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Data Adequacy Supplement Set 2

Submitted to
California Energy Commission

Prepared by
Elmore North Geothermal LLC

With assistance from
Jacobs

Elmore North Geothermal Project
(23-AFC-02)
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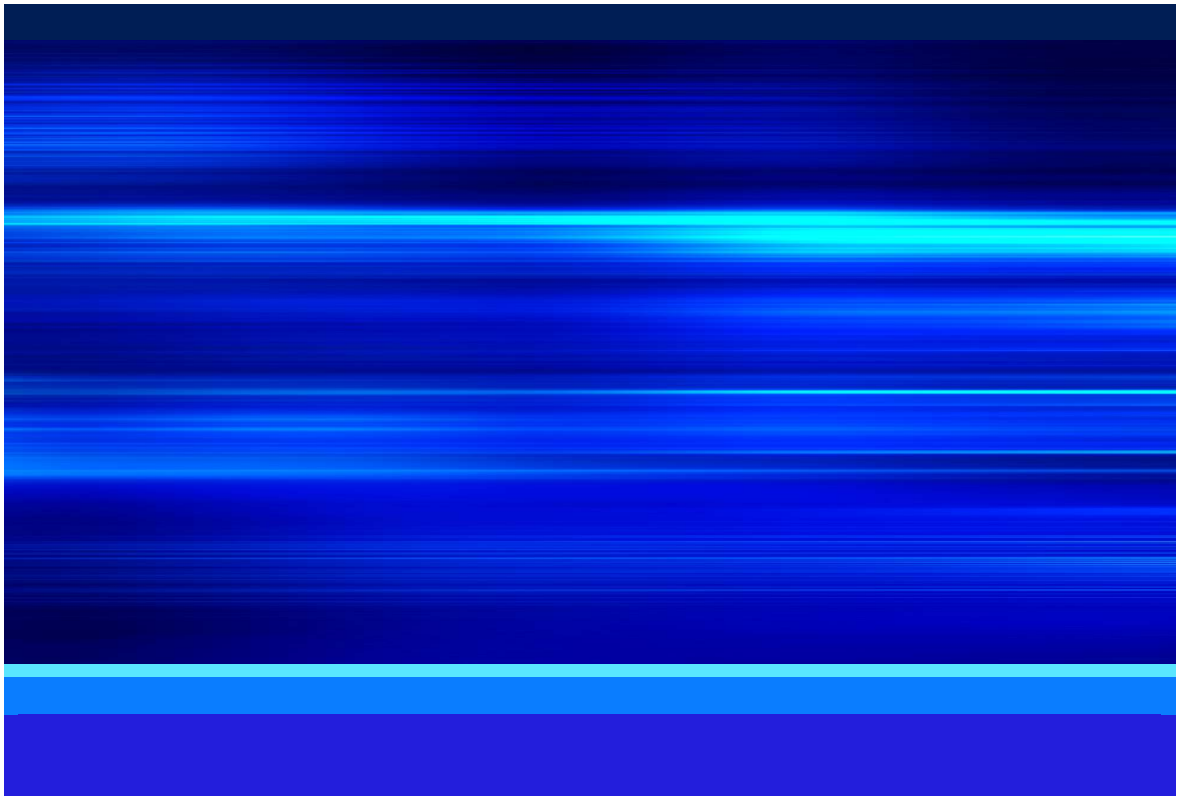

Introduction

This Data Adequacy Supplement Set 2 ("Supplement Set 2") to Elmore North Geothermal LLC's, an indirect, wholly owned subsidiary of BHE Renewables, LLC ("BHER"), Application for Certification ("AFC") for the Elmore North Geothermal Project (ENGP) (23-AFC-02) provides information in response to the California Energy Commission ("CEC" or "Commission") Staff 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 (CCR) 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 Elmore North 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
BRMIMP	Biological Resources Mitigation Implementation and Monitoring Plan
BSA	Biological Study Area
CEC	California Energy Commission
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CNDDB	California Natural Diversity Database
CNRA	California Natural Resources Agency
CPM	Compliance Project Manager
DA	Data Adequacy
dBA	A-weighted decibels
ENGP	Elmore North Geothermal Project
ESA	Federal Endangered Species Act
ICAPCD	Imperial County Air Pollution Control District
IID	Imperial Irrigation District
m	meters
PM_{10}	Particulate matter, diameter of 10 microns or less
RWQCB	Regional Water Quality Control Board
SBSSNWR	Sonny Bono Salton Sea National Wildlife Refuge
USACE	US Army Corps of Engineers
USFWS	United States Fish and Wildlife Service

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) *Please discuss AFC Page 5.1-40 potential impacts of geothermal steam flashing on avian species. Provide a thorough discussion of what steam flashing is, how high, how often, how long this occurs, ambient temperature, and its potential impacts on avian and/or bat species.*

Response: Steam is generated by introducing the geothermal fluid into a series of three enclosed process vessels that generate high pressure, standard pressure, and low pressure steam (see AFC Section 2 Project Description, Figure 2-2). The geothermal brine expands in the process vessels, resulting in the steam being released from the geothermal fluid. The steam is directed from the process vessels to the steam turbine generator to create electrical power. After passing through the steam turbine generator, the steam passes through the condenser where it is cooled/condensed into condensate for use in the cooling tower. The spent geothermal fluid that exits the process vessels passes through an atmospheric flash tank that reduces the fluid pressure before being processed in the primary/secondary clarifiers (also enclosed) before being re-injected into the geothermal resource. The steam flash process is not expected to impact avian species.

b) *Direct Impacts: Sections 5.2.2.26 and 5.2.2.3: Please use the following protocol to survey for special status rail species: USFWS (2017), Yuma Ridgway's Rail Survey Protocol for Project Evaluation, and submit a report. Please also discuss findings for CA black rail, as these were not discussed. Page 5.2-13 states no suitable habitat exists, e.g., cattails and bulrush, however, Page 5.2-18 states that North American Arid West Emergent Marsh, within the BSA buffer, occurs, and contains cattails and bulrush. Further, as this is a California Fully Protected Species and no take may occur, methods of 100 percent avoidance and minimization techniques must be demonstrated.*

Response: Appendix DA 5.2-1a (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).

These sites are in an area that has historically used the *Standardized North American Marsh Monitoring Protocol* (Conway 2011) and, hence, those survey methods were used for efficiency and compatibility rather than the *Yuma Ridgway's Rail Survey Protocol* (USFWS 2017). Per the U.S. Fish and Wildlife Service (USFWS) 2017 protocol:

> "To help survey efficiency, if a site has historically used the National Marsh Bird Protocol but is planned for a potential project, the format of the National Marsh Bird Protocol can still be done".

The ENGP is within the proposed development area (Figure 1, page 13, of the Sliwa and Conway 2022 report) that was assessed for potentially suitable marsh bird habitat. Suitable marsh bird habitat was identified in ENGP area (Figure 4, page 16, the Sliwa and Conway 2022 report). No occupied Ridgway's rail or California black rail habitat was documented in ENGP (Figure 8, page 20 the Sliwa and Conway 2022 report). See two excerpts from the technical report regarding Elmore North:

[Page 5 of the report] **Survey Locations:** Elmore North survey area (Fig. 4) is an 841-ha area with transmission lines throughout the proposed development area covering an additional 181 ha. The northern section of Elmore North is surrounded by land managed by the Sonny Bono Salton Sea National Wildlife Refuge (SBSSNWR). Areas south of Hatfield Road are dominated by active agriculture. North of Hatfield Road, proposed development areas overlapped with land currently managed by SBSSNWR. The section west of Garst Road and north of Hatfield Road is mostly bare ground with 2 patches predominantly consisting of salt cedar; however, cattails are present within these otherwise woody patches. This area is supported by irrigation ditches. East of Garst Road is the 272 ha Hazard Tract managed by SBSSNWR for waterfowl hunting. In spring and summer 2022, this area had no water, but consisted of large patches of dead cattails.

[Page 8 of the report] **Results:** There was no suitable breeding habitat for Yuma Ridgway's rails at the Elmore North area – the patches of marsh vegetation are too small and standing water is not always present. This area is not suitable to support nests or breeding activities for Yuma Ridgway's rails. However, surveys were conducted in this area just to be certain. No Yuma Ridgway's rails were detected at the Elmore North survey point locations during each of the 3 survey replicates (Table 3). The proximity of the 4 survey points to a nearby facility made it difficult to hear any birds that were >50-100 m away. Moreover, no marsh birds of any species were detected at the Elmore North site.

c) *Sections 5.2.2.2 and 5.2.2.3 must discuss and evaluate the impacts of the project on the adjacent Salton Sea National Wildlife Refuge, along which pipelines would run adjacent, as well as the Hazard Tract.*

Response: The potential temporary impacts to adjacent 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 ENGP 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 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 currently present. In addition, the Biological Study Area (BSA) is not within a 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 ENGP (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 ENGP 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 potential 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 ENGP 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 measures provided in Section 5.2.3.

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

Operation of the ENGP 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.

d) *Sections 5.2.2.2 and 5.2.2.3 relating to direct and indirect impacts must include the project's effects along the Alamo River. Section 5.2.3 offers no mitigation for foraging special status birds such as California brown pelican. Please consider and evaluate the impacts of loss of foraging habitat and whether mitigation is appropriate for impacted species such as foraging birds, American badger, etc., bats as a suite of species, and kit fox. Please further discuss if mitigation is necessary for the desert pupfish.*

Response: This section provides responses to several requests including Alamo River, California brown pelican, foraging habitat, and desert pupfish.

Alamo River: These sections provide a further discussion of the Alamo River. Figure DA 5.2-1 shows the location of Alamo River in proximity to ENGP (Appendix DA 5.2-1b). The Alamo River flows northwest through the middle of ENGP BSA and discharges into the Salton Sea (Figure DA 5.2-1). The Alamo River is impacted by "…urban and agricultural runoff, pollution, sedimentation, trash, and invasive species, rarely functioning as naturally flowing river. Much of the floodways…are populated with high-density invasive plant species including salt cedar…[and] giant reed. These species provide low habitat value for listed wildlife species, reduce water availability, increase fire risk in riparian zones, alter soil chemistry, and increase flood risk." (CNRA 2023). In the Project vicinity, the Alamo River was on average 50 feet across. No ENGP features cross the Alamo River. Three temporary disturbance areas are approximately 1,000 feet from the Alamo River (Figure DA 5.2-1) and do not impact any riparian vegetation, woodland, or shrubland associated with the Alamo River.

References California Natural Resources Agency (CNRA). 2023. Project: The Alamo and New Rivers Riparian Habitat and Restoration Planning and Permitting. Accessed on May 31, 2023 at: http://bondaccountability.resources.ca.gov/Project.aspx?ProjectPK=33048&PropositionPK=48

California brown pelican: California brown pelicans forage in two ways, plunge diving and sitting on water and scavenging for food. They are known to forage where the Alamo River discharges into the Salton Sea (CDFW n.d.) where lower water salinity provides suitable fish habitat. The Alamo River delta is located more than one mile northwest of the nearest ENGP feature (Appendix DA 5.2-1b). California brown pelican may forage by sitting on water in the Alamo River channel. The ENGP does not cross or impact the Alamo River. The nearest ENGP features (two borrow pits and one construction laydown parking lot) to the Alamo River are approximately 1,000 feet away (Appendix DA 5.2-1b). The ENGP would not have any expected impacts to California brown pelican foraging habitat in the Salton Sea or Alamo River channel.

