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Avian & Bat Monitoring and Management Plan

Ivanpah Solar Electric Generating System

Prepared for

Solar Partners I, LLC; Solar Partners II, LLC; and Solar Partners VIII, LLC

November 2015

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1.0 Introduction

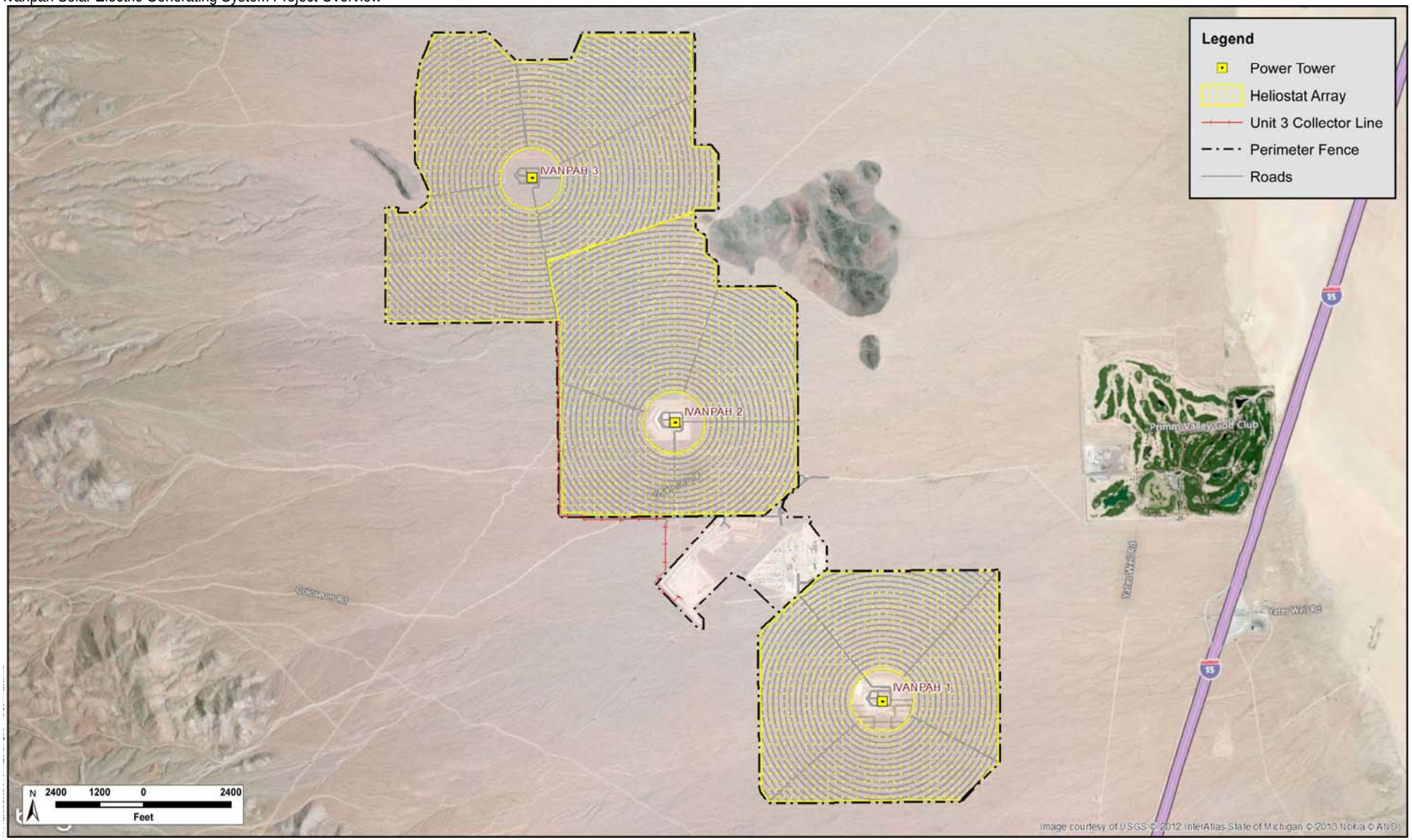
The Ivanpah Solar Electric Generating System (ISEGS) consists of three solar power electrical generating facilities with a combined net capacity of 377 megawatts. Each facility includes a central power tower, with associated electrical generating equipment, surrounded by a heliostat array that reflects sunlight to a receiver at the top of the tower (Figure 1). ISEGS is located on approximately 3,600 acres of federal land and was approved by the Bureau of Land Management (BLM) and the California Energy Commission (CEC) in 2010. Construction was initiated in 2010, and the first unit of the solar generating facility became operational in December 2013.

The purpose of this Avian & Bat Monitoring and Management Plan is to comprehensively monitor and identify potential avian impacts that may be associated with the facility, in collaboration with the U.S. Fish and Wildlife Service (USFWS), California Department of Fish and Wildlife (CDFW), CEC, and BLM. This plan is also intended to: 1) satisfy the BLM Right-of-Way (ROW) Permit requirement that the ISEGS team develop a Migratory Bird Treaty Act (MBTA) Conservation Agreement; 2) satisfy the requirements of the Avian and Bat Protection Plan approved by the CEC for ISEGS; and 3) achieve the avian and bat protection objectives of the USFWS in relation to the MBTA, Bald and Golden Eagle Protection Act (Eagle Act), and Endangered Species Act (ESA), including preparing written records of the actions that have been taken to avoid, minimize, and compensate for potential adverse impacts to avian and bat species. By developing a proactive management plan in close consultation with USFWS and other relevant state and federal agencies, project proponents can effectively minimize the potential for prosecutable offenses under the federal MBTA, Eagle Act, ESA, and relevant state regulations (USFWS, 2012).

