Data Request 16:

Please provide a detailed raven monitoring and control plan that includes at least the following elements:

a. a discussion of how the monitoring and control plan will be coordinated with CDFG and USFWS;
b. area to be covered by the plan;
c. use of perch-deterrent devices and locations of installation, and other pre-construction measures that might reduce raven presence and nesting activities;
d. a monitoring plan, including a discussion of survey methods and frequency, for establishing baseline data on pre-project raven numbers and activities and assessing post-project changes from this baseline
e. remedial actions that could be taken (e.g., nest removal) if ravens are preying on desert tortoise and other wildlife; and
f. triggers for those remedial actions.

Revised Response:

An initial Draft Raven Monitoring, Management and Control Plan for the Beacon Solar Energy Project was submitted on July 16, 2008. A revised plan is provided with this submittal as Attachment DR-16. This revised plan reflects discussions with the U.S. Fish and Wildlife Service (USFWS) on August 19, 2008 regarding the resource agency goals for raven management, and subsequent discussions with the USFWS, California Department of Fish and Game (CDFG), and the California Energy Commission (CEC) during the August 25, 2008 public workshop.

The plan also includes reference to the Memorandum of Agreement (MOA) discussed at the workshop and during subsequent conversations with the USFWS. This MOA is being prepared by the USFWS in collaboration with CDFG and Beacon Solar, LLC.

Attachment DR-16

Common Raven Monitoring, Management, and Control Plan

DRAFT
Common Raven Monitoring, Management, and Control Plan
Beacon Solar Energy Project

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October 21, 2008

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1.0 Introduction

This section introduces the project background, purpose, objectives, and conditions of concern related to raven monitoring, management, and control in the vicinity of the proposed Beacon Solar Energy Project (BSEP, or Project).

1.1 Background

The proposed BSEP is located along State Route 14 (SR-14), approximately 10 miles north-northwest of California City, approximately 15 miles north of the town of Mojave, and approximately 24 miles northeast of the city of Tehachapi, in Kern County, California (Figure 1). Landmarks in the area include Red Rock Canyon State Park approximately 3.6 miles to the north, Koehn Dry Lake approximately 5.4 miles to the east-northeast, and the Desert Tortoise Natural Area approximately 3 miles to the east.

Beacon Solar, LLC (Beacon) proposes to develop a 250-megawatt solar energy facility on approximately 2,012 acres. The BSEP would use parabolic trough solar thermal technology to concentrate the sun's energy on a linear receiver located at the center point of each parabolic solar subarray. Energy collected in the array would be used to generate steam, driving a turbine that generates electricity. This solar array would be located east of the Southern Pacific Railroad tracks, which run parallel to and east of SR-14. Two options are under consideration for a short (less than 3.5 miles) transmission line, which would be constructed from the solar array across SR-14 to interconnect with the Los Angeles Department of Water and Power's (LADWP) existing transmission system west of the site. Three evaporation ponds (8.3 acres each), used to manage the cooling tower blowdown stream, are planned within a highly disturbed portion of the Project Area. A 17.6-mile, 8-inch natural gas line, which would connect an existing Southern California Gas pipeline in California City with the Project, would be constructed to provide fuel for startup and emergency operations.

