keeney@wildlife.ca.gov)>

**Subject:** [EXTERNAL] RE: Sonny Bono Wildlife Refuge

**Importance:** High

Hi Morgan,

I discussed this with our desert pupfish biologist, Sharon Keeney, and before we schedule anything and/or start looking in our records, we need to have more detailed maps. The kmz file you provided is most helpful however, with the project "overlays" on top of the aerial imagery it is hard to identify the specific areas and drains potentially impacted. Please provide, in addition to the kmz file, maps with the drains and roads labelled, the parcel numbers (APNs) of the parcels impacted, and a map with outlines only displayed of the affected areas but with the affected areas labelled. Then we would be able to see the relevant drains and areas that may be impacted. After we get the maps, we will be happy to schedule a call. If you have any questions, please let me know.

Thanks!

Charley Land  
Senior Environmental Scientist, Supervisor  
Salton Sea Program  
California Department of Fish and Wildlife Region 6  
78078 Country Club Drive Suite 109  
Bermuda Dunes, CA 92203  
(760) 218-0063 Cell

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---

**From:** King, Morgan <[Morgan.King10@jacobs.com](mailto:Morgan.King10@jacobs.com)>

**Sent:** Monday, May 22, 2023 8:48 AM

**To:** Land, Charles@Wildlife <[Charles.Land@wildlife.ca.gov](mailto:Charles.Land@wildlife.ca.gov)>

**Cc:** Marshall, Tonya@Wildlife <[Tonya.Marshall@Wildlife.ca.gov](mailto:Tonya.Marshall@Wildlife.ca.gov)>; Keeney, Sharon@Wildlife <[Sharon.Keeney@wildlife.ca.gov](mailto:Sharon.Keeney@wildlife.ca.gov)>

**Subject:** RE: Sonny Bono Wildlife Refuge

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I understand – it's a busy time of year. Is there any data you could provide about recent surveys? The latest

CNDDDB record for our location is 2012 (followed by 2009, 1991 and 1986). I just spoke with Vincent James as well.

Thank you,  
Morgan

**Morgan King** | [Jacobs](#) | Biologist | M: +1.916.335.9141

---

**From:** Land, Charles@Wildlife <[Charles.Land@wildlife.ca.gov](mailto:Charles.Land@wildlife.ca.gov)>  
**Sent:** Monday, May 22, 2023 8:33 AM  
**To:** King, Morgan <[Morgan.King10@jacobs.com](mailto:Morgan.King10@jacobs.com)>  
**Cc:** Marshall, Tonya@Wildlife <[Tonya.Marshall@Wildlife.ca.gov](mailto:Tonya.Marshall@Wildlife.ca.gov)>; Keeney, Sharon@Wildlife <[Sharon.Keeney@wildlife.ca.gov](mailto:Sharon.Keeney@wildlife.ca.gov)>  
**Subject:** [EXTERNAL] RE: Sonny Bono Wildlife Refuge

Hi Morgan,

I'm sorry but that is a little short notice. I will want to have our desert pupfish biologist available for the discussion and she has been on leave. I will touch base with her and e-mail you tomorrow with some available time/dates. I apologize for any inconvenience.

Thanks!

Charley Land  
Senior Environmental Scientist, Supervisor  
Salton Sea Program  
California Department of Fish and Wildlife Region 6  
78078 Country Club Drive Suite 109  
Bermuda Dunes, CA 92203  
(760) 218-0063 Cell

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---

**From:** King, Morgan <[Morgan.King10@jacobs.com](mailto:Morgan.King10@jacobs.com)>  
**Sent:** Monday, May 22, 2023 8:21 AM  
**To:** Land, Charles@Wildlife <[Charles.Land@wildlife.ca.gov](mailto:Charles.Land@wildlife.ca.gov)>  
**Subject:** RE: Sonny Bono Wildlife Refuge

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Good morning Charley,

I am sorry for the urgent request - are you available today or tomorrow for a discussion about desert

pupfish? I am consulting biologist for BHE Renewables. I attached the proposed geothermal locations in \*.kmz for your reference.

My cell phone is (916)335-9141 or I would be happy to set up a call.

Thank you for your consideration,  
Morgan

**Morgan King** | [Jacobs](#) | Biologist | Federal & Environmental Solutions | M: +1.916.335.9141  
| [morgan.king10@jacobs.com](mailto:morgan.king10@jacobs.com)

---

**From:** Land, Charles@Wildlife <[Charles.Land@wildlife.ca.gov](mailto:Charles.Land@wildlife.ca.gov)>  
**Sent:** Monday, May 22, 2023 8:10 AM  
**To:** Shore, Jonathan <[jonathan\\_shore@fws.gov](mailto:jonathan_shore@fws.gov)>; Salamy, Jerry <[Jerry.Salamy@jacobs.com](mailto:Jerry.Salamy@jacobs.com)>  
**Cc:** Jon Trujillo ([jon.trujillo@calenergy.com](mailto:jon.trujillo@calenergy.com)) <[Jon.Trujillo@calenergy.com](mailto:Jon.Trujillo@calenergy.com)>; Madams, Sarah <[Sarah.Madams@jacobs.com](mailto:Sarah.Madams@jacobs.com)>; Xayachack, Lindsey <[Lindsey.Xayachack@jacobs.com](mailto:Lindsey.Xayachack@jacobs.com)>; King, Morgan <[Morgan.King10@jacobs.com](mailto:Morgan.King10@jacobs.com)>  
**Subject:** RE: [EXTERNAL] Sonny Bono Wildlife Refuge

Thanks Jonathan!

Charley Land  
Senior Environmental Scientist, Supervisor  
Salton Sea Program  
California Department of Fish and Wildlife Region 6  
78078 Country Club Drive Suite 109  
Bermuda Dunes, CA 92203  
(760) 218-0063 Cell

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---

**From:** Shore, Jonathan <[jonathan\\_shore@fws.gov](mailto:jonathan_shore@fws.gov)>  
**Sent:** Friday, May 19, 2023 5:55 PM  
**To:** Salamy, Jerry <[Jerry.Salamy@jacobs.com](mailto:Jerry.Salamy@jacobs.com)>; Land, Charles@Wildlife <[Charles.Land@wildlife.ca.gov](mailto:Charles.Land@wildlife.ca.gov)>  
**Cc:** Jon Trujillo ([jon.trujillo@calenergy.com](mailto:jon.trujillo@calenergy.com)) <[Jon.Trujillo@calenergy.com](mailto:Jon.Trujillo@calenergy.com)>; Madams, Sarah <[Sarah.Madams@jacobs.com](mailto:Sarah.Madams@jacobs.com)>; Xayachack, Lindsey <[Lindsey.Xayachack@jacobs.com](mailto:Lindsey.Xayachack@jacobs.com)>; King, Morgan <[Morgan.King10@jacobs.com](mailto:Morgan.King10@jacobs.com)>  
**Subject:** RE: [EXTERNAL] Sonny Bono Wildlife Refuge

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Hello Jerry,

You will want to contact Charles (Charley) Land, he is the Salton Sea Program Supervisor for the California Department of Fish and Wildlife. The State has the lead over Desert pupfish matters, and Charley will be able to help you. I have included him on this email.