This plan revision details the surveys to be conducted, the data analysis, reporting and management processes that will be implemented by ISEGS in collaboration with the USFWS, CDFW, CEC, and BLM (collectively, the Technical Advisory Committee or "TAC"; see Section 5.0) for the third year of avian and bat monitoring and management at the facility. The monitoring has been adapted based upon the results of the first two years of monitoring as conducted under the prior approved version of the plan (Revision 12 of this plan). Specifically, the monitoring during the first two years documented consistent patterns of on-site and offsite avian use along with "low" estimated levels of avian mortality (see Section 5.3 and quarterly reports). The consistency of the patterns of use and low levels of avian fatalities permit the discontinuation of plan elements from Revision 12 that do not provide additional information to characterize the avian use or mortality at the site. Revision 13 documents the modifications made to Revision 12, as approved by the TAC on DATE. However, the monitoring proposed in this revision is adaptive and the TAC may recommend modifications to the BLM Authorized Officer (AO) and CEC Compliance Project Manager (CPM) for the survey protocols and for adaptive management responses, if necessary, based on analysis of the survey data for avian and bat species detected at the site.

ISEGS incorporates practical design, construction, and operational measures to avoid or minimize potential avian impacts, including the mitigation measures identified by the CEC in the *Ivanpah Solar Electric Generating System Commission Decision* (CEC, 2010) and by BLM in the final environmental impact statement (BLM, 2010) and Right-of-Way grants for the facility. Substantial resources have been committed toward the development and implementation of avoidance, minimization, and mitigation actions to benefit the conservation of avian resources, including the development of this plan.

Figure 1.
Ivanpah Solar Electric Generating System Project Overview



1.1 Plan Goals

During the first two years of monitoring, the patterns of avian use at the facility along with collision and flux risk were documented and reported in the quarterly and annual reports. For the third year of monitoring, the goals are as follows:

1. **Provide Collision Mortality Estimates:** Estimates of avian mortality from collision will be calculated from data obtained by monitoring and identifying avian mortality and injury associated with facility structure collisions.
2. **Provide Solar Flux Mortality Estimates:** Estimates of avian mortality from flux effects will be calculated from data obtained by monitoring and identifying avian mortality and injury associated with solar flux generated by the facility.
3. **Provide a Framework for Management and Response to Risks:** The designation and description of the functioning of the TAC provides a management and decision framework for the identification and implementation of potential adaptive management measures.

1.2 Plan Objectives

The first two years of monitoring documented that the mortality associated with the perimeter fences, transmission lines, and offsite transects was less than 5 detections a season. Additionally, the patterns associated with avian use have been consistent over the seasons and documented in the annual reports. Therefore, as revised, this plan has the following goals:

1. Estimate collision-related avian mortality and injury with the following facility structures (Figure 1), using empirical data to calculate facility-wide mortality and injury rates:
    a. Power towers
    b. Heliostats
2. Estimate flux-related avian mortality and injury using empirical data to calculate facility-wide mortality and injury rates.
3. Document patterns of collision or flux-related mortality and injury associated with species, age/sex, season, weather, and visibility.
4. Document spatial patterns associated with collision- or flux-related mortality and injury.
5. Provide quantitative information for developing and implementing adaptive management responses commensurate with identified impacts.

Provide a framework for the TAC to jointly review, characterize, and recommend responses, based on monitoring results, to the appropriate lead agency representatives.

2.0 Adaptive Monitoring Plan

This monitoring plan is designed to determine the level of avian mortality and injury at the ISEGS project. The mortality and injury investigation will focus on the potential for collision and flux effects to occur during normal facility operation and during weather-related events. Survey protocols are detailed in Sections 2.1 and 2.2. This monitoring plan is adaptive, and modifications may be recommended by the TAC in response to the results obtained from the initial surveys.

2.1 Collision- and Flux-related Monitoring

This section describes the monitoring studies that will be implemented to assess avian mortality and injury risks associated with avian collisions with the facility power tower and heliostats (Figure 1) and sunlight (solar flux) reflected from the heliostat field toward the solar tower receiver. The primary objectives of the monitoring study are to estimate levels of avian mortality or injury and provide a framework for the management and response to risk. All avian casualties detected within the study areas will be recorded and, based on a field inspection of each casualty, a cause of death or injury will be determined, if possible. The total number of avian casualties will be estimated by adjusting for search frequency, removal bias (length of carcass persistence in the field), and searcher efficiency bias (percent found).

The number and proportion of detections related to unknown causes will be reported. If a large portion (i.e., more than 40 percent) of the detections cannot be determined, or presumed without a reasonable doubt to be caused by the facility, potential other causes, such as unrelated avian disease or a lightning event, will be considered and the analysis adjusted as appropriate in the seasonal report. All bat mortalities detected ancillary to other study objectives will be recorded by field survey personnel and operations staff, and reported in the quarterly reports described in this plan.