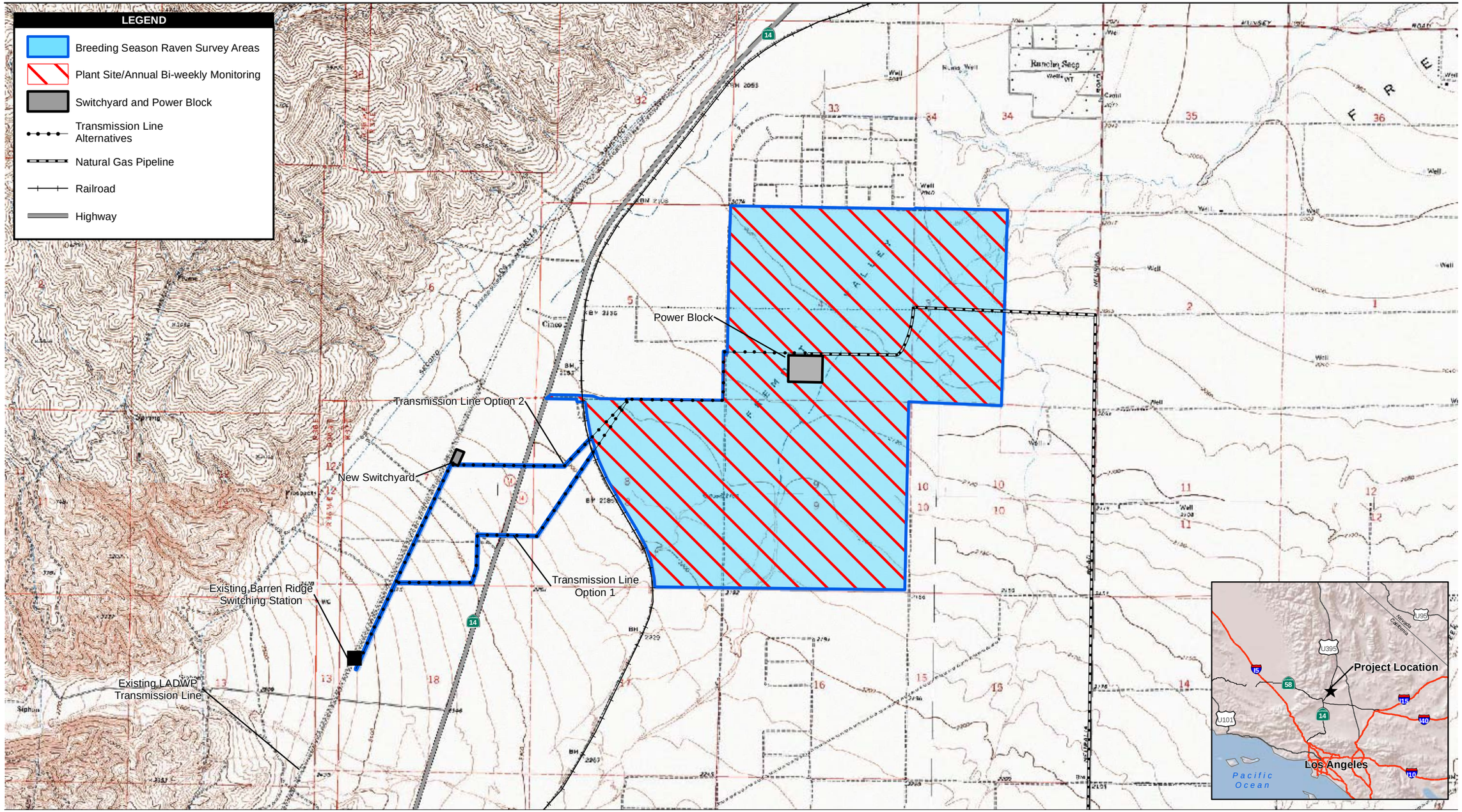
The proposed Project has the potential to indirectly impact populations of the desert tortoise, Mojave population (*Gopherus agassizii* [DT]), listed as threatened under the federal Endangered Species Act (ESA) and California ESA, by increasing the attraction of common ravens (*Corvus corax* [raven]) into the area and thereby increasing potential DT depredation by raven. While potential attractants are not within DT habitat, the movement of raven throughout the area and over potential DT habitat adjacent to and in the vicinity of the Project Area could increase the chances of a raven encountering and depredating a DT.