Foraging habitat for American badger, birds, bats, and desert kit fox. A majority of the foraging habitat in ENGP BSA is agricultural lands. Permanent impacts to agriculture will be approximately 125 acres (see Table DA 5.2-1 excerpt below). The 125 acres is a relatively small area in comparison to the over 500,000 acres total agriculture in Imperial County (Census of Agriculture 2017).

Table DA 5.2-1 Temporary and Permanent Impacts to Vegetation Communities and Other Land Cover Types within the ENGP Biological Study Area

Vegetation Communities and Other Land Cover Types within the BSA	Impacts (acres)	
	Temporary	Permanent
Agriculture	979.01	125.93
Canals and Drains[a]	31.89	3.45
Developed	16.52	4.38
Disturbed with Vegetation	211.41	18.98
Disturbed with No Vegetation	76.69	6.54
Invasive Southwest Riparian Woodland and Shrubland	4.12	1.77
North American Arid West Emergent Marsh	1.06	0.00
North American Warm Desert Playa	31.09	31.90
Open Water	1.00	0.00
Total	**1,352.78**	**192.95**

[a] The proposed Project will not impact any irrigation infrastructure, including any canals and drains.

Foraging habitat that is permanently destroyed will be replaced at a ratio suitable for the protection of burrowing owls and managed for the protection of burrowing owls. Based on these ratios, the Project owner must protect and manage land for burrowing owls. The mitigation amount can be reduced if mitigation land for the same burrowing owls also is being provided for other suitable purposes (Note: Final burrowing owl mitigation needs can only be determined following Phase III (nesting) surveys and subsequent discussions with the resource agencies and CEC). This foraging habitat mitigation measure will also benefit other bird, bat, and mammal species who also forage in agricultural lands. Through implementation of Mitigation Measure *Closure, Revegetation and Rehabilitation Plan*, the temporary disturbance to foraging habitat (approximately 1,000 acres of agriculture) (see Table 5.2-7 above) will be revegetated or reverted to original function (for instance, active agriculture).

Closure, Revegetation and Rehabilitation Plan - The Project owner shall develop and implement a Closure, Revegetation and Rehabilitation Plan to guide site restoration of disturbed areas not being placed back into agricultural production immediately following construction. Restoration of disturbed areas may include reverting areas back to previous land use, such as agricultural production. The purpose of the plan shall be re-creation of the types of habitats lost during construction and operation of the proposed geothermal facility. The final plan shall include a cost estimate, adjusted for inflation, reflecting the costs of the revegetation and rehabilitation.

Mountain plover, American badger, desert kit fox: Although these species have low potential to occur in ENGP BSA, the proposed mitigation measure, shown below, *Preconstruction Surveys to Avoid Harassment or Harm* include pre-construction surveys for American badger, desert kit fox, Yuma hispid cotton rat, and birds protected by the Migratory Bird Treaty Act, which includes mountain plover. Excerpted here:

Preconstruction Surveys to Avoid Harassment or Harm - The Project owner will provide a preconstruction survey proposal in the Biological Resources Mitigation and Monitoring Plan (BRMIMP). The Compliance Project Manager (CPM), in consultation with the California Department of Fish and Wildlife (CDFW), the SBSSNWR, the USFWS, and any other appropriate agencies, will

determine the acceptability of the preconstruction survey protocols, the survey areas, and the Designated Biologist's prescriptions for potential impacts.

Prior to mobilization, the Project owner will conduct preconstruction surveys for burrowing owls at a level that establishes the occurrence and abundance of the species. Preconstruction surveys also will include burrowing mammal species, such as American badger, desert kit fox, and Yuma hispid cotton rat, and active nests of migratory birds during the nesting season (generally February 1 through August 31). The Designated Biologist will make recommendations to the Project owner to avoid or minimize impacts to the special-status species based on completed pre-construction surveys.

Special-status bats: Potential impacts to bats are 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. Several special-status bat species have potential to forage in the BSA in agricultural lands, riparian areas, and marshes. 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 Project area, 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.

Preventative Design Mitigation Features provides mitigation measures that reduces lighting, noise, and electrocution impacts to bird and bat species, excerpted below:

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 to greatest extent possible.
3. Shield pile-driving equipment from the Alamo River to maximize noise reduction for potentially occupied Yuma Ridgway's rail habitat.
4. Design, install, and maintain gen-tie lines and all electrical components to reduce the likelihood of electrocutions of birds by following *Suggested Practices for Avian Protection on Power Lines* (APLIC 2006).

Desert pupfish: Desert pupfish are restricted to Imperial Irrigation District (IID) managed drains, canals, and other channels. The ENGP will have no impact on IID canals and drains other than crossing with above ground pipes and gen-tie line. Based on data from CDFW and USFWS, desert pupfish are presumed present[1] in the Project vicinity (Appendix DA 5.2-1c submitted under request for a confidential designation). The Project will have no impact IID canals or drains. Terrestrial drilling,

[1] Jacobs, CDFW, and USFWS met on June 7, 2023 where agencies confirmed that desert pupfish surveys are not required because presence of desert pupfish is presumed. Attendee list: King, Morgan, Salamy, Jerry, Rasmussen, David, Xayachack, Lindsey, Rodriguez, Magdalena, Banks, Rose, Daniels, Warner (Brett), Land, Charley, Kowalski, Kent, Sirchia, Felicia, Menjivar, Stephanie, Davydova-Flores, Maria

construction, and permanent and temporary conversion of agricultural lands are not expected to result in take or any direct or indirect impacts of desert pupfish.

Table DA 5.2-2 provides 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[a]	Potential for Occurrence
Fish	Desert pupfish	*Cyprinodon macularis*	SE, FE	Presumed present (the Project has no impacts to canals or drains)
Bird	Burrowing owl	*Athene cunicularia*	SSC, BCC	Present
Bird	California brown pelican	*Pelecanus occidentalis californicus*	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	*Larus californicus*	WL[b], 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	*Accipiter cooperii*	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	Loggerhead shrike	*Lanius ludovicianus*	SSC, BCC	Low Potential
Bird	Long-billed curlew	*Numenius americanus*	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	*Charadrius montanus*	SSC, BCC	Low Potential
Bird	Short-eared owl	*Asio flammeus*	SSC, BCC	Low Potential
Bird	White-faced ibis	*Plegadis chihi*	WL[b]	Present. Species was incidentally observed during surveys; however, no suitable nesting habitat is present within

Class	Common Name	Scientific Name	Regulatory Status[a]	Potential for Occurrence
				the BSA. This species has potential to forage in the BSA.
Bird	Yellow warbler	*Setophaga petechia*	SSC, BCC	Low Potential
Mammal	American badger	*Taxidea taxus*	SSC, fur bearing mammal	Low Potential
Mammal	Big free-tailed bat	*Nyctinomops macrotis*	SSC	Low Potential (foraging only)
Mammal	Desert kit fox	*Vulpes macrotis arsipus*	Fur bearing mammal	Low Potential
Mammal	California leaf-nosed bat	*Macrotis californicus*	SSC	Low Potential (foraging only)
Mammal	Mexican long-tongued bat	*Choeronycteris maxicana*	SSC	Low Potential (foraging only)
Mammal	Pallid bat	*Antrozous pallidus*	SSC	Low Potential (foraging only)
Mammal	Pocketed free-tailed bat	*Nyctinomops femorosaccus*	SSC	Low Potential (foraging only)
Mammal	Spotted bat	*Euderma maculatum*	SSC	Low Potential (foraging only)
Mammal	Western mastiff bat	*Eumops perotis californicus*	SSC	Low Potential (foraging only)
Mammal	Western yellow bat	*Lasiurus xanthinus*	SSC	Low Potential (foraging only)
Mammal	Yuma hispid cotton rat	*Sigmodon hispidus eremicus*	SSC	Moderate Potential

a Regulatory Status

BCC – USFWS Bird of Conservation Concern

FE – USFWS federally endangered

FP – CDFW Fully Protected Species

SE – CDFW state endangered

SSC – CDFW Species of Special Concern

WL – CDFW Watch List Species

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

Desert pupfish. The desert pupfish is a small fish that lives 1 to 3 years in small, isolated populations within shallow, slow moving waters with sand-silt substrates (CDFW 2023). Habitat within and near the BSA is in IID canals and drains (Sirchia, pers. comm. 2023; Keeney, pers. comm. 2023). Often these shallow areas are a host to fluctuating conditions and can host high salinity, low oxygen, wide temperature swings, and increased pollutants. Desert pupfish have a high tolerance for these varying conditions

(USFWS 2010). Based on data from CDFW and USFWS, desert pupfish are presumed present in the project vicinity (Appendix DA 7.0d-2 submitted under confidential designation). The project will have no impact IID canals or drains. Terrestrial drilling, construction, and permanent and temporary conversion of agricultural lands are not expected to result in take or any direct or indirect impacts of desert pupfish.

Construction Impacts - Desert pupfish are restricted to IID managed drains, canals, and other channels. The ENGP will have no impact on IID canals and drains other than crossing with above ground pipes and gen-tie line. Potential construction impacts to desert pupfish include dust, soil from installation of features falling into canals or drains, and vibration from feature installation. The Applicant will use auger cast piles instead of impact or vibratory pile driving to eliminate the potential for hydroacoustic impacts to desert pupfish. Pipelines and gen-tie lines that cross occupied desert pupfish aquatic features will be placed as far back from the edge to the extent feasible. Best Management Practices (BMPs), such as straw wattles, watering to reduce dust, and other SWPPP management will be in place to reduce any construction related material entering the aquatic feature. Concrete wash outs will be placed on the power plant site, away from any aquatic features. Impacts to desert pupfish would be reduced to less than significant levels by implementation of preventative measures provided in AFC Section 5.2.3.

Operations Impacts - Operations of the facility is not expected to have any impacts to IID canals or drains or any desert pupfish occupied aquatic features.

Project features were specifically located to avoid impacts to aquatic resources, such as irrigation supply and drain canals, the Alamo River, and the Salton Sea. The irrigation and drain canals represent a major part of the IID's operational infrastructure and impacts to these features could affect their ability to service their customers. To this end, the Applicant has included design measures to avoid potential impacts to these aquatic resources. These measures include the following:

- Prepare and implement a construction stormwater pollution prevention plan identifying Best Management Practices to avoid stormwater and erosion control impacts
- Prepare and implement a fugitive dust control plan (consistent with ICAPCD requirements and the CEC's construction air quality construction mitigation measures)
- Access the construction, laydown/parking, borrow pit, and construction camp sites using existing crossings over supply and irrigation canals.
- When constructing pipelines over irrigation/drain canals or the Alamo River, construction equipment and work areas will be staged well away from the aquatic resources. The pipelines will be placed on support structures on either side of the canals with a crane to protect the canals.

Generation tie (gen-tie) towers will be located well away from IID canals or the Alamo River and conductors will be positioned to avoid aquatic resource impacts.

e) *Section 5.2.1.5 must discuss the mountain plover, why the species was dismissed from further consideration, and why surveys were not conducted. The CDFW should be consulted for guidance in survey necessity and performance, and records of these conversations provided, per Appendix B (g)(13)(H).*

Response: This section provides a further discussion of Mountain Plover.

Mountain Plover. Mountain plovers do not breed in California and are known to winter in Imperial County agricultural lands. Preferred wintering sites where this species can forage for insects in cracks are "fallow, grazed, or burned sites with mean vegetative heights of <[2.3 inches] 6 [centimeters] cm and <65% cover" (Shuford and Gardali 2008).