Causes of injury or mortality will be categorized according to the following criteria:

1. **Collision effects:** Birds with broken bones, chipped beaks, or other evidence of collision trauma, or birds found at the base of heliostats with bird-strike imprints in the dust on the heliostat.
2. **Flux effects:** Birds with any signs of singed feathers or tissues or visible ocular damage (per field evaluation with handheld magnifying glasses, binocular microscope or if detected during subsequent necropsy analysis).
3. **Flux and collision:** Birds with evidence of both collision and flux effects (evidence that flux impacts could have affected a bird's ability to avoid facility structures).
4. **Other:** Known cause, but not 1, 2, or 3 above (for example, lightning strike, avian disease, entrapment in buildings, etc.).
5. **Unknown:** No known or presumed cause.

2.1.1 Study Components and Field Methodology

This section describes a standardized field-survey approach based on USFWS and other guidance pertinent to renewable energy projects (e.g., CEC and California Department of Fish and Game [CDFG], 2007; Nicolai et al., 2011; Strickland et al., 2011; USFWS, 2010, 2012). The approach primarily involves systematically walking transects in 48 randomly selected, 5-acre plots inside Unit 2 and within the tower areas (including the high density heliostat areas) of all three Units of the facility to detect avian casualties and injuries; it also considers detection biases in estimation of impacts. Observers trained in proper search techniques will conduct the field surveys.

2.1.2 Carcass Removal Trials

If required by the TAC, the carcass removal trials will be conducted simultaneously with mortality surveys during the third year of monitoring. Carcass removal trials will be conducted for each of four seasons, because mesopredator and aerial scavenger pressure may vary by season (Smallwood, 2013). The test species selected will be based on availability and their similarity to expected small birds onsite. To the extent authorized in the USFWS Special Purpose – Utility (SPUT) permit, carcasses of native songbirds that are analogous to those occurring on the site and that are found incidentally by biologists involved in the project (e.g., road-killed birds), or otherwise made available by the USFWS or others, will be used. Small bird carcasses may also include house sparrows (*Passer domesticus*) or European starlings (*Sturnus vulgaris)*, consistent with all applicable laws and regulations. The trial carcasses will be dropped

from 5 feet or higher and allowed to land in a random posture. Global Positioning System (GPS) locations of each trial carcass will be recorded, and each carcass will be discreetly marked with tape or thread prior to placement so that it can be identified as a trial carcass if detected by facility personnel or moved by a scavenger.

Under Revision 12 of this plan the number of scavenger trials increased in the spring season of the second year of monitoring from 15 trials per season to 32 carcasses per season for small birds. Data from the first two years of monitoring showed consistent carcass persistence rates for large birds. The large bird carcass trials are therefore discontinued for the third year. Carcass removal trials for small birds will be continued during this third year of monitoring as evaluated by the TAC and if warranted based upon the results (see Adaptive Monitoring/TAC section).

The trial carcasses will typically be placed during each season to incorporate the potential effects of varying weather conditions and scavenger types and densities. Each trial carcass will be monitored with the use of a Bushnell Trophy Camera (Model 119436) or equivalent remote camera at randomly chosen locations within the areas surveyed for fatalities (See Attachment A, Example of Remote Camera Settings and Data). At most, five carcasses will be placed in a survey area at one time to limit scavenger swamping. Each carcass will be checked at least two times per week until it is scavenged or 6 weeks has passed since placement. If the carcass has been scavenged, all remaining feathers and parts of the carcass and the camera will be removed. The final disposition of the carcass will be classified as "Removed" if the carcass cannot be located and there are fewer than 10 feathers of any type or fewer than two primary feathers remaining. The final disposition will be classified as "Not Removed" if there are ≥ 10 feathers of any type, ≥ two primary feathers, or any flesh or bone remaining. Methods for incorporating carcass removal trial data into facility fatality estimates are described in detail in Section 3.1.

2.1.3 Searcher Efficiency Trials

The objective of the searcher efficiency trials is to estimate the percentage of casualties found by individual or teams of searchers. Trials will be conducted during each season in which vegetation differs from the prior season, because changes in cover may affect detection of carcasses. Smallwood (2013) found that searcher efficiency did not change over different seasons when controlled for cover type, which often becomes a covariate. Such similarities in cover may occur in desert regions between two seasons (e.g., summer and fall), when precipitation is very scarce and changes in vegetation cover are minimal. Searcher efficiency will be estimated by size of bird (small and large, as defined in Section 2.1.2). Estimates of searcher efficiency will be used to adjust the total number of birds found by observers to correct for detection bias.

During the first two years, searcher efficiency trials were conducted during each season. Searcher efficiency trials for all birds will be continued during this third year of monitoring in consultation with the TAC. During the third year of monitoring, protocols will ensure that the observers conducting surveys do not know when these trials are conducted or the location of the detection trial carcasses. During the third year of monitoring, the TAC will evaluate continuation or modification of these trials based upon the results (see Adaptive Monitoring/TAC section).

All searcher efficiency trials will be coordinated with the Designated Biologist and placed at random locations within areas being searched prior to the monitoring survey on the given day. Trial carcasses will be dropped from 5 feet or higher and allowed to land in a random posture. The GPS coordinates of each efficiency trial carcass will be recorded and used to retrieve carcasses not found during the survey. To prevent a trial carcass from being confused with actual study detections, trial carcasses will be marked unobtrusively with dark tape or thread on the leg of the bird. Immediately following the trial, the person responsible for distributing the trial carcasses will determine the number of trial carcasses found by observers. Each searcher is tested for searcher efficiency and all trials are combined for purposes of estimating overall searcher efficiency. Searcher efficiency trials are planned for continuation during the third year of monitoring under Revision 13 of this plan and will only be continued for subsequent years if

warranted under conditions that had previously not been tested (e.g., a substantially different amount of cover because of an unusually high amount of rain or the addition of new observers to the project).