1.2 Purpose and Objectives

The purpose of this plan is to identify the conditions of concern specific to the BSEP that may attract ravens to the area and to define a monitoring, management, and control plan that will 1) monitor raven activity and 2) specify management and control measures that will avoid, minimize, or mitigate impacts. The monitoring effort is intended to provide qualitative data that can be interpreted by the Project Biologist to determine if Project design features (PDFs) are working or if additional management and control measures are needed to mitigate impacts to DTs.

Specific plan objectives include:

1. Clearly identify how the Project would utilize PDFs to manage the conditions of concern specific to the BSEP that may attract ravens to the area.



Source: TetraTech 2007; Kern County 2007; USGS 2007; WorleyParsons 2007

2,750 1,375 0 2,750 Feet

Scale: 1:33,000; 1 inch = 2,750 feet

Figure 1
Site Location and Raven Monitoring Areas

2. Document the effectiveness of PDFs in addition to raven management and control measures implemented at the BSEP.

3. Specify how and when mitigation measures would be selected and implemented if the monitoring suggests the need for additional controls.

4. Define triggers for modification of management and control measures using adaptive management principles.

1.3 Conditions of Concern

The conditions of concern are those Project features or activities that, when not properly managed, provide new subsidies that may result in changes in raven population or behavior that could potentially adversely affect the DT population in the Project Area. Four basic conditions of concern have been identified for the BSEP and have been considered in developing this Plan:

1. Water from evaporation ponds;

2. Potential creation of new perching/roosting/nesting sites;

3. Water ponding potential from dust suppression; and

4. Construction/operation waste management.

The study design for raven monitoring, as well as measures for raven management and control, are dependent upon the accuracy of defining these conditions. Each of these conditions of concern is defined in more detail below.

<u>Evaporation Ponds</u>

The proposed Project includes three evaporation ponds that will collect blowdown water from the cooling towers. The three evaporation ponds will have a nominal surface area of 8.3 acres each for a total of 25 acres. The addition of a new water source to an area where water sources are generally sparse may result in the attraction of raven to the BSEP. Ravens will travel up to 40.4 miles from their roosts for subsidies including water (Boarman, 2003). However, much shorter distances to point subsidies are more common and Kristan and Boarman (2003) observed that raven densities declined with increasing distance from point subsidies.

<u>Perching, Roosting, and Nesting Sites</u>

The majority of raven predation on DT is thought to take place during the spring, most likely by breeding birds that have been shown to spend most of their time foraging within 1,300 feet (ft) of their nests (Kristan and Boarman, 2003). Therefore, structures that facilitate nesting in areas ravens could not otherwise nest in may pose a danger to nearby DT populations. Project components, such as tower structures, transmission poles and lines, and support structures provide new elevated perching sites that have the potential to increase raven use of the Project Area.

<u>Ponding Water</u>

During construction, water will be applied to the graded areas, construction right-of-way, dirt roads, trenches, spoil piles, and other areas of ground disturbance to minimize dust emissions and topsoil erosion. Ponding water resulting from these dust suppression activities has the potential to attract ravens, thereby potentially resulting in increased DT predation by raven.

Waste Management

Ravens are considered scavengers that obtain a high percentage of their diet from human subsidies such as landfills, dumpsters behind restaurants and grocery stores, open garbage drums and plastic bags placed on the curb for garbage pickup, and roadkill. Both the construction and operation phases of the BSEP would result in increased waste generation in the Project Area, improper waste management could attract ravens.

2.0 Memorandum of Agreement and In-lieu Fee Program

A Memorandum of Agreement (MOA) was established on October X, 2008, between Beacon, California Department of Fish and Game (CDFG), and United States Fish and Wildlife Service (USFWS) (Appendix X). The MOA was created to provide the general framework for cooperation and participation among the signatories to implement this Common Raven Monitoring, Management, and Control Plan for the BSEP. Pursuant to the MOA, Beacon has agreed to pay in-lieu fees to USFWS in place of quantitative raven monitoring. These in-lieu fees will be directed toward a future quantitative regional monitoring program aimed at understanding the relationship between ongoing development in the desert region, raven population growth and expansion and raven impacts on DT populations.