References: Shuford, W. D., and Gardali, T., editors. 2008. California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.

CDFW does not have survey protocols for mountain plover. Biologists conducted reconnaissance-level wildlife surveys to assess potentially suitable habitat for wildlife species and record incidental observations of wildlife in the ENGP BSA. No mountain plover breeding habitat is present in the ENGP BSA. Suitable winter foraging habitat is present in agricultural lands that are burned, grazed, or fallow and in some of the disturbed land cover areas (Appendix DA 5.2-1d). Impacts to wildlife foraging habitat was discussed below:

Development of the site is expected to represent a minimal loss of special-status wildlife species foraging habitat. Most Project impacts to foraging habitat will be temporary and the areas will revert to previous use post construction. Special-status bird and bat species could use similar foraging habitats in the Project vicinity as alternatives during construction and these habitats are not a limiting factor for these species. With implementation of mitigation measures, such as compensation for loss of burrowing owl foraging habitat, the impacts to biological resources will be less than significant.

Foraging habitat that is permanently destroyed will be replaced at a ratio suitable for the protection of burrowing owls and managed for the protection of burrowing owls. Based on these ratios, the Project owner must protect and manage land for burrowing owls. The mitigation amount can be reduced if mitigation land for the same burrowing owls also is being provided. (Note: Final burrowing owl mitigation needs can only be determined following Phase III (nesting) surveys and subsequent discussions with the resource agencies and CEC.)

Agency communications are provided in responses to Appendix B (g) (13) (H) below. The Applicant did not engage the agencies regarding mountain plover because no survey protocol exists and the known impacts to wintering foraging habitat were analyzed and mitigated. Although no suitable breeding habitat exists for mountain plover, pre-construction surveys are proposed for birds protected by the migratory bird treaty act in mitigation measure Section 5.2.3.8 *Preconstruction Surveys to Avoid Harassment or Harm* (see full mitigation measure text in bullet e) above).

8. Desert Pupfish Surveys - Appendix B (g) (13) (A) (i)

…species listed under state or federal Endangered Species Acts…

Information required to make AFC conform with regulations:

This listed species (desert pupfish) occurs within the project site and must be evaluated for impacts. Please also consider mitigation and cumulative impacts. If surveys are not performed for this species, please explain why and describe agency coordination involved in making that decision. Please see above Appendix (g)(13)(1) for additional data adequacy needs.

Response: Based on data from CDFW and USFWS, desert pupfish are presumed present in the Project vicinity and no surveys are necessary[2] (Appendix DA 5.2-1c submitted under confidential designation).

[2] Jacobs, CDFW, and USFWS met on June 7, 2023 where agencies confirmed that desert pupfish surveys are not required because presence of desert pupfish is presumed. Attendee list: King, Morgan, Salamy, Jerry, Rasmussen, David, Xayachack, Lindsey, Rodriguez, Magdalena, Banks, Rose, Daniels, Warner (Brett), Land, Charley, Kowalski, Kent, Sirchia, Felicia, Menjivar, Stephanie, Davydova-Flores, Maria

Desert pupfish are restricted to IID managed drains, canals, and other channels. The ENGP will have no impact on IID canals and drains other than crossing with above ground pipes and gen-tie line.

Please see response above to DA 7 Site Conditions and Species Discussion - Appendix (g)(13)(1) for a discussion on proposed avoidance and minimization measures.

9. Additional Species Analysis - 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 include species omitted (such as desert pupfish and mountain plover) as discussed further above in Appendix B (g)(13)(A)(i) and Appendix B (g)(13), foraging avian species such as California brown pelican, and potentially impacted bat species which are noted to forage over the site and occur in the area (see Appendix (g)(13)(1) for further direction).

Response: Please see above discussion provided in DA 7. Site Conditions and Species Discussion - Appendix B (g) (1) (d) for desert pupfish, mountain plover, California brown pelican, and special-status bat species.

10. Protocol Rail Surveys - 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:

Please specifically include methods of "protocol" rail surveys (note staff's previous objection to use of improper original protocol, Appendix B(g)(13)(1)); please also include methods and qualifications of performing biologists. Please also provide copies of CNDDB survey forms as available.

Response: The discussion below describes Yuma Ridgway's rail surveys, resumes, and California Natural Diversity Database (CNDDB) form submittal documentation.

Appendix DA 5.2-1a (submitted under 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).

These sites are in an area that has historically used the *Standardized North American Marsh Monitoring Protocol* (Conway 2011) and, hence, those survey methods were used for efficiency and compatibility rather than the *Yuma Ridgway's Rail Survey Protocol* (USFWS 2017). Per the USFWS 2017 protocol:

> "To help survey efficiency, if a site has historically used the National Marsh Bird Protocol but is planned for a potential project, the format of the National Marsh Bird Protocol can still be done".

The Yuma Ridgway's rail is a year-round resident of the Salton Sea region (USFWS 2018). These birds are secretive and prefer extensive and undisturbed marshes for foraging and nesting but are adaptable to a variety of ephemeral and disturbed wetland conditions (Garrett and Dunn 1981). The species has been documented historically in freshwater marshes along the Colorado River and along the southern and eastern ends of the Salton Sea. These areas contain stands of cattails (*Typha* sp.) and bulrush dissected by narrow channels of flowing water inhabited by crayfish (*Procambarus* sp.), this species' principal food. Prior to surveys, biologists identified and mapped the perimeter of all patches of suitable marsh and riparian habitat in the BSA. Agriculture lands and irrigation canals and drains are not suitable rail habitat (Sliwa 2022). This species is reported as uncommon at the SBSSNWR (USFWS 2018).

Under subcontract to Jacobs, University of Idaho Department of Fish and Wildlife biologists Kathryn Sliwa and Courtney Conway conducted habitat assessments of the ENGP BSA using the *Standardized North American Marsh Bird Monitoring Protocol* (Conway 2011). Suitable nesting habitat is largely absent within the BSA because of the dominance of agriculture and the related ongoing removal of cattails and bulrush from irrigation canals to improve water supplies. Prior to surveys, biologists identified and mapped the perimeter of all patches of suitable habitat (Sliwa 2022). There was no suitable breeding habitat for Yuma Ridgway's rails in the ENGP BSA and the patches of marsh vegetation are too small and standing water is not always present. This area is not suitable to support nests or breeding activities for Yuma Ridgway's rails. However, surveys were conducted in this area just to be certain. Four locations for call-broadcast surveys were selected from these areas and surveys were replicated three times. No Yuma Ridgway's rails or California black rails were detected at the ENGP survey point locations during each of the three survey replicates. Moreover, no marsh birds of any species were detected in the ENGP BSA.

No Yuma Ridgway's rails or California black rails were observed during protocol-level surveys in several locations within the BSA. The dominant land cover within the BSA is agriculture fields, most of which were being actively farmed at the time of the surveys. Agriculture fields are not suitable rail habitat (Sliwa 2022).

Appendix DA 5.2-2 provides the resumes of the two biologists who performed protocol-level marsh bird surveys at ENGP, Courtney Conway and Kathryn Sliwa.

CNDDB 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. This submittal includes 11 locations where Yuma Ridgway's rail were confirmed present at the adjacent proposed Morton Bay Geothermal Facility (located north of Elmore North).

11. 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:

a) *Desert pupfish must be evaluated for impacts fully, along with a discussion of avoidance, minimization, and mitigation measures. See above (g)(13)(A)(i). Rails (Yuma Ridgway's and California black) should also be surveyed for using appropriate protocol as previously noted.*

Response:

Desert pupfish: Based on data from CDFW and USFWS, desert pupfish are presumed present in the Project vicinity and no surveys are necessary[3] (Appendix DA 5.2-1c submitted under confidential designation). Desert pupfish are restricted to IID managed drains, canals, and other channels. The ENGP will have no impact on IID canals and drains other than crossing with above ground pipes and gen-tie line.

Please see response above to DA 7 Site Conditions and Species Discussion - Appendix (g)(13)(1) for a discussion on proposed avoidance and minimization measures.

Rails: No Yuma Ridgway's rail or California black rail were documented in ENGP during protocol-level rail surveys. Appendix DA 5.2-1a (under 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).

These sites are in an area that has historically used the *Standardized North American Marsh Monitoring Protocol* (Conway 2011) and, hence, those survey methods were used for efficiency and compatibility rather than the *Yuma Ridgway's Rail Survey Protocol* (USFWS 2017). Per the USFWS 2017 protocol:

"To help survey efficiency, if a site has historically used the National Marsh Bird Protocol but is planned for a potential project, the format of the National Marsh Bird Protocol can still be done".

b) Please provide discussions with agencies regarding the use of appropriate field survey protocols.

Response: Agency communications to date are provided in Appendix DA 5.2-3 .

The agencies were not consulted prior to 2022 surveys because biologists followed agency approved protocols or guidelines where available:

- **Botany** - Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities (CDFW 2018) and Guidelines for conducting and reporting botanical inventories for federally listed, proposed and candidate plants (USFWS 1996)
- **Burrowing Owl** - Staff Report on Burrowing Owl Mitigation (CDFG 2012)
- **Marsh Birds including Yuma Ridgway's rail** - Standardized North American Marsh Bird Monitoring Protocol (Conway 2011).

No survey protocol exists for several of the special-status wildlife species that have potential to occur in the ENGP BSA, such as American badger, desert kit fox, and Yuma hispid cotton rat. Biologists conducted reconnaissance-level wildlife surveys focusing on wildlife habitat assessment and to record observed wildlife species.

c) If no discussions occurred, please contact state and federal agencies to determine which survey protocols are appropriate for the species in the area where a protocol exists

[3] Jacobs, CDFW, and USFWS met on June 7, 2023 where agencies confirmed that desert pupfish surveys are not required because presence of desert pupfish is presumed. Attendee list: King, Morgan, Salamy, Jerry, Rasmussen, David, Xayachack, Lindsey, Rodriguez, Magdalena, Banks, Rose, Daniels, Warner (Brett), Land, Charley, Kowalski, Kent, Sirchia, Felicia, Menjivar, Stephanie, Davydova-Flores, Maria

Response: Agency communications to date are provided in Appendix DA 5.2-3.

12. 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:

a) *Pupfish are known to occur in canals and drainages in the area of the project. Impacts cannot be determined for desert pupfish since surveys were not conducted. There is no information in the AFC that specifies where this species occurs in relationship to the project in order to conclude that the project would have no impacts (direct and indirect) to this species. Please conduct surveys for desert pupfish and contact appropriate agencies to determine the most current survey protocols to use. Please include copies of all email correspondence and record of conversations.*

   Response: Consultation with the USFWS and CDFW indicate the Applicant should assume presence of pupfish in IID drain canals. Agency communications to date are provided in Appendix DA 5.2-3.

b) *There is no discussion of the Sonny Bono Salton Sea National Wildlife Refuge or the Imperial Wildlife Area, Hazard Tract and the species that occur at these. They are adjacent to the site and linears and contain a variety of wildlife species that are species of special concern. Please provide a discussion of the Sonny Bono Salton Sea National Wildlife Refuge, the Imperial Wildlife Area, and the Hazard Tract, and possible impacts to these areas from the project and impacts to species from project activities.*

   Response: Descriptions of SBSSNWR (which also apply to Imperial Wildlife Area) seasonal abundance (USFWS 2018) are provided in specific wildlife species descriptions. AFC Section 5.2.1.5.3 Special-Status Wildlife where SBSSNWR seasonal abundance (USFWS 2018) is discussed for those species with high or moderate potential to occur is excerpted below:

   Desert pupfish. The desert pupfish is a small fish that lives 1 to 3 years in small, isolated populations within shallow, slow moving waters with sand-silt substrates (CDFW 2023). Habitat within and near the BSA is in IID canals and drains (Sirchia, pers. comm. 2023; Keeney, pers. comm. 2023). Often these shallow areas are a host to fluctuating conditions and can host high salinity, low oxygen, wide temperature swings, and increased pollutants. Desert pupfish have a high tolerance for these varying conditions (USFWS 2010). Based on data from CDFW and USFWS, desert pupfish are presumed present. No USFWS designated critical habitat is present in the BSA.