2.1.4 On-site Monitoring

Collision with ISEGS facility structures (towers and heliostats) will be evaluated by systematic sampling of the tower area in each of the three ISEGS units (Ivanpah 1, 2, and 3), and the heliostat field in Unit 2. Potential flux effects (associated with the concentration of sunlight near the top of the tower) will be investigated within each of the units in accordance with the following methodology. All (100 percent) of the tower area (Figure 2a, b and c), comprising bare ground with and without high-density heliostats, roads, and buildings immediately around the towers, will be surveyed with 10-meter transects. The tops of buildings within the tower area are surveyed visually from within the tower and accessed on foot where feasible.

Search Timing

During the spring (late March to early May) and fall (late August to early October) migrations, monitoring will occur every seven (7) days in order to identify potential pulses of fatalities. Fatalities occurring during the winter and summer months outside of these periods are lower and relatively homogeneous temporally; therefore, surveys during these periods will be 21 days apart, starting 21 days after the last fall or spring survey. Surveys will be conducted according to the schedule in Table 1.

TABLE 1.
Fatality Monitoring Search Periods and Intervals

	Fall Migratory Period (late-August to early-October)	Winter (late-October through early-March)	Spring Migratory Period (late-March to early-May)	Summer (early-June through mid-August)
Search interval	7 days	21 days	7 days	21 days
No. of searches	7	7	8	4
Example dates to begin survey rounds	8/22, 8/29, 9/5, 9/12, 9/19, 9/26, 10/3	10/24, 11/14, 12/05, 12/26, 1/16, 2/27	3/20, 3/27, 4/3, 4/10, 4/17, 4/24, 5/1, 5/8	5/29, 6/19, 7/10, 7/31

Figure 2a.
Unit 1 Avian and Bat Fatality and Injury Sampling Scheme.

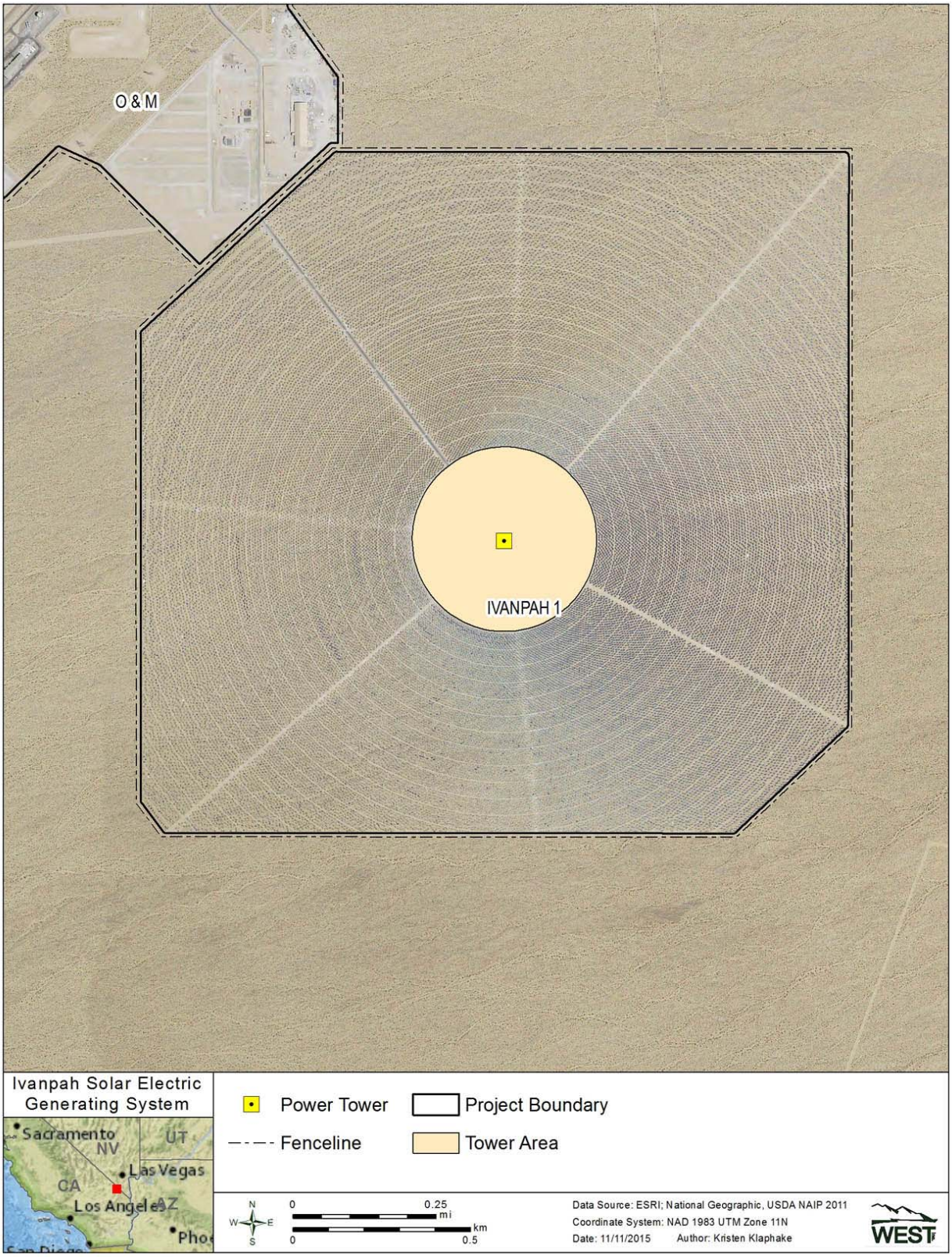


Figure 2b.
Unit 2 Avian and Bat Fatality and Injury Sampling Scheme.