Kind Regards,

Jonathan Shore, Project Leader  
Sonny Bono Salton Sea National Wildlife Refuge  
Coachella Valley National Wildlife Refuge  
U.S. Fish and Wildlife Service  
Department of the Interior, Region 8  
906 W. Sinclair Road, Calipatria, CA 92233  
Ph# (760) 348-5278, x225  
Cell: (760) 336-1812

[National Wildlife Refuges](#)



---

**From:** Salamy, Jerry <[Jerry.Salamy@jacobs.com](mailto:Jerry.Salamy@jacobs.com)>  
**Sent:** Friday, May 19, 2023 10:38 AM  
**To:** Shore, Jonathan <[jonathan\\_shore@fws.gov](mailto:jonathan_shore@fws.gov)>  
**Cc:** Jon Trujillo ([jon.trujillo@calenergy.com](mailto:jon.trujillo@calenergy.com)) <[Jon.Trujillo@calenergy.com](mailto:Jon.Trujillo@calenergy.com)>; Madams, Sarah <[Sarah.Madams@jacobs.com](mailto:Sarah.Madams@jacobs.com)>; Xayachack, Lindsey <[Lindsey.Xayachack@jacobs.com](mailto:Lindsey.Xayachack@jacobs.com)>; King, Morgan <[Morgan.King10@jacobs.com](mailto:Morgan.King10@jacobs.com)>  
**Subject:** [EXTERNAL] Sonny Bono Wildlife Refuge

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Hi Mr. Shore,

I am under contract with BHE Renewables, working on three geothermal power plants (Black Rock, Elmore North, and Morton Bay) near the refuge (see the image below). We have submitted Applications for Certification (a California Environmental Quality Act-equivalent process) to the California Energy Commission for these project and they have requested survey data for Desert pupfish. Does the refuge have or perform surveys for Desert pupfish surveys or have survey data that we can share with the California Energy Commission?



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**From:** [Sirchia, Felicia](#)  
**To:** [King, Morgan](#)  
**Cc:** [Menjivar, Stephanie R](#); [Kowalski, Kent M](#); [James, Vincent P](#)  
**Subject:** Re: [EXTERNAL] RE: Geothermal facilities & desert pupfish  
**Date:** Friday, May 26, 2023 3:16:58 PM  
**Attachments:** [SS\\_Pupfish\\_Drains\\_20200806.kmz](#)

---

Hi Morgan, attached is a KMZ file that indicates the IID drains that have had occurrences of desert pupfish based on past surveys.

It is good to hear you are coordinating with Sharon since she will be able to provide information on current surveys.

Let me know if you have additional questions.

\*\*\*\*\*

**Felicia M. Sirchia**

Fish and Wildlife Biologist

Colorado Desert Division

U.S. Fish and Wildlife Service

Palm Springs Fish and Wildlife Office

777 East Tahquitz Canyon Way, Suite 208

Palm Springs, CA 92262

Office: 760-322-2070 x405

---

**From:** King, Morgan <Morgan.King10@jacobs.com>  
**Sent:** Thursday, May 25, 2023 10:51 AM  
**To:** Sirchia, Felicia <Felicia\_Sirchia@fws.gov>; James, Vincent P <vincent\_james@fws.gov>  
**Cc:** Menjivar, Stephanie R <stephanie\_menjivar@fws.gov>; Kowalski, Kent M <kent\_kowalski@fws.gov>  
**Subject:** RE: [EXTERNAL] RE: Geothermal facilities & desert pupfish

Hello Felicia,

Here you go!

Just so you know, I'm also coordinating with CDFW Sharon Keeney for any information they may have available.

Thank you so much,  
Morgan

**Morgan King** | [Jacobs](#) | Biologist | Federal & Environmental Solutions | M: +1.916.335.9141  
| [morgan.king10@jacobs.com](mailto:morgan.king10@jacobs.com)

---

**From:** Sirchia, Felicia <Felicia\_Sirchia@fws.gov>  
**Sent:** Thursday, May 25, 2023 10:25 AM

**To:** King, Morgan <Morgan.King10@jacobs.com>; James, Vincent P <vincent\_james@fws.gov>  
**Cc:** Menjivar, Stephanie R <stephanie\_menjivar@fws.gov>; Kowalski, Kent M <kent\_kowalski@fws.gov>  
**Subject:** Re: [EXTERNAL] RE: Geothermal facilities & desert pupfish

Hi Morgan, can you send me the kmz file? Once I receive it, I can provide information on desert pupfish distribution in the IID drains. Thanks!

\*\*\*\*\*

**Felicia M. Sirchia**

Fish and Wildlife Biologist

Colorado Desert Division

U.S. Fish and Wildlife Service

Palm Springs Fish and Wildlife Office

777 East Tahquitz Canyon Way, Suite 208

Palm Springs, CA 92262

Office: 760-322-2070 x405

---

**From:** King, Morgan <[Morgan.King10@jacobs.com](mailto:Morgan.King10@jacobs.com)>  
**Sent:** Monday, May 22, 2023 9:27 AM  
**To:** James, Vincent P <[vincent\\_james@fws.gov](mailto:vincent_james@fws.gov)>  
**Cc:** Sirchia, Felicia <[Felicia\\_Sirchia@fws.gov](mailto:Felicia_Sirchia@fws.gov)>; Menjivar, Stephanie R <[stephanie\\_menjivar@fws.gov](mailto:stephanie_menjivar@fws.gov)>; Kowalski, Kent M <[kent\\_kowalski@fws.gov](mailto:kent_kowalski@fws.gov)>  
**Subject:** [EXTERNAL] RE: Geothermal facilities & desert pupfish

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Thank you so much, Vincent!