   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; 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 curlew 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, Special-Status Wildlife with the Potential for Occurrence provides SBSSNWR seasonal abundance information for each species that are listed in the SBSSNWR *Wildlife List* (USFWS 2018). Several of the species from our database query do not occur (no suitable habitat) in or at the SBSSNWR, such as Mojave desert tortoise. Therefore, no SBSSNWR seasonal abundance information is provided in the Potential for Occurrence column for those species.

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

Common Name	Scientific Name	CESA/ESA	CDFW Status[a]	Other Status[b]	Habitat Requirements	Potential for Occurrence
Invertebrates						
Monarch butterfly	*Danaus plexippus*	None/FC	None	None	Migratory invertebrate. Monarchs in the southwest live in canyons or riparian areas. They lay their eggs on milkweed (Asclepias 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	*Cyprinodon macularius*	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 vicintiy, but the project will not impact any water ways.
Razorback sucker	*Xyrauchen texanus*	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	*Scaphiopus couchii*	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	*Phrynosoma mcallii*	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	*Lithobates yavapaiensis*	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	*Gopherus agassizii*	ST[d]/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	*Incilius alvarius*	None	SSC	None	Breeds in temporary pools and irrigation ditches along the Colorado River and Southern Imperial Valley.	Not Expected. One historical CNDDB occurrence from 1916, possibly extirpated. The project will not impact any water ways.
Birds						
Black skimmer	*Rynchops niger*	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 CNDDB occurrence from 1998.
Black-tailed gnatcatcher	*Polioptila melanura*	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 CNDDB occurrences from 1968 and before. This species is uncommon to fairly common in the Refuge.
Burrowing owl	*Athene cunicularia*	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. CNDDB occurrences of this species in the BSA.
California black rail	*Laterallus jamaicensis coturniculus*	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.

California brown pelican	*Pelecanus occidentalis californicus*	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. Nesting colonies also known from mouth of the Alamo River. Forages on open water of Salton Sea. CNDDB records of this species in BSA vicinity. This species was not observed during biological surveys of the BSA.
California gull	*Larus californicus*	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 CNDDB occurrence from 1999 and before. This species is common to abundant in the Refuge year-round.
Cooper's hawk	*Accipiter cooperii*	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. This species is reported as uncommon in the Refuge. This species was incidentally observed during biological surveys of BSA.
Crissal thrasher	*Toxostoma crissale*	None	SSC	None	Resident of southeastern deserts in desert riparian and desert wash habitats	Not Expected: Historical CNDDB 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	*Melanerpes uropygialis*	SE/None	None	USFWS - BCC	In California, inhabits cottonwoods and other desert riparian trees, shade trees and date palms.	Not Expected. Historical CNDDB 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	*Junco hyemalis caniceps*	None	WL	None	Summer resident of Clark Mountain (Eastern San Bernardino county) and Grapevine mountains (Inyo county). Nesting only.	Not Expected. Historical CNDDB occurrence from 1957. This species is rare to very uncommon in the Refuge.
Gull-billed tern	*Gelochelidon nilotica*	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 CNDDB occurrences from 1998 are present in BSA vicinity.
Le Conte's thrasher	*Toxostoma lecontei*	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. CNDDB occurrence from 2009 in Refuge, but Refuge lists this species as extirpated breeding habitat.
Loggerhead shrike	*Lanius ludovicianus*	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. CNDDB occurrence from 2007. The Refuge lists this species as occasional.
Long-billed Curlew	*Numenius americanus*	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 CNDDB. Excluding the summer, long-billed curlew are reported as being common to abundant at the Refuge.
Merlin	*Falco columbarius*	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. CNDDB occurrences in desert scrub east of the BSA. Rare to very uncommonly present in Refuge.

Mountain plover	*Charadrius montanus*	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 CNDDB 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	*Asio flammeus*	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 CNDDB occurrence of this species from 1956. This species is rare to occasionally observed in the Refuge.
Southwestern willow flycatcher	*Empidonax traillii extimus*	SE/FE	None	None	Inhabits riparian woodlands in southern California.	Not Expected: No suitable habitat in BSA. One CNDDB occurrence in vicinity from 2007, and not reported from occurring in the Refuge.
Western Snowy Plover	*Charadrius alexandrinus nivosus*	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 CNDDB occurrence of this species from 1999. This species is uncommon to fairly common in the Refuge.
White-faced Ibis	*Plegadis chihi*	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 CNDDB occurrence from 1980. This species is common to abundant at the Refuge.
Yellow warbler	*Setophaga petechia*	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 CNDDB 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	*Icteria virens*	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 CNDDB occurrences of this species from the 1960s. This species is rare to very uncommon in the Refuge.
Yuma Ridgway's rail	*Rallus obsoletus yumanensis*	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	*Taxidea taxus*	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 CNDDB 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	*Nyctinomops macrotis*	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 CNDDB 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	*Ovis canadensis nelsoni*	None	FP	None	Widely distributed from the White Mountains in Mono County to the Chocolate Mountains in Imperial County.	Not Expected: Historical CNDDB occurrence from 1986 near Chocolate Mountains. No suitable habitat in the BSA.
Desert kit fox	*Vulpes macrotis arsipus*	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 CNDDB 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	*Macrotis californicus*	None	SSC	None	Roost in caves, mines and buildings. Utilizes desert riparian habitat.	Low Potential. No CNDDB 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	*Choeronycteris maxicana*	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 CNDDB 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	*Antrozous pallidus*	None	SSC	None	Inhabits rocky canyons, open farmland, scattered desert scrub, grassland, shrubland, woodland, and mixed conifer forest.	Low Potential. Historical CNDDB 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.
Pocketed free-tailed bat	*Nyctinomops femorosaccus*	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 CNDDB 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	*Euderma maculatum*	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 CNDDB 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	*Eumops perotis californicus*	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 CNDDB 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	*Lasiurus xanthinus*	None	SSC	None	Found in valley foothill riparian, desert riparian, desert wash and palm oasis habitats.	Low Potential. Historical CNDDB 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	*Sigmodon hispidus eremicus*	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. CNDDB 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 CNDDB query but were not included in this analysis because their only special-status listing is International Union for Conservation of Nature least concern.
[a] CDFW Status
[b] Other Status
CESA = California Endangered Species Act

f

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
c Potential for Occurrence definitions are provided in the body text (Section 5.2.1.5)

d 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).

Air Quality: The air quality impacts were assessed from construction and operation of the ENGP 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_{10}). 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_{10}, the Project area's background PM_{10} concentrations already exceed the California AAQS and ENGP construction contributes approximately 14.5% of the AAQS for this finite and temporary activity (see AFC Table 5.1-33). To reduce the PM_{10} 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 ($PM_{2.5}$) and ozone to 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_{10}. 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_{10}, the Project area's background PM_{10} concentrations already exceed the California AAQS and the ENGP contributes approximately 9.4% 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 ($PM_{2.5}$) 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 no significant changes to sensitive habitats.

13. Proposed Measures - 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:

a) *Section 5.2.3.8 must include specifics of duration, frequency, and timing of preconstruction nesting bird surveys. Preconstruction surveys similarly for species such as the desert kit fox, the Species of Special Concern Yuma hispid cotton rat, burrowing owl, and the American badger typically have standardized protocols, including evacuation (if necessary) of occupied burrows or dens. Without this information, staff cannot evaluate proposed measures or their ultimate effectiveness in reducing impacts to species.*

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 burrowing owl surveys in the BSA plus 100-meter buffer are currently being conducted in accordance with the *Staff Report on Burrowing Owl Mitigation* (CDFG 2012; Appendix DA 5.2-4) guidelines and in coordination with CDFW (Appendix DA 5.2-3) as described below:

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. Results from breeding season surveys will be used to quantify mitigation and impacts to burrowing owls.

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* (CDFW 2012; Appendix DA 5.2-4). This plan will define exclusion techniques, such as installing one-way doors in burrow openings during the non-breeding season. Excerpted below:

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* (CDFW 2012; Appendix DA 5.2-4). 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.

Pre-construction surveys will also establish buffer distances based on recommendations in the *Staff Report on Burrowing Owl Mitigation* (CDFW 2012; Appendix DA 5.2-4). Excerpted below:

> 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)

Birds Protected by Migratory Bird Treaty Act: The Applicant has proposed pre-construction surveys in Mitigation Measure *Preconstruction 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 5.2-4.
- Active nests will be monitored to ensure that measures are being employed to minimize disturbance to nesting birds.

Table DA 5.2-4. Agency Approved Nest Exclusion Buffers During Construction

Avian Group (nest type/ location)	Species Potentially Nesting Within ENGP	Minimum Buffers for Ground Construction Per Disturbance Level (feet)
Waterfowl and rails	Canada goose, wood duck, mallard, cinnamon teal, ruddy duck, Virginia rail, sora, American coot, pied-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, black-crowned night-heron	250
Birds of prey (Category 1)	American kestrel, barn owl, western screech-owl	300

Avian Group (nest type/ location)	Species Potentially Nesting Within ENGP	Minimum Buffers for Ground Construction Per Disturbance Level (feet)
Birds of prey (Category 2)	Cooper's hawk, red-tailed hawk red-shouldered hawk, great horned owl, burrowing owl	300
Birds of prey (Category 3)	Turkey vulture, red-tailed hawk (2; some rural/ remote), 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-dove	150
Roadrunners	Greater roadrunner	300
Nightjars	Lesser nighthawk, common poorwill	150
Swifts	White-throated swift	200
Hummingbirds	Black-chinned hummingbird, Anna's hummingbird, Costa's hummingbird, Allen's hummingbird	100
Woodpeckers	Acorn woodpecker, ladder-backed woodpecker, Nuttall's woodpecker, downy woodpecker, north- ern flicker	150
Passerines (cavity and 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 (bridge, culvert, and building nesters)	Black phoebe, Say's phoebe, northern rough-winged swallow, cliff swallow, barn swallow, house finch (3)	100
Passerines (ground nesters, open habitats)	Horned lark, rock wren, western meadowlark, orange-crowned warbler, lark sparrow, grasshopper sparrow	150
Passerines (understory and 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 DA 7 Appendix B (g) (1) (b) above.

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 5.2.3.8

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.

b) *Section 5.2.3 must also contain a detailed revegetation and weed monitoring plan for temporarily disturbed areas; as weed proliferation in this area can be prevalent and is the responsibility of the project owner to control.*

Response: It is anticipated the Closure, Revegetation and Rehabilitation Plan and Weed Management Plan will be developed during the AFC process and will include the following components:

Closure, Revegetation and Rehabilitation Plan: The Project owner will develop and implement a Closure, Revegetation and Rehabilitation Plan to guide site restoration of disturbed areas not being put back into agricultural production, immediately following construction. Restoration of disturbed areas may include reverting areas back to previous land use, such as agricultural production. The purpose of the plan will be re-creation of the types of habitats lost during construction and operation of the proposed geothermal facility. The final plan will include a cost estimate, adjusted for inflation, reflecting the costs of the revegetation and rehabilitation.