3.0 Management Practices

This section specifies management practices or PDFs to be implemented by the Project to avoid new subsidies and thus minimize the potential for the Project to attract ravens. The four basic conditions of concern identified in Section 1.3 have been grouped into construction and/or postconstruction (operation) phase conditions, as appropriate for the Project. Construction phase conditions are considered temporary and are anticipated to be avoided or minimized mainly by the implementation of management measures as defined in Section 3.1 below. Postconstruction (operation) conditions will include management measures to minimize potential impacts and may require additional control measures based on the results of the monitoring program (Section 3.2).

3.1 Construction

Construction-phase impacts are considered more temporary in nature than postconstruction impacts and would therefore require temporary management practices to avoid or minimize the potential to attract ravens to the BSEP. Construction-phase conditions of concern for the BSEP include ponding water and waste management.

3.1.1 Ponding Water

To minimize the occurrence of ponding water, the application rates of water for dust suppression activities will be predetermined to minimize excessive application. The application rate should consider soil infiltration and evaporation rates. During the DT active season, the Environmental Compliance Monitor (ECM) will patrol areas to ensure water does not puddle for long periods and make recommendations for reduced water application rates where necessary.

3.1.2 Waste Management

A trash abatement program will be established during the construction phase of the BSEP. Trash and food items will be contained in closed, secured containers on the Plant Site and removed daily to reduce the attractiveness to opportunistic predators such as ravens. In addition, the Worker Environmental Awareness Program will assist in ensuring that no trash is available that might attract DT predators.

3.2 Operation

Operation-phase impacts are considered ongoing impacts and would therefore require PDFs and ongoing management practices to avoid or minimize the potential to attract ravens to the BSEP. Operation-phase conditions of concern for the BSEP include evaporation ponds, perching sites, and waste management.

3.2.1 Evaporation Ponds

PDFs to deter use of the ponds by ravens include pond design features that will make the pond water less available to ravens (e.g., steep pond sides, at least 2 feet of freeboard, and perimeter protection). In addition, reducing other potential site attractants (see below) will assist in reducing the overall attractiveness of the Plant Site to ravens.

The evaporation ponds would be located approximately 0.25 mile inside of the perimeter fence, thus minimizing any visual cues to terrestrial wildlife species that a source of water is present within the Plant Site. Because the ponds need to remain uncovered to maximize evaporation rates, a series of avian deterrence measures are being incorporated into the design and operation of the evaporation ponds that would minimize access to the ponds by birds. The operational design of the ponds includes a minimum depth of 1 foot and a minimum freeboard of 2 feet so ravens cannot reach the water from the perimeter. In addition, the interior sides of the ponds would be at a 33 percent slope (3:1, horizontal:vertical), which is considered too steep for birds to walk down. Other options include the use of antiperching devices, such as “Bird-B-Gone” and “WhirlyBird,” placed strategically along the perimeter of the ponds to exclude ravens and other birds from accessing the edge of the ponds to drink water. These design features would make it difficult for perching birds (e.g., ravens) and/or shorebirds to access the water.

With three evaporation ponds available, each pond can be prepared with a different configuration of deterrents to determine the most effective combination (i.e., the first pond with only Bird-B-Gone, the second pond with only WhirlyBird, and the third pond with a combination of the two deterrents). The Project’s ECM would be responsible for making qualitative observations on the relative success of the deterrent(s) at each pond and providing recommendations for future improvements in monthly reports. The Project Biologist will review these reports and make recommendations regarding adapting the current configuration of the antiperching devices to maximize deterrence.

3.2.2 Perching, Roosting, and Nesting Sites

PDFs would be implemented to avoid introducing new subsidies by minimizing the attractiveness of Project components. Potential PDFs that would be considered to reduce impacts from these Project components primarily include the use of physical bird deterrents such as bird spikes, Bird-B-Gones, and WhirlyBirds. In addition, nest removal would occur in conjunction with monitoring, as discussed below in Section 4.3.