Please hit me up anytime for any information you may need,  
Morgan

**Morgan King** | [Jacobs](#) | Biologist | Federal & Environmental Solutions | M: +1.916.335.9141  
| [morgan.king10@jacobs.com](mailto:morgan.king10@jacobs.com)

---

**From:** James, Vincent P <[vincent\\_james@fws.gov](mailto:vincent_james@fws.gov)>  
**Sent:** Monday, May 22, 2023 9:19 AM  
**To:** King, Morgan <[Morgan.King10@jacobs.com](mailto:Morgan.King10@jacobs.com)>  
**Cc:** Sirchia, Felicia <[Felicia\\_Sirchia@fws.gov](mailto:Felicia_Sirchia@fws.gov)>; Menjivar, Stephanie R <[stephanie\\_menjivar@fws.gov](mailto:stephanie_menjivar@fws.gov)>; Kowalski, Kent M <[kent\\_kowalski@fws.gov](mailto:kent_kowalski@fws.gov)>  
**Subject:** Fw: [EXTERNAL] Geothermal facilities & desert pupfish



Good Morning Morgan,

Thanks for the call this morning. Just to recap, you are requesting that the USFWS provide any occurrence data that we may have for desert pupfish within the locations of each of these projects (see KMZ). In addition, we discuss potential noise and vibration effects to desert pupfish that may occur within the agricultural drains about 100 feet from the proposed project footprints. Also Morgan, I wanted to provide you with a contact list for each individual project listed below and also listed potential regulatory processes for each project.

**Black Rock Geothermal (Felicia Sirchia) - Potential HCP**

<https://www.energy.ca.gov/powerplant/steam-turbine/black-rock-geothermal-project-brgp>

**Elmore North Geothermal (Kent Kowalski) - Potential HCP**

<https://www.energy.ca.gov/powerplant/steam-turbine/elmore-north-geothermal-project-engp>

**Morton Bay Geothermal (Stephanie Menjivar) - S7 BO with USACE - Federal Nexus**

<https://www.energy.ca.gov/powerplant/steam-turbine/morton-bay-geothermal-project-mbgp>

Felicia, Stephanie, and/or Kent,

Would you provide the information mentioned above to Morgan to assist with any ESA regulatory permitting processes?

Thanks All,

**Vincent James** (he/his/him) [\(why is this important\)](#)

Division Supervisor

Colorado Desert Division

U.S. Fish and Wildlife Service

777 East Tahquitz Canyon Way, Suite 208

Palm Springs, CA 92262

Work Cell: 760-333-4138

Office: 760-322-2070 x 415\*

\*Please note the best way to reach me is via email

---

**From:** King, Morgan <[Morgan.King10@jacobs.com](mailto:Morgan.King10@jacobs.com)>

**Sent:** Monday, May 22, 2023 7:12 AM

**To:** James, Vincent P <[vincent\\_james@fws.gov](mailto:vincent_james@fws.gov)>

**Subject:** [EXTERNAL] Geothermal facilities & desert pupfish

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Good morning Vincent,

I apologize for such an urgent request – but are you available for a 15 min (max as long as 30 minute) conversation about desert pupfish? Today or tomorrow would be preferable. If you are available, my phone number is (916) 335-9141 or I would be happy to set up a call.

I am a consulting biologist working for BHE Renewables in permitting phase for three geothermal facilities located southeast Salton Sea: Black Rock, Elmore North, Morton Bay. California Energy Commission is lead CEQA agency. I attached a \*.kmz of the sites for your reference.

Thank you so much for your time and consideration,  
Morgan

**Morgan King** | [Jacobs](#) | Biologist | Federal & Environmental Solutions | M: +1.916.335.9141  
| [morgan.king10@jacobs.com](mailto:morgan.king10@jacobs.com)

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**From:** [Keeney, Sharon@Wildlife](mailto:Keeney, Sharon@Wildlife)  
**To:** [Davydova-Flores, Maria@Wildlife](mailto:Davydova-Flores, Maria@Wildlife); [King, Morgan](mailto:King, Morgan); [Land, Charles@Wildlife](mailto:Land, Charles@Wildlife)  
**Cc:** [Marshall, Tonya@Wildlife](mailto:Marshall, Tonya@Wildlife)  
**Subject:** [EXTERNAL] RE: Salton Sea - Desert pupfish data?  
**Date:** Wednesday, May 31, 2023 5:25:35 PM  
**Attachments:** [image002.png](#)  
[image003.png](#)  
[image004.png](#)

---

Hello all,

This is to add that it hasn't been possible to survey some drains/shoreline pools because of accessibility issues. Even those drains/pools that I am able to survey, it can be difficult or impossible to survey the entire habitat if accessibility is poor due to abundance of cattails, tamarisk and/or other vegetation.

Additionally, I haven't been able to survey some sites because of private property restrictions.

Sharon Keeney  
Environmental Scientist/Fishery Biologist  
California Department of Fish and Wildlife  
78078 Country Club Drive, Suite 109  
Bermuda Dunes, CA 92203  
(760) 485-1836 (cell)  
[Sharon.Keeney@wildlife.ca.gov](mailto:Sharon.Keeney@wildlife.ca.gov)

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---

**From:** Davydova-Flores, Maria@Wildlife <Maria.Davydova-Flores@Wildlife.ca.gov>  
**Sent:** Tuesday, May 30, 2023 2:26 PM  
**To:** King, Morgan <Morgan.King10@jacobs.com>; Land, Charles@Wildlife <Charles.Land@wildlife.ca.gov>  
**Cc:** Marshall, Tonya@Wildlife <Tonya.Marshall@Wildlife.ca.gov>; Keeney, Sharon@Wildlife <Sharon.Keeney@wildlife.ca.gov>  
**Subject:** Re: Salton Sea - Desert pupfish data?

Good afternoon, Morgan,

Thank you for providing those maps earlier, and for the update regarding finding the 2020 kmz. Coincidentally, I also dug up that map last Friday afternoon and was working on comparing our latest survey data against that map before responding to you. Based on updates from our pupfish biologist Sharon Keeney, we just have one update for areas within 500 ft of the project polygons: Morton Bay had a positive DP occurrence as recently as 2022. Otherwise, the data in that 2020 kmz is the same as what we have for the area in question. Please be advised that since there has not been a systematic DP survey of all drains and other water bodies, and there are some drains that have not been surveyed at all, absence of a positive occurrence datum, or of a recent positive occurrence, does not suggest negative occurrence for any water body; even a negative occurrence

datum does not prove absence. Sharon's schedule is very busy at the moment with surveys, so a meeting with her may be difficult schedule for a while. However, I am available to consult with her and the rest of our team, so please reach out to me if you have any additional questions.