Weed Management Plan: Project owner will develop and implement a Weed Management Plan for those areas not being placed back into agricultural production. The purpose of this plan is to prevent invasive plant species (as defined by the U.S. Department of Agriculture) from establishing themselves in the temporary disturbance areas. The Weed Management Plan will describe weed eradication and control methods, and a reporting plan for weed management during and after construction, and shall include at least the following Best Management Practices to prevent the spread and propagation of weed species:

1. Limit the size of any vegetation and/or ground disturbance to the absolute minimum, and limit ingress and egress to defined routes.
2. Maintain vehicle wash and inspection stations and closely monitor the types of materials brought onto the site.

3. Reestablish vegetation quickly on disturbed sites.
4. Monitoring and rapid implementation of control measures to ensure early detection and eradication for weed invasions.
5. Use only weed-free straw or hay bales used for sediment barrier installations and weed-free seed.

c) *Section 5.2.3.6 #2, please rectify the necessity and application of this measure against Section 5.2.2.2.7, as staff is unclear which, if any, wetlands or jurisdictional features might be adversely impacted due to conflicting statements in the AFC (Section 5.2.3.6#2 versus Sections 5.2.2.2.7 and 5.2.2.3.4).*

Response: No impacts to wetlands or jurisdictional features are expected for the ENGP.

d) *This section should also contain a Closure, Revegetation, and Rehabilitation plan, as well as financial securities for such an effort.*

Response: See the response to Item b) above.

14. Compensatory Habitat Proposal for Burrowing Owl - 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:

a) *Section 5.2.3.12 must be enhanced with specific details that subsequently allow for evaluation of the compensatory habitat proposal for burrowing owl. Such details include but are not limited to: reference of appropriate agency guidance, passive relocation measures, financial securities measures for in-perpetuity land management, compensation land selection criteria, etc.*

Response: Breeding season burrowing owl surveys are currently being conducted in the BSA plus 100-meter buffer in accordance with the *Staff Report on Burrowing Owl Mitigation* (CDFG 2012; Appendix DA 5.2-4) guidelines and in coordination with CDFW (Appendix DA 5.2-3). These survey results will quantify mitigation and potential impacts to burrowing owls. 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 5.2-4).

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 of the 2012 CDFG report, 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 of the 2012 CDFG report) 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 for areas not being placed back into agricultural production. 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 owner 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. Jacobs 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 125.93 acres of agricultural land.

b) Section 5.2.3 must identify contacts for compensation habitat and management.

Response: 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 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
310-795-5616

15. Design Features of Steam Flashing - Appendix B (g) (13) (F) (iii)

Design features to better disperse or eliminate a thermal discharge;

Information required to make AFC conform with regulations:

If available, please provide design features to disperse or eliminate the thermal discharge from steam flashing (Section 5.2.3.6).

Response: As noted in the response to DA 7, Appendix B (g) (1), steam flashing occurs within enclosed process vessels and steam produced from the flash process is condensed after passing though the steam turbine generator. Under normal operating conditions, steam is not released to the atmosphere in an uncontrolled manner.

16. Agency Communications and Permits Required - 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:

Please 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 Wildlife, and the Regional Water Quality Control Board will be required for the proposed project. These may include, for this project, a Section 401/404 from USACE or special status Incidental Take permits from the USFWS and/or CDFW.

Response: Agency communications to date are provided in Appendix DA 5.2-3.

17. 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:

Please contact all the appropriate agencies and then provide an updated contact list. Staff has made inquiries and discovered the initial contacts for CDFW and USFWS. The CDFW contacts are Tonya Marshall, Magdalena Rodriguez, and Alisa Ellsworth. USFWS contacts are Vincent James and Felicia Sirchia. These may not be the individuals who actually review the project but may instead oversee staff who do.

Please explain/discuss which agencies were contacted and if not, why they were not contacted.

Response: Agency communications to date are provided in Appendix DA 5.2-3. The updated agency contact list is provided in Table DA 5.2-5, below:

Table DA 5.2-5. Agency Contacts for Biological Resources

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

18. 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:

Please provide 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.

As previously mentioned, staff believes the wrong survey protocol was used for listed rail species. These would entail state Fish and Game Code Section 2081 and federal ESA Section 7 or 10.

Response: The project will not require any other permits. Therefore, a permit schedule is not necessary.

Desert pupfish: The ENGP has no potential for take of desert pupfish. The potential Project impacts will be analyzed and mitigation measures will be proposed to reduce impacts to less than significant.

Waters and wetlands: No impacts to waters or wetlands are anticipated.

Yuma Ridgway's rail: Protocol-level marsh bird surveys did not detect any Yuma Rigdway's rail, California black rail, or suitable nesting or breeding habitat in the ENGP BSA (Appendix DA 5.2-1a). No permits for impacts to these species are necessary.

For additional discussion on this topic, please refer to DA 7, Site Conditions and Species Discussion - Appendix B (g) (13) (D) above.

5.7 Noise and Vibration

25. 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.

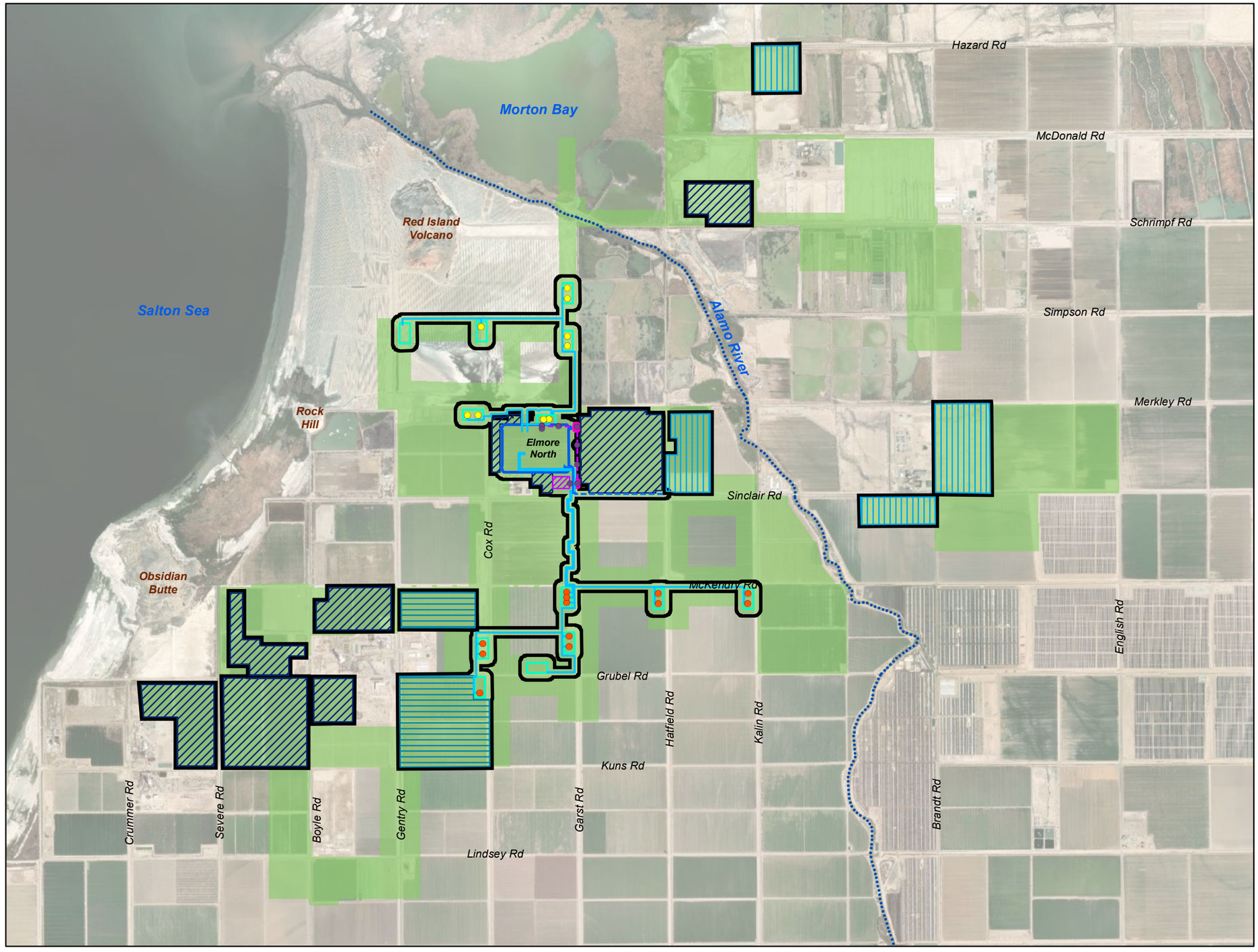
Information required to make AFC conform with regulations:

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: ENGP's predicted noise impacts, including all steady-state operating equipment, at the nearest human receptor site is predicted to be 60 dBA.

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

Appendix DA 5.2-1b
Biological Study Area



Legend

- Biological Study Area
- Biological Survey 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

Note: A portion of the eastern borrow pit was removed from the project area.

N

0 0.25 0.5 1
Miles

Figure DA 5.2-1b
Biological Study Area
Elmore North Geothermal Project
Imperial County, California

Jacobs

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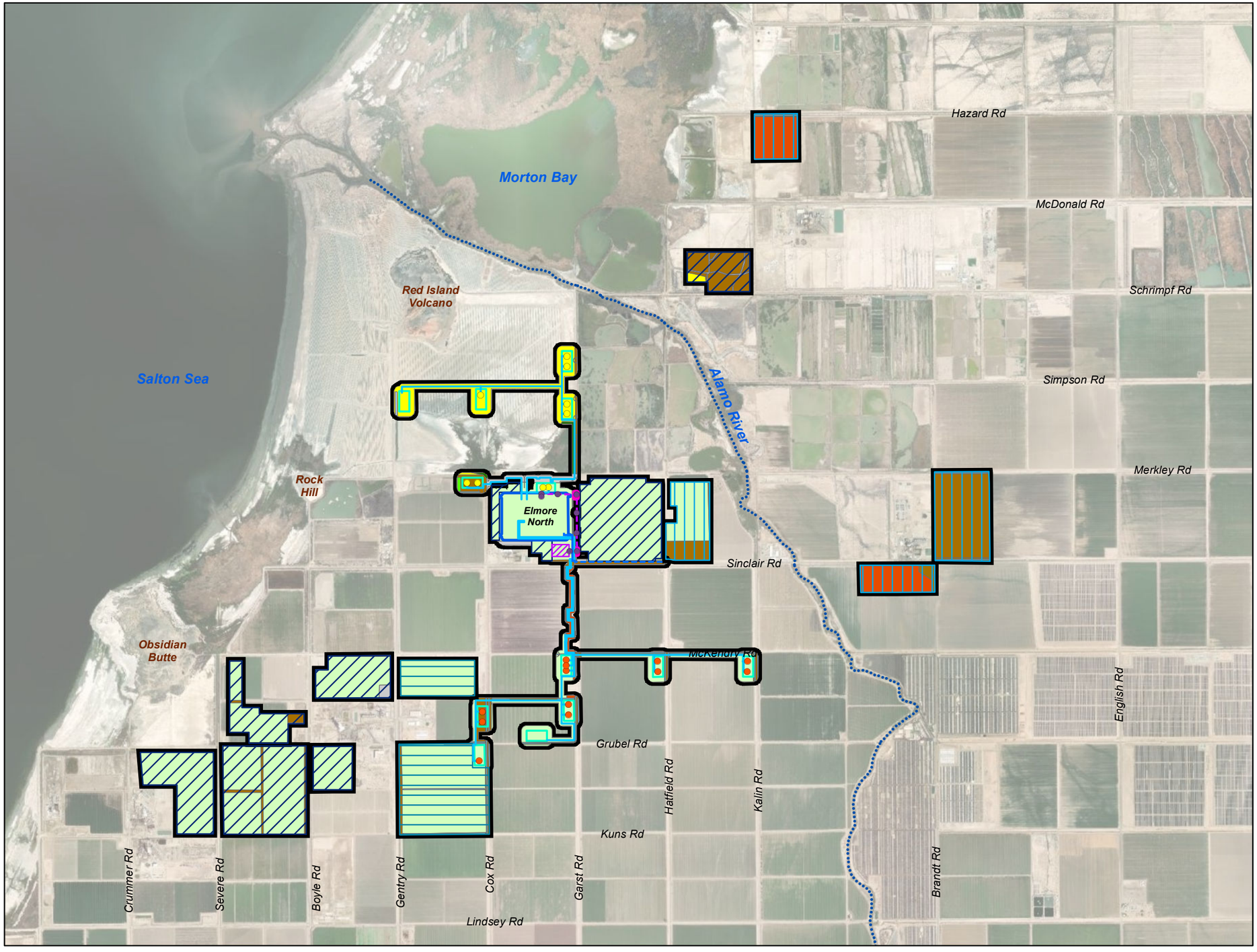
Appendix DA 5.2-1c
Desert Pupfish Habitat - CONFIDENTIAL