3.2.3 Waste Management

The trash abatement program developed for the construction phase will also include operation-phase measures to be implemented for the life of the Project. Trash and food items will be contained in closed, secured containers and removed daily to reduce the attractiveness to opportunistic predators such as ravens. The ECM will continue to ensure that these practices are enforced and make recommendations for improvements where applicable.

4.0 Monitoring Practices

Although Project-specific quantitative monitoring has been replaced by payment of an in-lieu fee to USFWS to support a regional monitoring plan, qualitative monitoring will be implemented to assess the efficacy of PDFs and management measures and to determine the need for implementing additional control measures. These qualitative monitoring practices are intended to evaluate the potential impacts that construction and operation may have on raven activity and populations, which could result in potential impacts to DT. Raven monitoring will be implemented in the construction and postconstruction (operations) phases of the BSEP. The monitoring program is designed as an observational reconnaissance level study aimed at monitoring the effectiveness of the PDFs and management measures implemented with the goal of avoiding new subsidies for ravens in the Project Area and evaluating the overall effects of the Project and specific project components (i.e., evaporation ponds) on the raven population (e.g., activity or presence).

4.1 Construction Phase

To identify potential increases in raven activity, the ECM will conduct weekly reconnaissance level surveys in the Project Area. Surveys will focus on all potential subsidies including waste disposal areas, erected structures, staging areas where large equipment or material may be stored, and any area where water is applied to control dust and erosion. Data will be recorded for each raven observed, including activity, categorized as flying, perched, or on the ground (likely scavenging); type of perch (if applicable); and the general location of the bird within the Project Area. In addition, any new nesting locations will be recorded and unoccupied nests will be removed (see Section 4.3 for a discussion on nest removal).

4.2 Operation Phase

To identify potential increases in raven activity during the operations phase of the BSEP, the ECM will conduct biweekly (i.e., every other week) reconnaissance level monitoring at the Plant Site for the life of the project in addition to annual breeding season raven monitoring at the Plant Site and all associated aboveground linear components (Figure 1).

4.2.1 Ongoing Biweekly Raven Monitoring (life of project)

The ECM will conduct biweekly surveys for raven activity at predesignated locations throughout the Plant Site. Surveys will begin when the plant is operational and continue every 2 weeks (biweekly) for the life of the Project (30 years). Survey locations will focus on Project components that may influence raven abundance, activity, and behavior by potentially allowing perching, roosting, and nesting opportunities or by providing supplemental resources such as food and water. These Project components include tower structures, transmission poles and lines, support structures, as well as evaporation ponds and waste disposal facilities.

Sampling will occur every other week. Up to five permanent sampling locations will be identified by the Project Biologist throughout the Plant Site based on areas that have the greatest likelihood of attracting ravens (e.g., tower structures, transmission poles and lines, evaporation ponds, and waste facilities).

A 5-minute sampling session will be spent at each sampling location observing and listening for ravens. The surveyor will record raven detections and will document the behavior of the raven (e.g., perched, flying, on the ground, nesting), perch type (if applicable), and distance and direction from the sampling location. Additional data collected will include the survey start/stop time, and weather (including temperature, average wind speed, and percent cloud cover). In addition, the location of any nests detected during a survey will be noted and Universal

Transverse Mercator (UTM) coordinates recorded immediately following the conclusion of the sampling session. To aid the ECM and ensure consistency throughout the duration of the Project's life, a data sheet will be prepared in advance outlining the required data to be collected. Surveys should not be conducted when wind or rain interferes with audible detection or rain interferes with visual detection, or when unusual weather events may affect raven behavior.

In addition to raven monitoring, the ECM will document the occurrence of roadkill within the Plant Site including the surrounding paved and dirt access roads, the staging area, and any other Project facilities that may support vehicular traffic, including construction equipment. If roadkill is observed, special attention should be given to the presence and behavior of raven in the immediate vicinity.