Maria Davydova-Flores  
Senior Environmental Scientist (Specialist)  
California Department of Fish and Wildlife  
Inlands Deserts Region, R6  
Salton Sea Program  
(760) 220-7243

---

**From:** King, Morgan <[Morgan.King10@jacobs.com](mailto:Morgan.King10@jacobs.com)>  
**Sent:** Tuesday, May 30, 2023 10:25 AM  
**To:** Land, Charles@Wildlife <[Charles.Land@wildlife.ca.gov](mailto:Charles.Land@wildlife.ca.gov)>  
**Cc:** Marshall, Tonya@Wildlife <[Tonya.Marshall@Wildlife.ca.gov](mailto:Tonya.Marshall@Wildlife.ca.gov)>; Keeney, Sharon@Wildlife <[Sharon.Keeney@wildlife.ca.gov](mailto:Sharon.Keeney@wildlife.ca.gov)>; Davydova-Flores, Maria@Wildlife <[Maria.Davydova-Flores@Wildlife.ca.gov](mailto:Maria.Davydova-Flores@Wildlife.ca.gov)>  
**Subject:** Salton Sea - Desert pupfish data?

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Good morning,

Please let me know if there is anything else you need to provide the desert pupfish location data. I appreciate your time and consideration!

FYI - On Friday last week, Felicia Sirchia/USFWS provided a \*.kmz of the 2020 desert pupfish occupied IID canals/drains. She was glad I was coordinating with your office since you have the most current survey data.

Thank you,  
Morgan

**Morgan King** | [Jacobs](#) | Biologist | Federal & Environmental Solutions | M: +1.916.335.9141  
| [morgan.king10@jacobs.com](mailto:morgan.king10@jacobs.com)

---

**From:** Land, Charles@Wildlife <[Charles.Land@wildlife.ca.gov](mailto:Charles.Land@wildlife.ca.gov)>  
**Sent:** Thursday, May 25, 2023 11:13 AM  
**To:** King, Morgan <[Morgan.King10@jacobs.com](mailto:Morgan.King10@jacobs.com)>  
**Cc:** Marshall, Tonya@Wildlife <[Tonya.Marshall@Wildlife.ca.gov](mailto:Tonya.Marshall@Wildlife.ca.gov)>; Keeney, Sharon@Wildlife <[Sharon.Keeney@wildlife.ca.gov](mailto:Sharon.Keeney@wildlife.ca.gov)>; Davydova-Flores, Maria@Wildlife <[Maria.Davydova-Flores@Wildlife.ca.gov](mailto:Maria.Davydova-Flores@Wildlife.ca.gov)>  
**Subject:** [EXTERNAL] RE: Sonny Bono Wildlife Refuge

Hi Morgan,

Maria Davydova-Flores, SES Specialist (Regulatory) will help with the maps. She is a cc on this e-mail.

Thanks!

Charley Land  
Senior Environmental Scientist, Supervisor  
Salton Sea Program  
California Department of Fish and Wildlife Region 6  
78078 Country Club Drive Suite 109  
Bermuda Dunes, CA 92203  
(760) 218-0063 Cell

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---

**From:** King, Morgan <[Morgan.King10@jacobs.com](mailto:Morgan.King10@jacobs.com)>

**Sent:** Thursday, May 25, 2023 7:18 AM

**To:** Land, Charles@Wildlife <[Charles.Land@wildlife.ca.gov](mailto:Charles.Land@wildlife.ca.gov)>

**Cc:** Marshall, Tonya@Wildlife <[Tonya.Marshall@Wildlife.ca.gov](mailto:Tonya.Marshall@Wildlife.ca.gov)>; Keeney, Sharon@Wildlife <[Sharon.Keeney@wildlife.ca.gov](mailto:Sharon.Keeney@wildlife.ca.gov)>

**Subject:** RE: Sonny Bono Wildlife Refuge

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Good morning Charley,

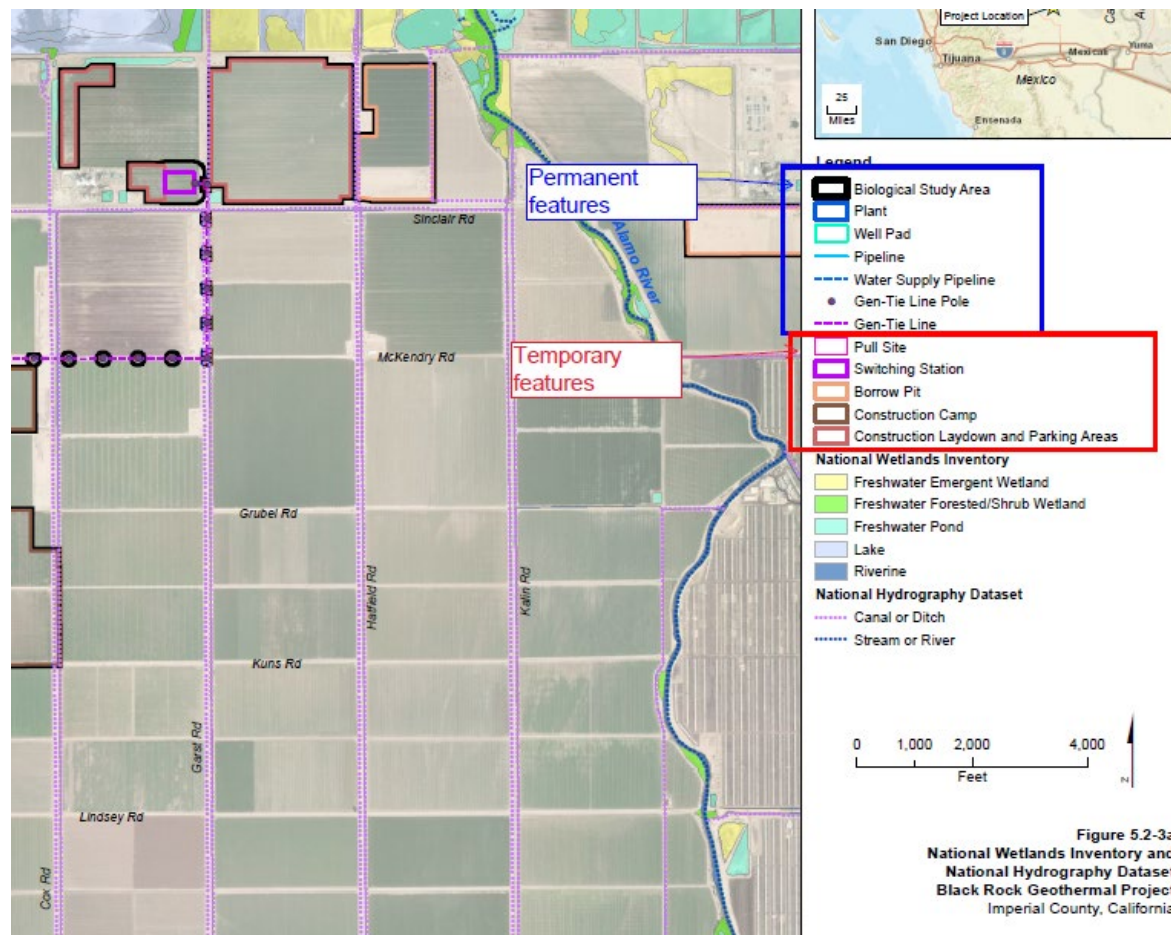
As requested, here are figures of the three BHE Renewables projects:

- 1) Black Rock (south),
- 2) Elmore North (middle), and
- 3) Morton Bay (north)

This background might be helpful? All three projects are being permitted separately (through California Energy Commission). They all share “auxiliary features” like laydown yards, parking lots, borrow pits, etc. These auxiliary features are triple permitted between the three sites. I took a screenshot of the first Black Rock Figure (see below). I circled the permanent features (in blue) and temporary features (in red). But – to make it more confusing – we show that the project areas overlap the IID canals/drains, but the project **will not impact** any IID canals or drains.

Please let me know if you have any other questions. I’m happy to help,

Thank you,  
Morgan



**Morgan King** | [Jacobs](#) | Biologist | M: +1.916.335.9141

**From:** Land, Charles@Wildlife <[Charles.Land@wildlife.ca.gov](mailto:Charles.Land@wildlife.ca.gov)>

**Sent:** Monday, May 22, 2023 3:43 PM

**To:** King, Morgan <[Morgan.King10@jacobs.com](mailto:Morgan.King10@jacobs.com)>

**Cc:** Marshall, Tonya@Wildlife <[Tonya.Marshall@Wildlife.ca.gov](mailto:Tonya.Marshall@Wildlife.ca.gov)>; Keeney, Sharon@Wildlife <[Sharon.Keeney@wildlife.ca.gov](mailto:Sharon.Keeney@wildlife.ca.gov)>

**Subject:** [EXTERNAL] RE: Sonny Bono Wildlife Refuge

Hi Morgan,

These are helpful but we can't see from this information provided so far is what is being "covered/obscured/overlain" by the project overlays. In other words, the aerial imagery under the project outlines. If you can make the overlays transparent but retain the outlines and labelling, that we be most helpful.

Thanks!

Charley Land

Senior Environmental Scientist, Supervisor  
Salton Sea Program  
California Department of Fish and Wildlife Region 6  
78078 Country Club Drive Suite 109  
Bermuda Dunes, CA 92203  
(760) 218-0063 Cell

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---

**From:** King, Morgan <[Morgan.King10@jacobs.com](mailto:Morgan.King10@jacobs.com)>  
**Sent:** Monday, May 22, 2023 3:28 PM  
**To:** Land, Charles@Wildlife <[Charles.Land@wildlife.ca.gov](mailto:Charles.Land@wildlife.ca.gov)>  
**Cc:** Marshall, Tonya@Wildlife <[Tonya.Marshall@Wildlife.ca.gov](mailto:Tonya.Marshall@Wildlife.ca.gov)>; Keeney, Sharon@Wildlife <[Sharon.Keeney@wildlife.ca.gov](mailto:Sharon.Keeney@wildlife.ca.gov)>  
**Subject:** RE: Sonny Bono Wildlife Refuge

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Hello Charley,

The three projects will not impact Imperial Irrigation District's (IID) canals/drains due to the construction or operation. Impacts during construction are not expected to result in vibrational or noise impacts that will impact any IID canals and offsite project features have been located to avoid IID's canals (either supply or drainage canals). Any project feature that crosses an IID canal (pipelines or overhead electrical lines) will occur on an existing roadway that crosses the canal or be constructed to avoid aquatic habitats by locating poles outside of riparian corridors. The implementation of Best Management Practices will eliminate the potential of impacting IID canals during construction. The operation of the power plants will not impact aquatic habitats.

I am attaching three Figures that show canal/drain in proximity to three projects. Although the three projects are being permitted separately, they all share auxiliary features: borrow pit, construction camp, construction laydown and parking areas. You'll see those areas are duplicated in each figure.

On short notice, I cannot provide the APN numbers. Would the shapefiles of the IID canals/drains be useful?

Thank you,  
Morgan

**Morgan King** | [Jacobs](#) | Biologist | M: +1.916.335.9141

---

**From:** Land, Charles@Wildlife <[Charles.Land@wildlife.ca.gov](mailto:Charles.Land@wildlife.ca.gov)>  
**Sent:** Monday, May 22, 2023 3:02 PM  
**To:** King, Morgan <[Morgan.King10@jacobs.com](mailto:Morgan.King10@jacobs.com)>  
**Cc:** Marshall, Tonya@Wildlife <[Tonya.Marshall@Wildlife.ca.gov](mailto:Tonya.Marshall@Wildlife.ca.gov)>; Keeney, Sharon@Wildlife <[Sharon.Keeney@wildlife.ca.gov](mailto:Sharon.Keeney@wildlife.ca.gov)>  
**Subject:** [EXTERNAL] RE: Sonny Bono Wildlife Refuge  
**Importance:** High

Hi Morgan,

I discussed this with our desert pupfish biologist, Sharon Keeney, and before we schedule anything and/or start looking in our records, we need to have more detailed maps. The kmz file you provided is most helpful however, with the project "overlays" on top of the aerial imagery it is hard to identify the specific areas and drains potentially impacted. Please provide, in addition to the kmz file, maps with the drains and roads labelled, the parcel numbers (APNs) of the parcels impacted, and a map with outlines only displayed of the affected areas but with the affected areas labelled. Then we would be able to see the relevant drains and areas that may be impacted. After we get the maps, we will be happy to schedule a call. If you have any questions, please let me know.

Thanks!

Charley Land  
Senior Environmental Scientist, Supervisor  
Salton Sea Program  
California Department of Fish and Wildlife Region 6  
78078 Country Club Drive Suite 109  
Bermuda Dunes, CA 92203  
(760) 218-0063 Cell

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---

**From:** King, Morgan <[Morgan.King10@jacobs.com](mailto:Morgan.King10@jacobs.com)>  
**Sent:** Monday, May 22, 2023 8:48 AM  
**To:** Land, Charles@Wildlife <[Charles.Land@wildlife.ca.gov](mailto:Charles.Land@wildlife.ca.gov)>  
**Cc:** Marshall, Tonya@Wildlife <[Tonya.Marshall@Wildlife.ca.gov](mailto:Tonya.Marshall@Wildlife.ca.gov)>; Keeney, Sharon@Wildlife <[Sharon.Keeney@wildlife.ca.gov](mailto:Sharon.Keeney@wildlife.ca.gov)>  
**Subject:** RE: Sonny Bono Wildlife Refuge

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I understand – it's a busy time of year. Is there any data you could provide about recent surveys? The



latest CNDDDB record for our location is 2012 (followed by 2009, 1991 and 1986). I just spoke with Vincent James as well.