Appendix DA 5.2-1d
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
- Open Water

Notes:
[a] Impacts to canals and drains are included for completeness; no IID infrastructure will be impacted by this Project.
[b] A portion of the eastern borrow pit was removed from the project area.

0 0.25 0.5 1
Miles

N

Figure DA 5.2-1d
Land Cover and Vegetation Types
Elmore North Geothermal Project
Imperial County, California

Jacobs

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Appendix DA 5.2-2
Staff Resumes

COURTNEY J. CONWAY

Department of Fish & Wildlife Sciences
875 Perimeter Drive, University of Idaho, Moscow, ID 83844
cconway@uidaho.edu; 208-885-6176

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

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).

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.

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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.

Harrity*, 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.

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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.

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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.

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Hohbein**, R., and C. J. Conway. 2018. Pitfall traps: a review of methods for estimating arthropod abundance. *Wildlife Society Bulletin* 42:597-606.

Burak, G.S., A.R. Goldberg*, J.M. Galloway, D. Evans Mack, and C.J. Conway. 2018. Collaborating to save a tiny threatened species: what does the northern Idaho ground squirrel need to survive? *The Wildlife Professional* 12(5):39-42.

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.

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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.

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Glisson, W. J., C. J. Conway, C. P. Nadeau**, K. L. Borgmann*, and T. A. Laxson. 2015. Range-wide Wetland Associations of the King Rail: A Multi-scale Approach. *Wetlands* 35:577-587.

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*Borgmann, K. L., C. J. Conway, and M. L. Morrison. 2013. Breeding phenology of birds: mechanisms underlying seasonal declines in the risk of nest predation. *PLoS ONE* 8(6): e65909.

Steidl, R. J., C. J. Conway, and A. Litt. 2013. Power to detect trends in abundance of secretive marsh birds: effects of species traits and sampling effort. *Journal of Wildlife Management* 77:445-453.

Rush, S.A., K. F. Gaines, W. R. Eddleman, and C. J. Conway. 2012. Clapper Rail (*Rallus longirostris*). In: The Birds of North America Online (ed. A. Poole). Cornell Lab of Ornithology, Ithaca, NY. http://bna.birds.cornell.edu/bna/species/340.

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*Steckler, S. E., and C. J. Conway. 2012. Frequent vocalizing is negatively associated with brood parasitism in a host of the Brown-headed Cowbird. *Condor* 114: 219-226.

*Decker, K., C. J. Conway, J. J. Fontaine. 2012. Nest predation, food, and female age explain seasonal declines in clutch size. *Evolutionary Ecology* 26:683-699.

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*Smith, M. D., and C. J. Conway. 2011. Collection of mammal manure and other debris by nesting burrowing owls. *Journal of Raptor Research* 45:220-228.

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migrate? A comparative study of diet breadth and fruit preference. *Evolutionary Ecology* 25:219-236.

Conway, C. J., **C. P. Nadeau, and L. Piest. 2010. Fire helps restore natural disturbance regime to benefit rare and endangered marsh birds endemic to Colorado River. *Ecological Applications* 20:2024-2035.

Kirkpatrick, C., and C. J. Conway. 2010. Nest predators of ground-nesting birds in montane forests of the Santa Catalina Mountains, Arizona. *Wilson Journal of Ornithology* 122:614-617.

**Bartok, N., and C. J. Conway. 2010. Factors affecting the presence of nesting burrowing owls in an agricultural landscape. *Journal of Raptor Research* 44:286-293.

* Macías-Duarte, A., C. J. Conway, A. Munguia-Vega, and M. Culver. 2010. Novel microsatellite loci for the Burrowing Owl, Athene cunicularia. *Conservation Genetics Resources* 2:67-69.

**Robinson, G., C. J. Conway, C. Kirkpatrick, and D. D. LaRoche. 2010. Response to Nestling Throat Ligatures by Three Songbirds. *Wilson Journal of Ornithology* 122:806-809.

Conway, C. J., and **C. P. Nadeau. 2010. The effects of conspecific and heterospecific call-broadcast on detection probability of marsh birds in North America. *Wetlands* 30:358-368.

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*Decker, K. L., and C. J. Conway. 2009. Effects of an unseasonable snowstorm on Red-faced Warbler nesting success. *The Condor* 111:392-395.

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Eddleman, W. R., and C. J. Conway. 1994. Clapper Rail. Pages 167-179 *In* Management of Migratory Shore and Upland Game Birds in North America (T.C. Tacha and C.E. Braun, eds.). International Association of Fish & Wildlife Agencies, Washington, DC.

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Conway, C. J., W. R. Eddleman, S. H. Anderson, L. R. Hanebury. 1993. Seasonal Changes in Yuma Clapper Rail Vocalization Rate and Habitat Use. *Journal of Wildlife Management* 57:282-290.

Conway, C. J., and T. E. Martin. 1993. Habitat Suitability for Williamson's Sapsuckers in Mixed-Conifer Forests. *Journal of Wildlife Management* 57:322-328.

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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..

Harrity, 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

Kathryn M. Sliwa
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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

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

- 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 obscurity 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 obscurity 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

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*)
2nd 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*)

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)

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 5.2-3
Agency Record of Communications

USFWS Communication Regarding BHE Renewables

Date: May 22, 2023
Project name: Black Rock, Elmore North, and Morton Bay
Prepared by: Morgan King/Biologist, Jacobs
Location: Banning, California
Participants: Vincent James/Division Supervisor USFWS
Document no: 1
Duration: 8:35 – 8:46 AM
Copies to: Jerry Salamy/Jacobs, Sarah Madams/Jacobs

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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 30th.	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

Date: June 1, 2023
Project name: Black Rock, Elmore North, and Morton Bay
Prepared by: Morgan King/Biologist, Jacobs
Location: Banning, California
Participants: Magdalena Rodriguez/CDFW, Rose Banks/CDFW, Jerry Salamy/Jacobs, Christy Payne/Jacobs, Lindsey Xayachack/Jacobs
Document no: 1
Duration: Conference call 9:30-10:30 AM
Copies to: Jerry Salamy/Jacobs, Sarah Madams/Jacobs

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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

Date: June 7, 2023
Project name: Black Rock, Elmore North, and Morton Bay
Prepared by: Morgan King/Biologist, Jacobs
Participants: 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
Document no: 1
Duration: Conference call 1:00-2:00 PM

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Sacramento, CA 95833-2937
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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: • Quantify the loss of irrigation water runoff into if agricultural lands are converted to other use • Well pads • Changes in hydrology	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
To:	Davydova-Flores, Maria@Wildlife; King, Morgan; Land, Charles@Wildlife; "Felicia_Sirchia@fws.gov"
Cc:	Marshall, Tonya@Wildlife; 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,

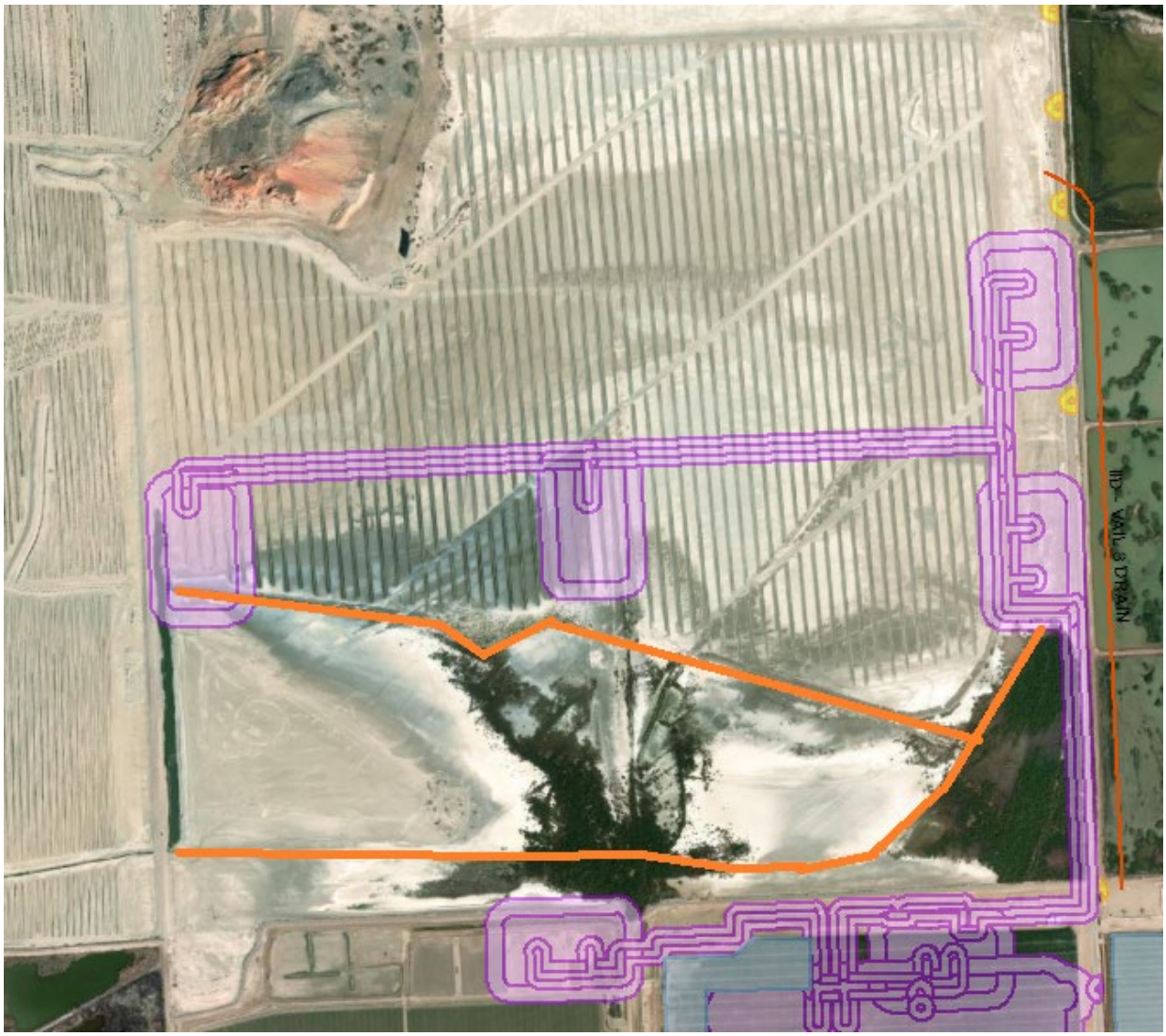
A survey conducted last week yielded over 400 desert pupfish, mostly juveniles, in the main connector channel (south side, between the two drains) shown below. This area is obviously extremely important for desert pupfish.