4.2.2 Breeding Season Raven Surveys

Annual breeding season raven surveys will follow a modified form of raptor nest search protocol (CEC, 2007). Breeding season surveys will occur biweekly (two week intervals) starting at the beginning of the typical breeding season (mid-February) and continue to the end of June to identify nests and evidence of predation at nests (Boarman, 2002, 2003). These surveys will be conducted during the first 5 years of BSEP operation. Each survey will consist of systematically searching the Survey Area, which includes the Plant Site and the aboveground linear features associated with the Project (Figure 1). Because the 17.6-mile natural gas pipeline is an underground linear component of the BSEP that will not act as a potential raven attractant, it will not be surveyed. Figure 1 currently depicts two transmission line alternatives; only the final selected option will be included in the breeding season surveys.

Surveys will be conducted by vehicle when possible and on foot when necessary. All Joshua trees, landscape trees, utility poles, transmission towers, and other structures within the Survey Area will be searched for nests. A UTM coordinate, as well as nesting substrate and current breeding status (if detectable), will be recorded for each nest located. Once data have been collected, the ECM will determine if the nest is unoccupied (i.e., no eggs in the nest or nestlings have fledged), in which case, pursuant to the MOA, the nest will be removed by the ECM (see description of nest removal below). The ECM will search a 30-meter radius surrounding each nest for evidence of DT predation. All DTs depredated will be photographed, a UTM coordinate collected, and the length measured (or estimated). In addition, each DT will be marked to avoid duplication of data recording on subsequent surveys.

Although descriptions of nesting behavior and DT predation will be qualitative, the data will be valuable for assessing raven behavior and documenting potential problem individuals for management actions. In addition, an increase in the number of raven nests in the Project vicinity with or without signs of DT predation will suggest the potential need for revisions to PDFs or additional control measures (as described in Section 6).

4.3 Nest Removal

The majority of raven predation on DT most likely occurs in the spring, from April to May, when DT are most active and ravens are feeding young (Boarman and Heinrich, 1999). As such, the removal of unoccupied raven nests may be utilized to control DT predation. Pursuant to the MOA, both the CDFG and USFWS have approved the removal of unoccupied nests within the Plant Site and associated aboveground linear components. Nests will be removed only from within Beacon controlled lands. If nest are observed on adjacent lands, the resource agencies will be notified. The removal of unoccupied nests will occur simultaneously with the breeding season raven surveys that will take place from mid-February to the end of June. Removing raven nests outside of the breeding season may have a smaller effect on the raven population since they may readily rebuild the following season. However, evidence suggests that birds with no nest in their territory at the beginning of the breeding season were less likely to commence

nesting than those who already had an intact nest (Kristan and Boarman, 2003). As such, if an unoccupied raven nest is detected outside of the breeding window, it will also be removed by the ECM.

5.0 Adaptive Management

This section defines how adaptive management principles will be applied to the Common Raven Monitoring, Management, and Control Plan, specifically in reference to PDF and control/mitigation measure implementation. This section defines potential changes to the mitigation and conditions that may trigger them. Key examples would be 1) eliminating or refining a PDF or management measure if it is not working, or 2) incorporating a defined control measure, if impacts are observed, that would not otherwise be implemented (triggered). Other adaptive management techniques may also be identified in this section.

5.1 Definition

Adaptive management is typically used in environmental management efforts to facilitate more effective management of resources to achieve desired objectives. Adaptive management can be defined as an iterative and structured optimal decision-making process intended to reduce uncertainty through system monitoring. The decision-making process simultaneously maximizes one or more resource objectives and accrues information needed to improve future management, either actively or passively. Using current knowledge, passive adaptive management involves the use of conceptual modeling to guide management actions. The model is adjusted as new knowledge is obtained and management decisions are subsequently modified. Active adaptive management involves testing alternative hypotheses through system manipulation employing management strategies. Thus, passive adaptive management is based on information gained from observational studies whereas active adaptive management is based on information gained from experimental manipulation (Holling, 1978). This plan will focus on passive adaptive management but may ultimately apply both passive and active adaptive management.