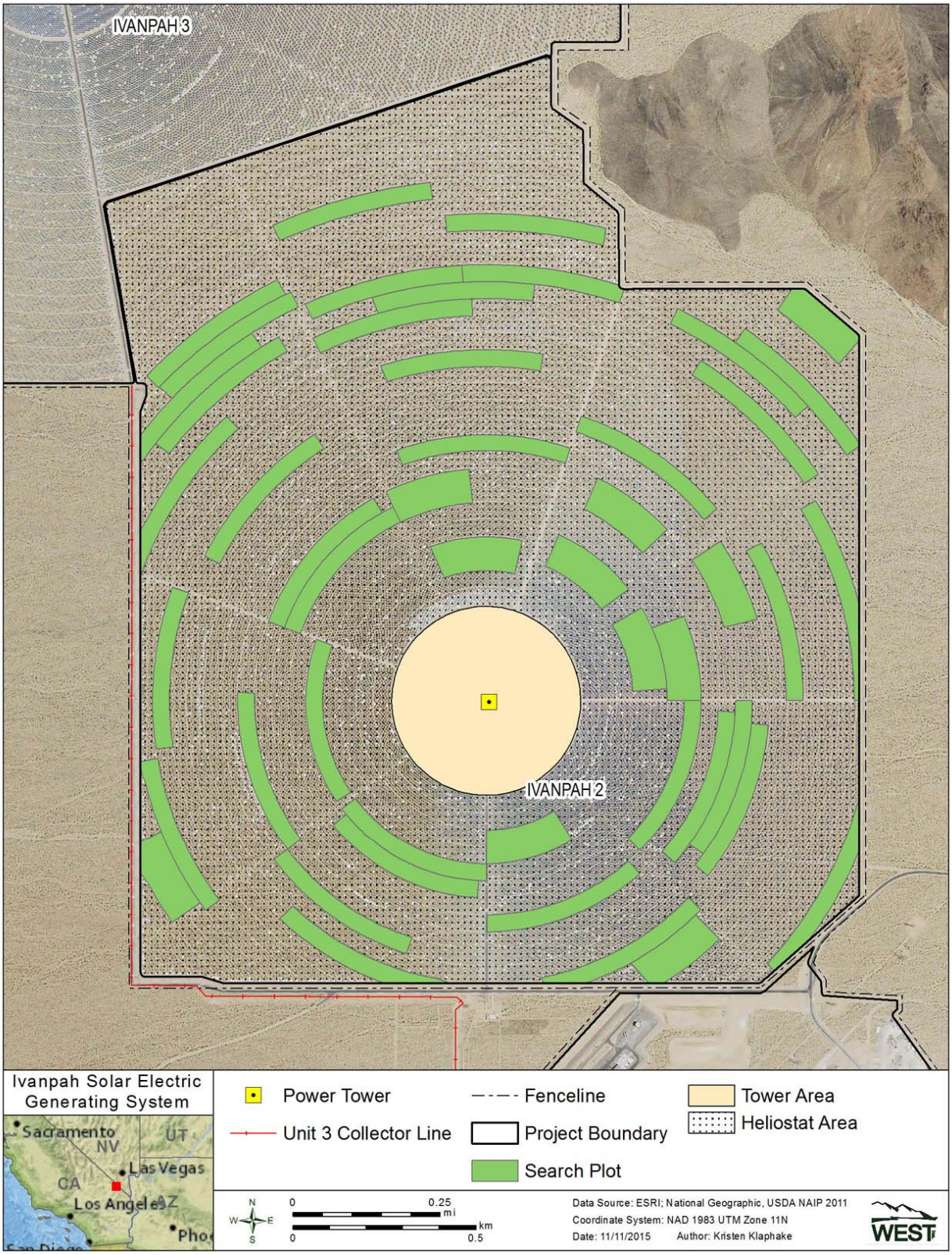
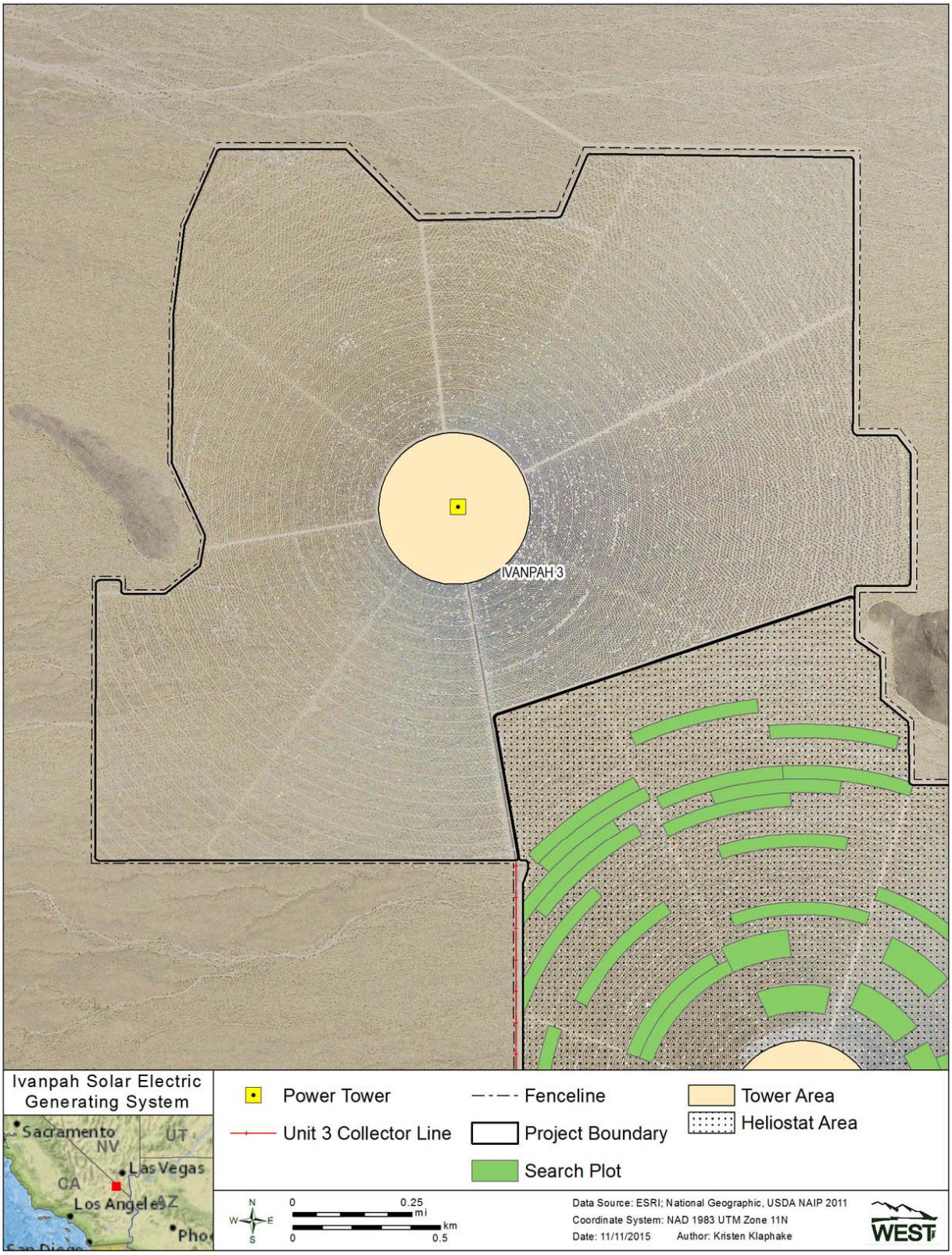