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

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>
Sent: Thursday, June 1, 2023 6:11 AM
To: Keeney, Sharon@Wildlife <Sharon.Keeney@wildlife.ca.gov>; Davydova-Flores, Maria@Wildlife <Maria.Davydova-Flores@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 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>
Sent: Wednesday, May 31, 2023 5:25 PM
To: Davydova-Flores, Maria@Wildlife <Maria.Davydova-Flores@Wildlife.ca.gov>; King, Morgan <Morgan.King10@jacobs.com>; Land, Charles@Wildlife <Charles.Land@wildlife.ca.gov>
Cc: Marshall, Tonya@Wildlife <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
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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

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>
Sent: Tuesday, May 30, 2023 10:25 AM
To: 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>; Davydova-Flores, Maria@Wildlife <Maria.Davydova-Flores@Wildlife.ca.gov>
Subject: Salton Sea - Desert pupfish data?

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

From: Land, Charles@Wildlife <Charles.Land@wildlife.ca.gov>
Sent: Thursday, May 25, 2023 11:13 AM
To: King, Morgan <Morgan.King10@jacobs.com>
Cc: Marshall, Tonya@Wildlife <Tonya.Marshall@Wildlife.ca.gov>; Keeney, Sharon@Wildlife <Sharon.Keeney@wildlife.ca.gov>; Davydova-Flores, Maria@Wildlife <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

From: King, Morgan <Morgan.King10@jacobs.com>
Sent: Thursday, May 25, 2023 7:18 AM
To: 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: Sonny Bono Wildlife Refuge

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

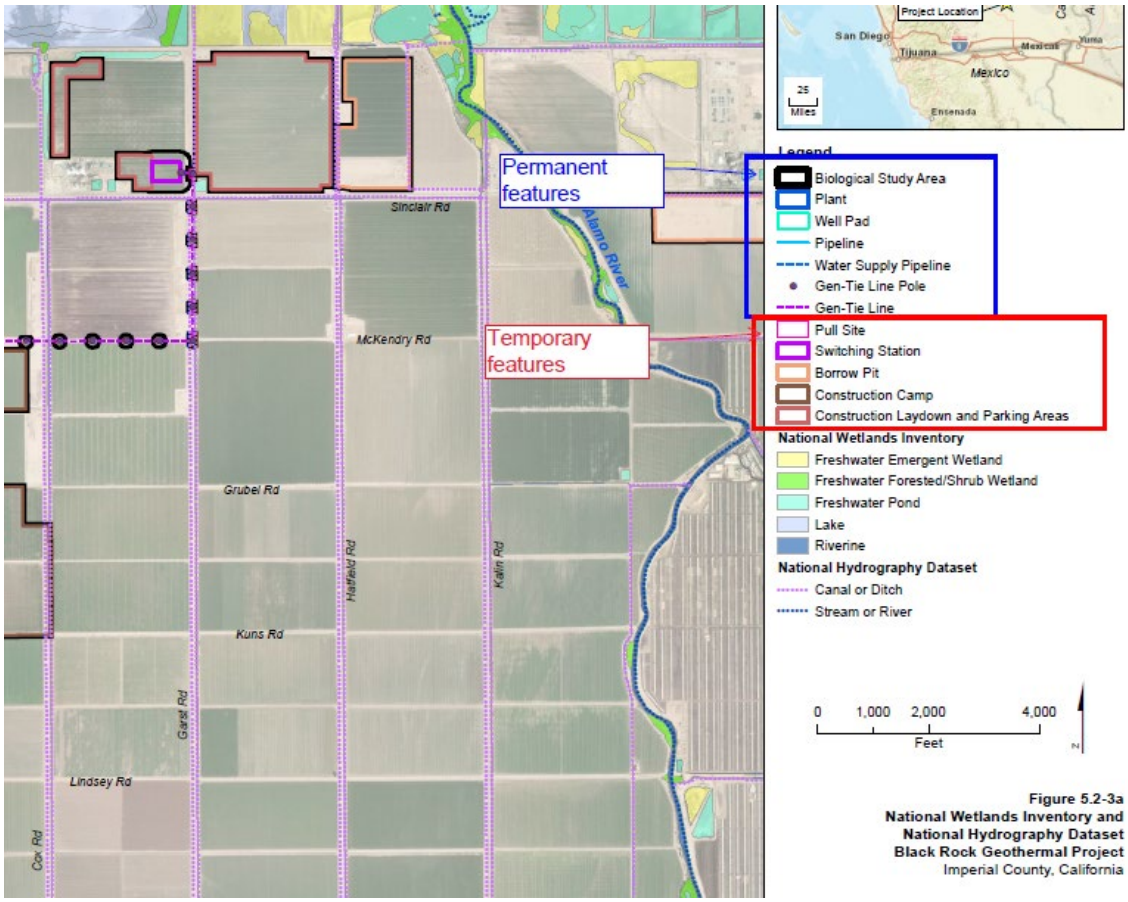

Figure 5.2-3a
National Wetlands Inventory and National Hydrography Dataset
Black Rock Geothermal Project
Imperial County, California

Morgan King | Jacobs | Biologist | M: +1.916.335.9141

From: Land, Charles@Wildlife <Charles.Land@wildlife.ca.gov>
Sent: Monday, May 22, 2023 3:43 PM
To: King, Morgan <Morgan.King10@jacobs.com>
Cc: Marshall, Tonya@Wildlife <Tonya.Marshall@Wildlife.ca.gov>; Keeney, Sharon@Wildlife <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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SaveOurWater.com · Drought.CA.gov

From: King, Morgan <Morgan.King10@jacobs.com>
Sent: Monday, May 22, 2023 3:28 PM
To: 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: Sonny Bono Wildlife Refuge

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>
Sent: Monday, May 22, 2023 3:02 PM
To: King, Morgan <Morgan.King10@jacobs.com>
Cc: Marshall, Tonya@Wildlife <Tonya.Marshall@Wildlife.ca.gov>; Keeney, Sharon@Wildlife <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

From: King, Morgan <Morgan.King10@jacobs.com>
Sent: Monday, May 22, 2023 8:48 AM
To: 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: Sonny Bono Wildlife Refuge

I understand – it's a busy time of year. Is there any data you could provide about recent surveys? The latest

CNDDB 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>
Sent: Monday, May 22, 2023 8:33 AM
To: King, Morgan <Morgan.King10@jacobs.com>
Cc: Marshall, Tonya@Wildlife <Tonya.Marshall@Wildlife.ca.gov>; Keeney, Sharon@Wildlife <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

From: King, Morgan <Morgan.King10@jacobs.com>
Sent: Monday, May 22, 2023 8:21 AM
To: Land, Charles@Wildlife <Charles.Land@wildlife.ca.gov>
Subject: RE: Sonny Bono Wildlife Refuge

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

---

From: Land, Charles@Wildlife <Charles.Land@wildlife.ca.gov>
Sent: Monday, May 22, 2023 8:10 AM
To: Shore, Jonathan <jonathan_shore@fws.gov>; Salamy, Jerry <Jerry.Salamy@jacobs.com>
Cc: Jon Trujillo (jon.trujillo@calenergy.com) <Jon.Trujillo@calenergy.com>; Madams, Sarah <Sarah.Madams@jacobs.com>; Xayachack, Lindsey <Lindsey.Xayachack@jacobs.com>; King, Morgan <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

Every Californian should conserve water. Find out how at:

SaveOurWater.com · Drought.CA.gov

From: Shore, Jonathan <jonathan_shore@fws.gov>
Sent: Friday, May 19, 2023 5:55 PM
To: Salamy, Jerry <Jerry.Salamy@jacobs.com>; Land, Charles@Wildlife <Charles.Land@wildlife.ca.gov>
Cc: Jon Trujillo (jon.trujillo@calenergy.com) <Jon.Trujillo@calenergy.com>; Madams, Sarah <Sarah.Madams@jacobs.com>; Xayachack, Lindsey <Lindsey.Xayachack@jacobs.com>; King, Morgan <Morgan.King10@jacobs.com>
Subject: RE: [EXTERNAL] Sonny Bono Wildlife Refuge

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>
Sent: Friday, May 19, 2023 10:38 AM
To: Shore, Jonathan <jonathan_shore@fws.gov>
Cc: Jon Trujillo (jon.trujillo@calenergy.com) <Jon.Trujillo@calenergy.com>; Madams, Sarah <Sarah.Madams@jacobs.com>; Xayachack, Lindsey <Lindsey.Xayachack@jacobs.com>; King, Morgan <Morgan.King10@jacobs.com>
Subject: [EXTERNAL] Sonny Bono Wildlife Refuge

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
2485 Natomas Park Drive, Suite 600 | Sacramento, CA 95833 | USA

Upcoming PTO - May 9th and June 12th to June 20th

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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

---

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>
Sent: Monday, May 22, 2023 9:27 AM
To: James, Vincent P <vincent_james@fws.gov>
Cc: Sirchia, Felicia <Felicia_Sirchia@fws.gov>; Menjivar, Stephanie R <stephanie_menjivar@fws.gov>; Kowalski, Kent M <kent_kowalski@fws.gov>
Subject: [EXTERNAL] RE: Geothermal facilities & desert pupfish

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

---

From: James, Vincent P <vincent_james@fws.gov>
Sent: Monday, May 22, 2023 9:19 AM
To: King, Morgan <Morgan.King10@jacobs.com>
Cc: Sirchia, Felicia <Felicia_Sirchia@fws.gov>; Menjivar, Stephanie R <stephanie_menjivar@fws.gov>; Kowalski, Kent M <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>
Sent: Monday, May 22, 2023 7:12 AM
To: James, Vincent P <vincent_james@fws.gov>
Subject: [EXTERNAL] Geothermal facilities & desert pupfish

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

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From: Keeney, Sharon@Wildlife
To: Davydova-Flores, Maria@Wildlife; King, Morgan; Land, Charles@Wildlife
Cc: 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

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>
Sent: Tuesday, May 30, 2023 10:25 AM
To: 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>; Davydova-Flores, Maria@Wildlife <Maria.Davydova-Flores@Wildlife.ca.gov>
Subject: Salton Sea - Desert pupfish data?