5.2 Adaptive Management Conditions

In an effort to facilitate meeting plan objectives, it may be necessary to make changes to the PDFs or initiate the implementation of additional control measures. Foreseeable areas where changes may occur include the following:

1. Adjustments to the PDFs could occur for the following conditions of concern:

    a. Ponding water (construction phase)

    b. Evaporation ponds (operations phase)

    c. Roosting, nesting, and perching structures (operations phase)

    d. Waste management (construction and operations phases)

2. Implementation of additional control measures (described below in Section 6) could occur under the following set of conditions:

    a. The results of the biweekly and annual breeding season raven monitoring events suggest that current PDFs are ineffective at controlling raven occurrences in the Plant Site, thereby increasing the potential for DT mortality.

b. The Project proponent makes every attempt to adjust PDFs to resolve the raven issue and avoid the need for additional control measures; however, increased raven occurrences continue.

c. After reviewing the raven monitoring reports, the Project Biologist determines that any additional changes to PDFs will be ineffective at reducing the occurrence of ravens on site.

d. The Project Biologist makes recommendations regarding the appropriate control measure(s) to address an identified and uncontrolled raven issue.

e. The conditions prompting the need for additional control measures and the recommended control measures are discussed with Beacon and the resource agencies before any decisions are made.

f. The control measures proposed to be implemented are agreed to by the appropriate Project resource agency representatives.

3. Other adaptive management techniques may also be identified during implementation of the monitoring program but would be discussed with the Project proponent and the appropriate resource agencies before any decisions are made. These may include modifications to the monitoring program survey frequency.

6.0 Control Practices

If the results of the monitoring efforts suggest that there is a substantial and sustained (e.g., consecutive years) increase in raven activity that may result in DT predation, even with the implementation of PDFs as defined in Section 3.0, then Beacon may need to implement additional mitigation measures to further control ravens at the Project site. This section defines the types of control practices that may be implemented if additional mitigation is determined to be necessary based on the adaptive management conditions described above. As stated above, prior to the implementation of any control measure, the Project Biologist and Beacon would coordinate the discussion and approval of control measures with the appropriate resource agency representatives.

6.1 Roadkill Removal

Ravens are well known for eating animals that have been killed along roads and highways, which are often abundant in the desert region (Boarman and Heinrich, 1999). Although this food source is not considered great enough to dramatically increase raven populations in the desert region, it is considered a potential facilitator to increased raven nesting near roads and highways which may otherwise offer little food. Roadkill can comprise a large proportion of the diet for ravens nesting close to highways when other subsidies are located far away (Kristan et al., 2004). As described in Section 4.2.1, the ECM will document the occurrence of roadkill during the biweekly raven monitoring events. Monitoring of roadkill will focus on the Project Area, in particular the Plant Site, and surrounding paved and dirt roads, the staging area, and any other Project facilities that may support vehicular traffic, including construction equipment. If roadkill occurs frequently in the Project Area and if ravens are commonly noted feeding on that roadkill, it may be appropriate for Beacon to implement a roadkill removal program. Details of a roadkill removal program would be designed by the ECM in coordination with the Project Biologist and the appropriate resource agencies.

6.2 Hazing

Hazing can include any number of devices designed to scare birds; hazing can include either visual and auditory devices, or combinations of the two. Hazing was commonly used by farmers to dissuade birds from eating recently planted crops on airfields to prevent birds from accumulating near runways.