Figure 2c.
Unit 3 Avian and Bat Fatality and Injury Sampling Scheme.



Search Areas/ Methodology

This section describes the robust nature by which avian fatalities and injuries will be evaluated through systematic sampling of the ISEGS towers, and heliostats. Because the nature of avian risk varies by these project elements, search area methodologies also vary by project element, as described below. More than 8 percent of the heliostat fields, and 12 percent of the total area comprising Ivanpah 1, 2, and 3 (Figure 1) will be systematically sampled through these methods. In addition to this sampling effort, 100 percent of the facility surface will be examined by workers three to five times a year through the Wildlife Incident Reporting System (WIRS; refer to Section 3.4).

Tower area: An area defined by a radius of approximately 850 feet (260 meters) around each tower (the "tower area") is generally cleared of vegetation for operational purposes. Each tower area is located beneath the portions of the solar field that would have the highest flux intensity and surrounds the tallest structure within the facility. Each tower area will be sampled according to the schedule in Table 1 by walking transects and visually inspecting the area for evidence of avian and bat mortality and injury (e.g., carcasses, feathers, injured birds). Each survey will result in a complete (100-percent-coverage) assessment of the tower area. The tower area survey is primarily intended to examine the potential for birds and bats to be affected by acute flux exposure or tower-related collisions.

Heliostat field: Approximately 24 percent of the Unit 2 heliostat field will be visually inspected for evidence of avian mortality or injury, according to the schedule in Table 1. The results for three heliostat field monitoring was provided in the annual reports. For the third year of monitoring, Unit 2 heliostat field was selected. Use of Unit 2 will continue to allow for estimates across the full facility because searcher efficiency, carcass persistence, numbers of detections and species composition are all comparable across units as evidenced in the past two years of monitoring. Sampling in Unit 2 will consist of 48 five-acre arc plots distributed throughout the heliostat fields, as shown in Figure 2b. Each region of the project area will be sampled to account for potential tendencies for bird fatalities based on the direction of approach and variation in the density of the heliostat arrays, resulting in a spatially balanced design, as suggested by Manuela Huso (pers. comm.). The heliostat arrays surrounding the tower are divided into 8 segments that are each divided again by 2, resulting in inner and outer halves totaling 16 areas. Modeling requires at least 20 percent of each of these 16 areas in Unit 2; however, 24 percent will be sampled.