Thank you,  
Morgan

**Morgan King** | [Jacobs](#) | Biologist | M: +1.916.335.9141

---

**From:** Land, Charles@Wildlife <[Charles.Land@wildlife.ca.gov](mailto:Charles.Land@wildlife.ca.gov)>  
**Sent:** Monday, May 22, 2023 8:33 AM  
**To:** King, Morgan <[Morgan.King10@jacobs.com](mailto:Morgan.King10@jacobs.com)>  
**Cc:** Marshall, Tonya@Wildlife <[Tonya.Marshall@Wildlife.ca.gov](mailto:Tonya.Marshall@Wildlife.ca.gov)>; Keeney, Sharon@Wildlife <[Sharon.Keeney@wildlife.ca.gov](mailto:Sharon.Keeney@wildlife.ca.gov)>  
**Subject:** [EXTERNAL] RE: Sonny Bono Wildlife Refuge

Hi Morgan,

I'm sorry but that is a little short notice. I will want to have our desert pupfish biologist available for the discussion and she has been on leave. I will touch base with her and e-mail you tomorrow with some available time/dates. I apologize for any inconvenience.

Thanks!

Charley Land  
Senior Environmental Scientist, Supervisor  
Salton Sea Program  
California Department of Fish and Wildlife Region 6  
78078 Country Club Drive Suite 109  
Bermuda Dunes, CA 92203  
(760) 218-0063 Cell

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---

**From:** King, Morgan <[Morgan.King10@jacobs.com](mailto:Morgan.King10@jacobs.com)>  
**Sent:** Monday, May 22, 2023 8:21 AM  
**To:** Land, Charles@Wildlife <[Charles.Land@wildlife.ca.gov](mailto:Charles.Land@wildlife.ca.gov)>  
**Subject:** RE: Sonny Bono Wildlife Refuge

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Good morning Charley,

I am sorry for the urgent request - are you available today or tomorrow for a discussion about desert pupfish? I am consulting biologist for BHE Renewables. I attached the proposed geothermal locations in \*.kmz for your reference.

My cell phone is (916)335-9141 or I would be happy to set up a call.

Thank you for your consideration,  
Morgan

**Morgan King** | [Jacobs](#) | Biologist | Federal & Environmental Solutions | M: +1.916.335.9141  
| [morgan.king10@jacobs.com](mailto:morgan.king10@jacobs.com)

---

**From:** Land, Charles@Wildlife <[Charles.Land@wildlife.ca.gov](mailto:Charles.Land@wildlife.ca.gov)>  
**Sent:** Monday, May 22, 2023 8:10 AM  
**To:** Shore, Jonathan <[jonathan\\_shore@fws.gov](mailto:jonathan_shore@fws.gov)>; Salamy, Jerry <[Jerry.Salamy@jacobs.com](mailto:Jerry.Salamy@jacobs.com)>  
**Cc:** Jon Trujillo ([jon.trujillo@calenergy.com](mailto:jon.trujillo@calenergy.com)) <[Jon.Trujillo@calenergy.com](mailto:Jon.Trujillo@calenergy.com)>; Madams, Sarah <[Sarah.Madams@jacobs.com](mailto:Sarah.Madams@jacobs.com)>; Xayachack, Lindsey <[Lindsey.Xayachack@jacobs.com](mailto:Lindsey.Xayachack@jacobs.com)>; King, Morgan <[Morgan.King10@jacobs.com](mailto:Morgan.King10@jacobs.com)>  
**Subject:** RE: [EXTERNAL] Sonny Bono Wildlife Refuge

Thanks Jonathan!

Charley Land  
Senior Environmental Scientist, Supervisor  
Salton Sea Program  
California Department of Fish and Wildlife Region 6  
78078 Country Club Drive Suite 109  
Bermuda Dunes, CA 92203  
(760) 218-0063 Cell

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**From:** Shore, Jonathan <[jonathan\\_shore@fws.gov](mailto:jonathan_shore@fws.gov)>  
**Sent:** Friday, May 19, 2023 5:55 PM  
**To:** Salamy, Jerry <[Jerry.Salamy@jacobs.com](mailto:Jerry.Salamy@jacobs.com)>; Land, Charles@Wildlife <[Charles.Land@wildlife.ca.gov](mailto:Charles.Land@wildlife.ca.gov)>  
**Cc:** Jon Trujillo ([jon.trujillo@calenergy.com](mailto:jon.trujillo@calenergy.com)) <[Jon.Trujillo@calenergy.com](mailto:Jon.Trujillo@calenergy.com)>; Madams, Sarah <[Sarah.Madams@jacobs.com](mailto:Sarah.Madams@jacobs.com)>; Xayachack, Lindsey <[Lindsey.Xayachack@jacobs.com](mailto:Lindsey.Xayachack@jacobs.com)>; King, Morgan <[Morgan.King10@jacobs.com](mailto:Morgan.King10@jacobs.com)>  
**Subject:** RE: [EXTERNAL] Sonny Bono Wildlife Refuge

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opening attachments.

Hello Jerry,

You will want to contact Charles (Charley) Land, he is the Salton Sea Program Supervisor for the California Department of Fish and Wildlife. The State has the lead over Desert pupfish matters, and Charley will be able to help you. I have included him on this email.