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

---

From: Land, Charles@Wildlife <Charles.Land@wildlife.ca.gov>
Sent: Thursday, May 25, 2023 11:13 AM
To: King, Morgan <Morgan.King10@jacobs.com>
Cc: Marshall, Tonya@Wildlife <Tonya.Marshall@Wildlife.ca.gov>; Keeney, Sharon@Wildlife <Sharon.Keeney@wildlife.ca.gov>; Davydova-Flores, Maria@Wildlife <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>
Sent: Thursday, May 25, 2023 7:18 AM
To: 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: Sonny Bono Wildlife Refuge

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

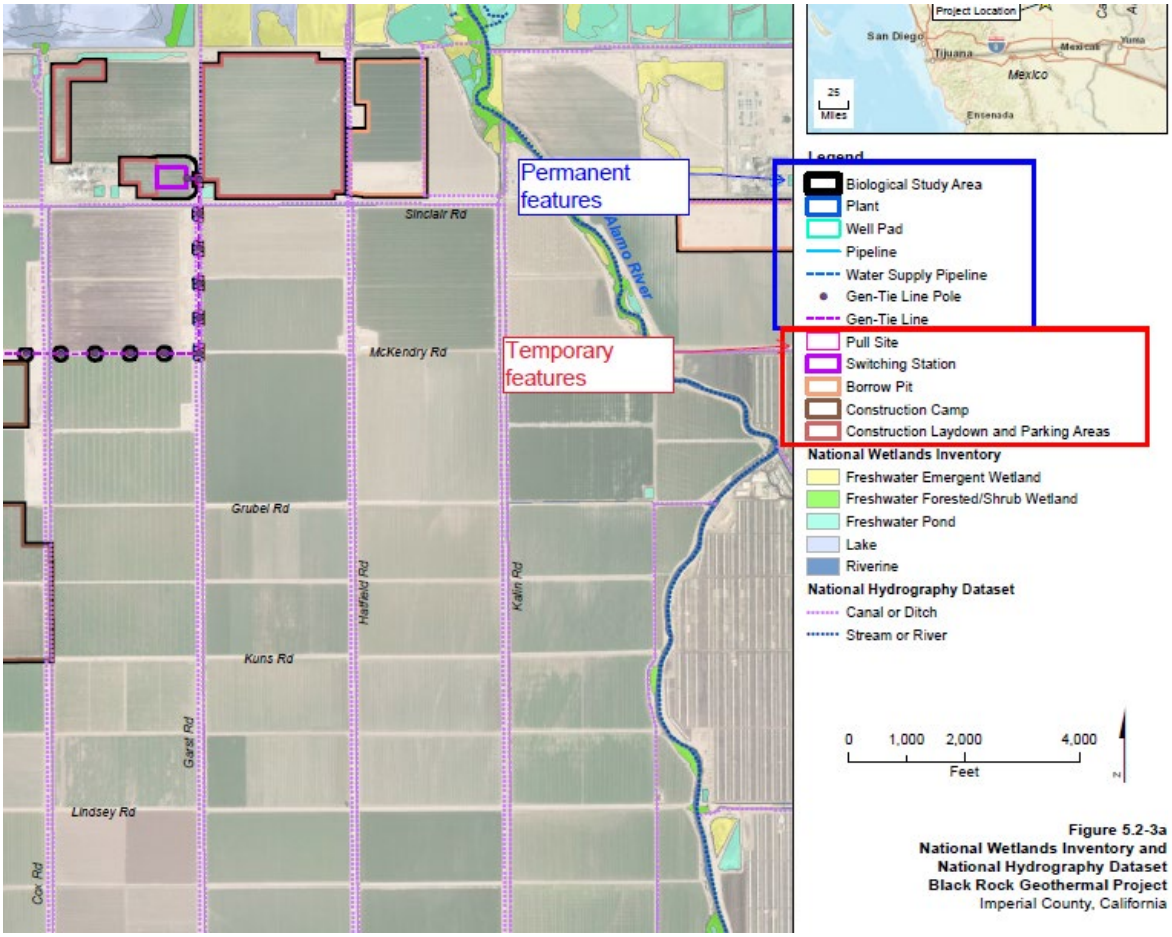

Figure 5.2-3a
National Wetlands Inventory and National Hydrography Dataset
Black Rock Geothermal Project
Imperial County, California

Morgan King | Jacobs | Biologist | M: +1.916.335.9141

From: Land, Charles@Wildlife <Charles.Land@wildlife.ca.gov>
Sent: Monday, May 22, 2023 3:43 PM
To: King, Morgan <Morgan.King10@jacobs.com>
Cc: Marshall, Tonya@Wildlife <Tonya.Marshall@Wildlife.ca.gov>; Keeney, Sharon@Wildlife <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>
Sent: Monday, May 22, 2023 3:28 PM
To: 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: Sonny Bono Wildlife Refuge

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>
Sent: Monday, May 22, 2023 3:02 PM
To: King, Morgan <Morgan.King10@jacobs.com>
Cc: Marshall, Tonya@Wildlife <Tonya.Marshall@Wildlife.ca.gov>; Keeney, Sharon@Wildlife <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

From: King, Morgan <Morgan.King10@jacobs.com>
Sent: Monday, May 22, 2023 8:48 AM
To: 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: Sonny Bono Wildlife Refuge

I understand – it's a busy time of year. Is there any data you could provide about recent surveys? The

latest CNDDB 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>
Sent: Monday, May 22, 2023 8:33 AM
To: King, Morgan <Morgan.King10@jacobs.com>
Cc: Marshall, Tonya@Wildlife <Tonya.Marshall@Wildlife.ca.gov>; Keeney, Sharon@Wildlife <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

From: King, Morgan <Morgan.King10@jacobs.com>
Sent: Monday, May 22, 2023 8:21 AM
To: Land, Charles@Wildlife <Charles.Land@wildlife.ca.gov>
Subject: RE: Sonny Bono Wildlife Refuge

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

---

From: Land, Charles@Wildlife <Charles.Land@wildlife.ca.gov>
Sent: Monday, May 22, 2023 8:10 AM
To: Shore, Jonathan <jonathan_shore@fws.gov>; Salamy, Jerry <Jerry.Salamy@jacobs.com>
Cc: Jon Trujillo (jon.trujillo@calenergy.com) <Jon.Trujillo@calenergy.com>; Madams, Sarah <Sarah.Madams@jacobs.com>; Xayachack, Lindsey <Lindsey.Xayachack@jacobs.com>; King, Morgan <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>
Sent: Friday, May 19, 2023 5:55 PM
To: Salamy, Jerry <Jerry.Salamy@jacobs.com>; Land, Charles@Wildlife <Charles.Land@wildlife.ca.gov>
Cc: Jon Trujillo (jon.trujillo@calenergy.com) <Jon.Trujillo@calenergy.com>; Madams, Sarah <Sarah.Madams@jacobs.com>; Xayachack, Lindsey <Lindsey.Xayachack@jacobs.com>; King, Morgan <Morgan.King10@jacobs.com>
Subject: RE: [EXTERNAL] Sonny Bono Wildlife Refuge

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>
Sent: Friday, May 19, 2023 10:38 AM
To: Shore, Jonathan <jonathan_shore@fws.gov>
Cc: Jon Trujillo (jon.trujillo@calenergy.com) <Jon.Trujillo@calenergy.com>; Madams, Sarah <Sarah.Madams@jacobs.com>; Xayachack, Lindsey <Lindsey.Xayachack@jacobs.com>; King, Morgan <Morgan.King10@jacobs.com>
Subject: [EXTERNAL] Sonny Bono Wildlife Refuge

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
2485 Natomas Park Drive, Suite 600 | Sacramento, CA 95833 | USA

Upcoming PTO - May 9th and June 12th to June 20th

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From: Banks, Rose@Wildlife
To: King, Morgan; 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>
Sent: Friday, June 9, 2023 1:26 PM
To: Rodriguez, Magdalena@Wildlife <Magdalena.Rodriguez@wildlife.ca.gov>; Banks, Rose@Wildlife <Rose.Banks@wildlife.ca.gov>
Subject: RE: BHER - BUOW Technical Memorandum

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>
Sent: Wednesday, June 7, 2023 4:00 PM
To: King, Morgan <Morgan.King10@jacobs.com>; Banks, Rose@Wildlife <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>
Sent: Wednesday, June 7, 2023 6:13 AM
To: Rodriguez, Magdalena@Wildlife <Magdalena.Rodriguez@wildlife.ca.gov>; Banks, Rose@Wildlife <Rose.Banks@wildlife.ca.gov>
Subject: RE: BHER - BUOW Technical Memorandum

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>
Sent: Tuesday, June 6, 2023 4:02 PM
To: King, Morgan <Morgan.King10@jacobs.com>; Banks, Rose@Wildlife <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>
Sent: Tuesday, June 6, 2023 9:59 AM
To: Rodriguez, Magdalena@Wildlife <Magdalena.Rodriguez@wildlife.ca.gov>; Banks, Rose@Wildlife <Rose.Banks@wildlife.ca.gov>
Subject: BHER - BUOW Technical Memorandum

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>; Rodriguez, Magdalena@Wildlife <Magdalena.Rodriguez@wildlife.ca.gov>; Banks, Rose@Wildlife <Rose.Banks@wildlife.ca.gov>
Cc: Salamy, Jerry <jerry.salamy@jacobs.com>; Payne, Christy <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

-----Original Appointment-----
From: Xayachack, Lindsey <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
2525 Airpark Drive | Redding, CA 96001 | USA

Microsoft Teams meeting

Join on your computer, mobile app or room device
Click here to join the meeting

Meeting ID: 224 519 942 955
Passcode: xUgivB
Download Teams | Join on the web

Join with a video conferencing device
493366865@t.plcm.vc
Video Conference ID: 111 080 524 8
Alternate VTC instructions

Learn More | Meeting options

From: Xayachack, Lindsey
Sent: Friday, May 26, 2023 10:48 AM
To: Rodriguez, Magdalena@Wildlife <Magdalena.Rodriguez@wildlife.ca.gov>; Banks, Rose@Wildlife <Rose.Banks@wildlife.ca.gov>
Cc: King, Morgan <Morgan.King10@jacobs.com>; Salamy, Jerry <jerry.salamy@jacobs.com>; Payne, Christy <Christy.Payne@jacobs.com>; Santolo, Gary <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 1st @ 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
2525 Airpark Drive | Redding, CA 96001 | USA

From: Rodriguez, Magdalena@Wildlife <Magdalena.Rodriguez@wildlife.ca.gov>
Sent: Friday, May 26, 2023 10:44 AM
To: Xayachack, Lindsey <Lindsey.Xayachack@jacobs.com>; Banks, Rose@Wildlife <Rose.Banks@wildlife.ca.gov>
Cc: King, Morgan <Morgan.King10@jacobs.com>; Salamy, Jerry <Jerry.Salamy@jacobs.com>; Payne, Christy <Christy.Payne@jacobs.com>; Santolo, Gary <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>
Sent: Friday, May 26, 2023 8:25 AM
To: Rodriguez, Magdalena@Wildlife <Magdalena.Rodriguez@wildlife.ca.gov>; Banks, Rose@Wildlife <Rose.Banks@wildlife.ca.gov>
Cc: King, Morgan <Morgan.King10@jacobs.com>; Salamy, Jerry <Jerry.Salamy@jacobs.com>; Payne, Christy <Christy.Payne@jacobs.com>; Santolo, Gary <Gary.Santolo@jacobs.com>
Subject: BUOW Discussion

Hello,

Are both of you able to join a 30-minute call regarding burrowing owls on Thursday, June 1st 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
2525 Airpark Drive | Redding, CA 96001 | USA

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Appendix DA 5.2-4
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[1]

[1] 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, Thompsen 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 (Thompsen 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 CNDDB 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 >20º 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 CNDDB Field Survey Forms should be sent directly to the Department's CNDDB 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;
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. 1985*a)*.
- 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.