The decision to sample at least 20 percent of the Unit 2 heliostat field was made based on an in-depth analysis that relied on conservative scenarios for potential avian mortality at the site and subjecting these scenarios to a sensitivity analysis to determine the coefficient of variation (WEST, Inc., 2013). In addition, these scenarios were then adjusted by the actual searcher efficiency and scavenger trial results to date along with the actual mortality per megawatt as determined in the first year of monitoring. This analysis was undertaken to ensure that the outcome of the heliostat field surveys are effective for supporting the adaptive management goals of this plan and to allow accurate extrapolation of results to facility-wide estimates. Thus, the scenarios were evaluated with power analysis by using actual site mortality levels and simulating three hypothetical levels of fatality (based on per-megawatt mortality reported for other renewable energy projects) under actual site values for searcher efficiency and carcass removal. Details regarding the values used in this analysis are presented in Table 2.

The values for each of the scenarios used ISEGS carcass removal rates, searcher efficiencies, and the distribution of fatalities across the site. At the simulated levels of mortality, the 90-percent confidence interval for the facility-wide estimate narrows as the survey area increases, reaching a nearly asymptotic relationship at the 15-percent sample area in all cases (Figure 3a-d). Additionally, for all fatality rates modeled except 1 bird/MW/year, the coefficient of variation (the standard deviation/estimate) reaches a level of less than 25 percent at the 8.1% heliostat sample area (Figure 4). If fatality rates should fall to 1 bird/MW/year, the coefficient of variation will increase modestly to approximately 30%, however, should this mortality rate be estimated through this year of the monitoring program, the concerns

associated with the site would be minimal. The analysis demonstrates that the decreased sample area in this plan revision is adequate to provide a sufficient coefficient of variation in the overall facility estimates.

TABLE 2
Values for the Analysis of the Effects of Sample Area on Fatality Estimates and Confidence Limits (i.e., Power Analysis) for ISEGS Monitoring Study

Topic	Details	Comments for ISEGS Values
Area searched	Range from 1 percent to 30 percent	Range used for assessment of statistically valid search area.
Scavenging rate	Mean removal time of 9.8 days for small birds, >42 days for large birds	Based on 2013-2014 Winter through 2015 Summer carcass removal trial data collected at ISEGS
Searcher efficiency	0.53 for small birds; 0.65 for large birds	Based on 2013-2014 Winter through 2015 Summer searcher efficiency trial data collected at ISEGS. Accounts for proportion of feather spots in detections (0.20 for small birds, 0.26 for large birds) and feather spot detection rate (0.48)
Distribution	Assumed evenly distributed throughout facility area	The distribution of detections has been distributed in a generally uniform fashion with respect to unit, and uniformly with respect to distance and direction from tower within units.
Fatality rates	A: 1 bird per MW/year B: 5 per MW/year	8.8% of fatalities were large birds based on detections from 2013-2014 Winter through 2015 Summer.
	ISEGS: 6.4 per MW/year C: 10 per MW/year	Year 1 annual fatality rate in heliostat areas was 6.4 birds per MW/year

Figure 3a.
Fatality Estimates and 90% Confidence Intervals for Fatality Rate A Simulation.