Kind Regards,

Jonathan Shore, Project Leader  
Sonny Bono Salton Sea National Wildlife Refuge  
Coachella Valley National Wildlife Refuge  
U.S. Fish and Wildlife Service  
Department of the Interior, Region 8  
906 W. Sinclair Road, Calipatria, CA 92233  
Ph# (760) 348-5278, x225  
Cell: (760) 336-1812

[National Wildlife Refuges](#)



---

**From:** Salamy, Jerry <[Jerry.Salamy@jacobs.com](mailto:Jerry.Salamy@jacobs.com)>

**Sent:** Friday, May 19, 2023 10:38 AM

**To:** Shore, Jonathan <[jonathan\\_shore@fws.gov](mailto:jonathan_shore@fws.gov)>

**Cc:** Jon Trujillo ([jon.trujillo@calenergy.com](mailto:jon.trujillo@calenergy.com)) <[Jon.Trujillo@calenergy.com](mailto:Jon.Trujillo@calenergy.com)>; Madams, Sarah <[Sarah.Madams@jacobs.com](mailto:Sarah.Madams@jacobs.com)>; Xayachack, Lindsey <[Lindsey.Xayachack@jacobs.com](mailto:Lindsey.Xayachack@jacobs.com)>; King, Morgan <[Morgan.King10@jacobs.com](mailto:Morgan.King10@jacobs.com)>

**Subject:** [EXTERNAL] Sonny Bono Wildlife Refuge

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Hi Mr. Shore,

I am under contract with BHE Renewables, working on three geothermal power plants (Black Rock, Elmore North, and Morton Bay) near the refuge (see the image below). We have submitted Applications for Certification (a California Environmental Quality Act-equivalent process) to the California Energy Commission for these project and they have requested survey data for Desert pupfish. Does the refuge

have or perform surveys for Desert pupfish surveys or have survey data that we can share with the California Energy Commission?



Thanks,

**Jerry Salamy** | [Jacobs](#) | Project Manager  
M:+916.769.8919 | [jerry.salamy@jacobs.com](mailto:jerry.salamy@jacobs.com)  
2485 Natomas Park Drive, Suite 600 | Sacramento, CA 95833 | USA  
**Upcoming PTO - May 9<sup>th</sup> and June 12<sup>th</sup> to June 20<sup>th</sup>**

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**From:** [Banks, Rose@Wildlife](mailto:Banks,Rose@Wildlife)  
**To:** [King, Morgan](mailto:King,Morgan); [Rodriguez, Magdalena@Wildlife](mailto:Rodriguez,Magdalena@Wildlife)  
**Subject:** [EXTERNAL] RE: BHER - BUOW Technical Memorandum  
**Date:** Friday, June 16, 2023 9:35:34 AM

---

Hi Morgan,

Thanks for incorporating those revisions. CDFW has no further comments or edits on the proposed plans.

Rose

Rose Banks  
California Department of Fish and Wildlife  
(760) 218-0022 cell

---

**From:** King, Morgan <[Morgan.King10@jacobs.com](mailto:Morgan.King10@jacobs.com)>  
**Sent:** Friday, June 9, 2023 1:26 PM  
**To:** Rodriguez, Magdalena@Wildlife <[Magdalena.Rodriguez@wildlife.ca.gov](mailto:Magdalena.Rodriguez@wildlife.ca.gov)>; Banks, Rose@Wildlife <[Rose.Banks@wildlife.ca.gov](mailto:Rose.Banks@wildlife.ca.gov)>  
**Subject:** RE: BHER - BUOW Technical Memorandum

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Hello Magdalena,

I revised the attached technical memorandum based on your comments/questions.

Thank you,  
Morgan

**Morgan King** | [Jacobs](#) | Biologist | M: +1.916.335.9141

---

**From:** Rodriguez, Magdalena@Wildlife <[Magdalena.Rodriguez@wildlife.ca.gov](mailto:Magdalena.Rodriguez@wildlife.ca.gov)>  
**Sent:** Wednesday, June 7, 2023 4:00 PM  
**To:** King, Morgan <[Morgan.King10@jacobs.com](mailto:Morgan.King10@jacobs.com)>; Banks, Rose@Wildlife <[Rose.Banks@wildlife.ca.gov](mailto:Rose.Banks@wildlife.ca.gov)>  
**Subject:** [EXTERNAL] RE: BHER - BUOW Technical Memorandum

Morgan,

Attached are my comments/questions.

Thank You,

Magdalena

---

**From:** King, Morgan <[Morgan.King10@jacobs.com](mailto:Morgan.King10@jacobs.com)>  
**Sent:** Wednesday, June 7, 2023 6:13 AM  
**To:** Rodriguez, Magdalena@Wildlife <[Magdalena.Rodriguez@wildlife.ca.gov](mailto:Magdalena.Rodriguez@wildlife.ca.gov)>; Banks, Rose@Wildlife <[Rose.Banks@wildlife.ca.gov](mailto:Rose.Banks@wildlife.ca.gov)>  
**Subject:** RE: BHER - BUOW Technical Memorandum

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Thank you Magdalena!

An update to BUOW breeding season survey:

1. Biologists are *already* conducting BHER breeding season surveys **this week**. It's going great and they are documenting lots of young!
2. After a three week window – we have a second survey scheduled before July 15.
3. We have a third survey scheduled before August 31.

Thank you,  
Morgan

**Morgan King** | [Jacobs](#) | Biologist | M: +1.916.335.9141

---

**From:** Rodriguez, Magdalena@Wildlife <[Magdalena.Rodriguez@wildlife.ca.gov](mailto:Magdalena.Rodriguez@wildlife.ca.gov)>  
**Sent:** Tuesday, June 6, 2023 4:02 PM  
**To:** King, Morgan <[Morgan.King10@jacobs.com](mailto:Morgan.King10@jacobs.com)>; Banks, Rose@Wildlife <[Rose.Banks@wildlife.ca.gov](mailto:Rose.Banks@wildlife.ca.gov)>  
**Subject:** [EXTERNAL] RE: BHER - BUOW Technical Memorandum

Morgan,

Thanks for the reminder. I will get you our comments or edits tomorrow.

Magdalena Rodriguez

---

**From:** King, Morgan <[Morgan.King10@jacobs.com](mailto:Morgan.King10@jacobs.com)>  
**Sent:** Tuesday, June 6, 2023 9:59 AM  
**To:** Rodriguez, Magdalena@Wildlife <[Magdalena.Rodriguez@wildlife.ca.gov](mailto:Magdalena.Rodriguez@wildlife.ca.gov)>; Banks, Rose@Wildlife <[Rose.Banks@wildlife.ca.gov](mailto:Rose.Banks@wildlife.ca.gov)>  
**Subject:** BHER - BUOW Technical Memorandum

---

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Hello Magdalena,

I apologize for being a bother, but have you had a chance to review the attached burrowing owl information?