The most appropriate form of hazing technique for the BSEP would be an air cannon that would frighten birds away from the evaporation ponds. Gas cannons are mechanical devices that produce loud banging noises (similar to the noise of a shotgun) by igniting either acetylene or propane gas. Gas cannons may be used to scare birds out of large areas like agriculture fields, golf courses, and airports. However, their effectiveness is variable and is dependent upon the chosen method, the bird species involved, and the availability of alternative feeding/nesting/perching areas close by (Bishop et al., 2003). Many birds will become accustomed to this technique quickly if it is not reinforced with other techniques. Cannons are most effective when they are moved around to different parts of the impact area every few days. The air cannon would be stored onsite, but only used under specific circumstances, since birds may habituate to the disturbance caused by air cannon hazing, if used on a regular basis. If deemed appropriate, a hazing program would be designed by the ECM in coordination with the Project Biologist and the appropriate resource agencies. Permission may also be required from the local police or municipality, as there may be local ordinances that prohibit the creation of loud noises.

6.3 Methyl Anthranilate

Methyl anthranilate (MA) is a naturally occurring GRAS (generally recognized as safe) listed compound used as a food flavoring and fragrance additive. Chemical formulations containing MA have been found to be effective bird aversion agents as MA acts as chemosensory repellent, irritating pain receptors associated with taste and smell (Umeda and Sullivan, 2001). When applied as a formulated spray, MA has been found to be effective in repelling birds from feeding on crops such as cherries, blueberries, and table grapes. In addition, MA is used as a repellent for Canadian geese on lawns and in small pools of water. To date MA is thought to have limitations for topical application as it is considered highly volatile and breaks down readily under exposure to ultraviolet light. The most appropriate application of MA on the BSEP would be to small areas of ponding water or perhaps where known nesting has previously occurred. Repeat topical application would be necessary due to the breakdown of the chemical with exposure but may still prove useful as a short-term deterrent. After removing a current season unoccupied nest, the ECM could apply MA to deter nest rebuilding in that location. Prior to the use of MA at the BSEP, research into the most current application of MA to deter raven activity should be conducted by the Project Biologist and then methods could be designed in coordination with the ECM and the appropriate resource agencies.

6.4 Lethal Removal (Depradation)

If ravens are still attracted to the BSEP even after the implementation of PDFs, modification to PDFs, and implementation of control measures, it may be necessary to consider lethal removal. There is no evidence that lethal removal will have a long-lasting effect on raven population levels, raven foraging behavior, or survival of juvenile DT. In addition, identifying, targeting, and successfully removing individuals is also considered time consuming. However, this method is often used in management plans when specific raven pairs are determined to be responsible for taking relatively large numbers of DT (Boarman, 2002). These individuals can often be identified by the presence of juvenile DT shells beneath their nests, which are often used for consecutive years by the same pair of breeding ravens (Boarman and Heinrich, 1999). By removing those birds known to prey on DT, survival of juvenile DT in that vicinity may increase. However, it is

very difficult to identify the target bird(s) with absolute certainty, much less locate and shoot both members of a pair.

Under this control method, targeted ravens would be shot by rifle or shotgun. If shooting is not possible (e.g., on power lines) or has been unsuccessful, ravens could be trapped and humanely euthanized. Young ravens found in nests of removed adults need to be euthanized humanely if they can be captured safely.

7.0 Reporting

The ECM will prepare monthly monitoring reports summarizing the results of the biweekly monitoring events and describing any noted raven activity in the Project Area. These reports should include a discussion on raven observations in relation to PDFs and their efficacy or lack thereof. These monthly monitoring reports will be submitted to Beacon and the Project Biologist for review.

Following the completion of breeding season raven monitoring events, the ECM will submit a report summarizing the results to Beacon and the Project Biologist. The Project Biologist will compile both the monthly reports and the breeding season report into an annual report that will be submitted to the Project resource agency representatives for review. The annual report will summarize the survey results, interpret raven trends within the Plant Site, discuss the success or failure of PDFs, and make recommendations for modification of PDFs or implementation of control measures as necessary.

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