Thank you,  
Morgan

**Morgan King** | [Jacobs](#) | Biologist | M: +1.916.335.9141

---

**From:** King, Morgan

**Sent:** Friday, June 2, 2023 9:49 AM

**To:** Xayachack, Lindsey <[Lindsey.Xayachack@jacobs.com](mailto:Lindsey.Xayachack@jacobs.com)>; Rodriguez, Magdalena@Wildlife <[Magdalena.Rodriguez@wildlife.ca.gov](mailto:Magdalena.Rodriguez@wildlife.ca.gov)>; Banks, Rose@Wildlife <[Rose.Banks@wildlife.ca.gov](mailto:Rose.Banks@wildlife.ca.gov)>

**Cc:** Salamy, Jerry <[jerry.salamy@jacobs.com](mailto:jerry.salamy@jacobs.com)>; Payne, Christy <[Christy.Payne@jacobs.com](mailto:Christy.Payne@jacobs.com)>

**Subject:** BHER - BUOW Technical Memorandum

Hello Magdalena,

Per your request, here is a short technical memorandum describing the burrowing owl methods and results of the 2022 surveys and the proposed methodology for 2023-2024 breeding season surveys. This memo includes figures of the three sites as well as resumes of the primary biologists who conducted the surveys.

Thank you for your consideration,  
Morgan

**Morgan King** | [Jacobs](#) | Biologist | Federal & Environmental Solutions | M: +1.916.335.9141  
| [morgan.king10@jacobs.com](mailto:morgan.king10@jacobs.com)

-----Original Appointment-----

**From:** Xayachack, Lindsey <[Lindsey.Xayachack@jacobs.com](mailto:Lindsey.Xayachack@jacobs.com)>

**Sent:** Friday, May 26, 2023 10:55 AM

**To:** Xayachack, Lindsey; Rodriguez, Magdalena@Wildlife; Banks, Rose@Wildlife

**Cc:** King, Morgan; Salamy, Jerry; Payne, Christy; Santolo, Gary

**Subject:** BUOW Discussion

**When:** Thursday, June 1, 2023 9:30 AM-10:00 AM (UTC-08:00) Pacific Time (US & Canada).

**Where:** Microsoft Teams Meeting

Hi All,

Updated this time to accommodate schedule conflicts – as mentioned below, an agenda will be provided prior to this meeting.



Best,

**Lindsey Xayachack** | [Jacobs](#) | Scientist  
M: + 530.262.9732 | [lindsey.xayachack@jacobs.com](mailto:lindsey.xayachack@jacobs.com)  
2525 Airpark Drive | Redding, CA 96001 | USA

---

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Video Conference ID: 111 080 524 8  
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---

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**From:** Xayachack, Lindsey

**Sent:** Friday, May 26, 2023 10:48 AM

**To:** Rodriguez, Magdalena@Wildlife <[Magdalena.Rodriguez@wildlife.ca.gov](mailto:Magdalena.Rodriguez@wildlife.ca.gov)>; Banks, Rose@Wildlife <[Rose.Banks@wildlife.ca.gov](mailto:Rose.Banks@wildlife.ca.gov)>

**Cc:** King, Morgan <[Morgan.King10@jacobs.com](mailto:Morgan.King10@jacobs.com)>; Salamy, Jerry <[jerry.salamy@jacobs.com](mailto:jerry.salamy@jacobs.com)>; Payne, Christy <[Christy.Payne@jacobs.com](mailto:Christy.Payne@jacobs.com)>; Santolo, Gary <[gary.santolo@jacobs.com](mailto:gary.santolo@jacobs.com)>

**Subject:** RE: BUOW Discussion

Hi Magdalena,

Thank you for the prompt response!

We'll send out a MS Teams invite for Thursday, June 1<sup>st</sup> @ 12:00pm-1:00pm, and will provide an agenda prior to the call.

Best,

**Lindsey Xayachack** | [Jacobs](#) | Scientist  
M: + 530.262.9732 | [lindsey.xayachack@jacobs.com](mailto:lindsey.xayachack@jacobs.com)  
2525 Airpark Drive | Redding, CA 96001 | USA

---

**From:** Rodriguez, Magdalena@Wildlife <[Magdalena.Rodriguez@wildlife.ca.gov](mailto:Magdalena.Rodriguez@wildlife.ca.gov)>  
**Sent:** Friday, May 26, 2023 10:44 AM  
**To:** Xayachack, Lindsey <[Lindsey.Xayachack@jacobs.com](mailto:Lindsey.Xayachack@jacobs.com)>; Banks, Rose@Wildlife <[Rose.Banks@wildlife.ca.gov](mailto:Rose.Banks@wildlife.ca.gov)>  
**Cc:** King, Morgan <[Morgan.King10@jacobs.com](mailto:Morgan.King10@jacobs.com)>; Salamy, Jerry <[Jerry.Salamy@jacobs.com](mailto:Jerry.Salamy@jacobs.com)>; Payne, Christy <[Christy.Payne@jacobs.com](mailto:Christy.Payne@jacobs.com)>; Santolo, Gary <[Gary.Santolo@jacobs.com](mailto:Gary.Santolo@jacobs.com)>  
**Subject:** [EXTERNAL] RE: BUOW Discussion

We are available from 9:30-10:00 or 12-1pm. Can you send an agenda or questions that you would like to discuss?

Thanks,

Magdalena

---

**From:** Xayachack, Lindsey <[Lindsey.Xayachack@jacobs.com](mailto:Lindsey.Xayachack@jacobs.com)>  
**Sent:** Friday, May 26, 2023 8:25 AM  
**To:** Rodriguez, Magdalena@Wildlife <[Magdalena.Rodriguez@wildlife.ca.gov](mailto:Magdalena.Rodriguez@wildlife.ca.gov)>; Banks, Rose@Wildlife <[Rose.Banks@wildlife.ca.gov](mailto:Rose.Banks@wildlife.ca.gov)>  
**Cc:** King, Morgan <[Morgan.King10@jacobs.com](mailto:Morgan.King10@jacobs.com)>; Salamy, Jerry <[Jerry.Salamy@jacobs.com](mailto:Jerry.Salamy@jacobs.com)>; Payne, Christy <[Christy.Payne@jacobs.com](mailto:Christy.Payne@jacobs.com)>; Santolo, Gary <[Gary.Santolo@jacobs.com](mailto:Gary.Santolo@jacobs.com)>  
**Subject:** BUOW Discussion

Some people who received this message don't often get email from [lindsey.xayachack@jacobs.com](mailto:lindsey.xayachack@jacobs.com). [Learn why this is important](#)

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Hello,

Are both of you able to join a 30-minute call regarding burrowing owls on Thursday, June 1<sup>st</sup> within the timeframes listed below?

- 9:30am-11:30am
- 12:00am-1:00pm

Best,

**Lindsey Xayachack** | [Jacobs](#) | Scientist  
M: + 530.262.9732 | [lindsey.xayachack@jacobs.com](mailto:lindsey.xayachack@jacobs.com)  
2525 Airpark Drive | Redding, CA 96001 | USA

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