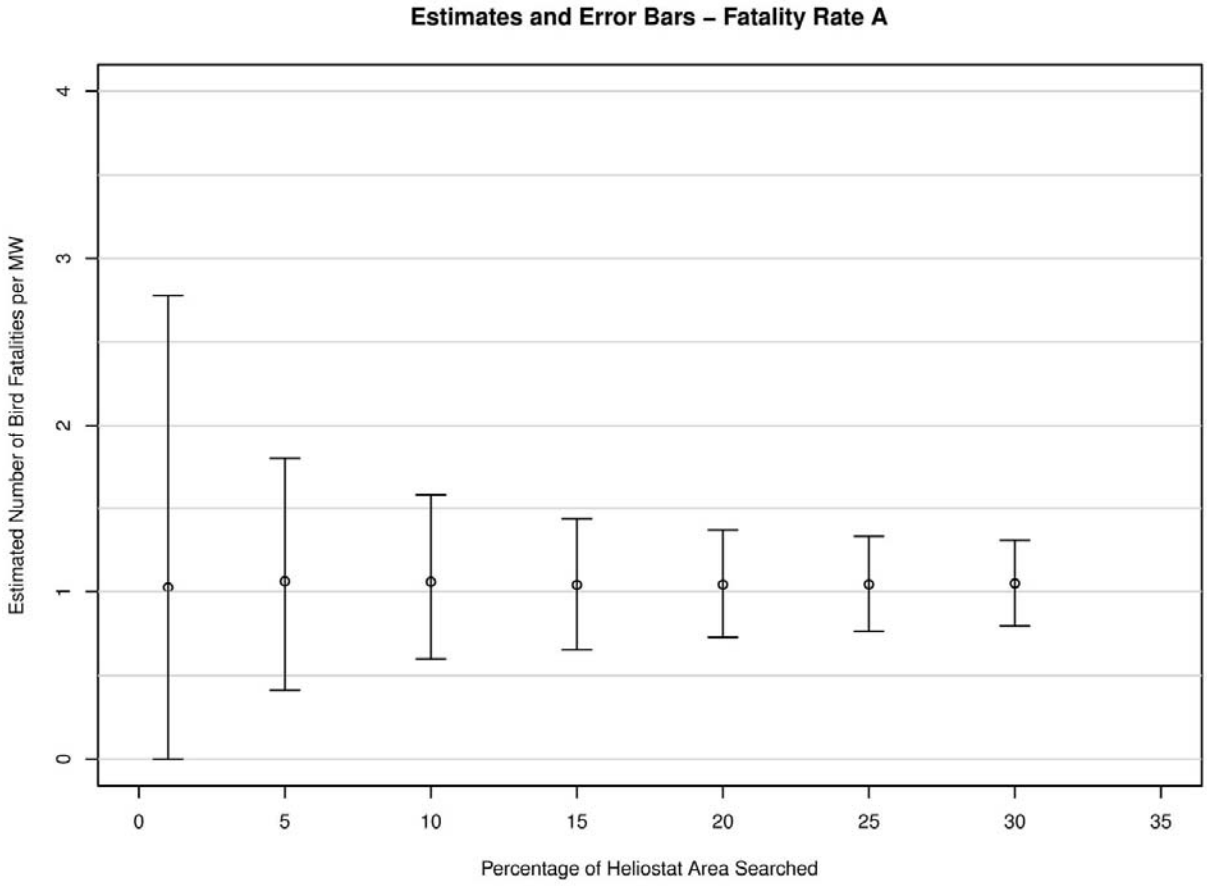


Figure 3b.
Fatality Estimates and 90% Confidence Intervals for Fatality Rate B Simulation.

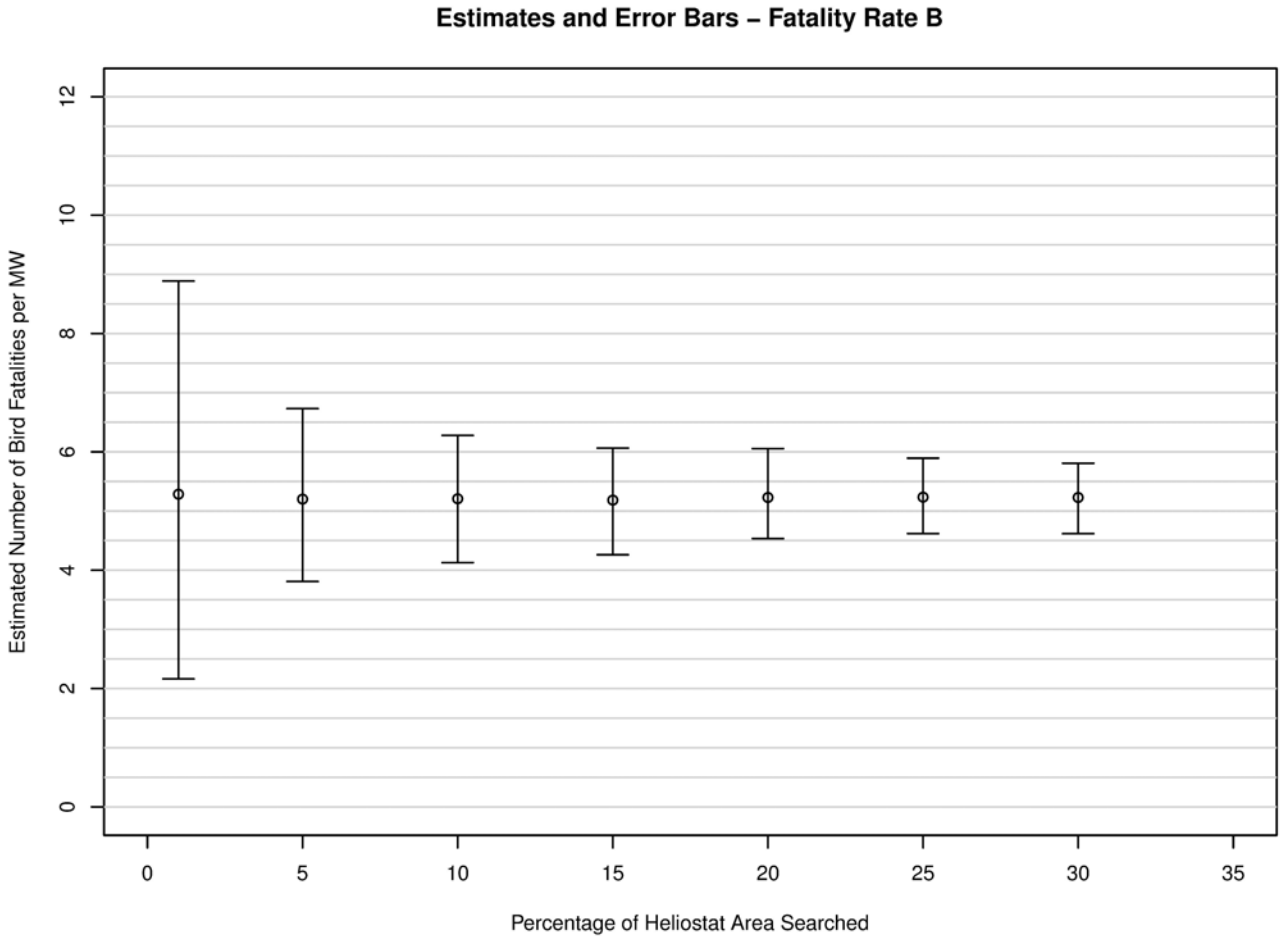


Figure 3c.
Fatality Estimates and 90% Confidence Intervals for Year 1 Fatality Rate.

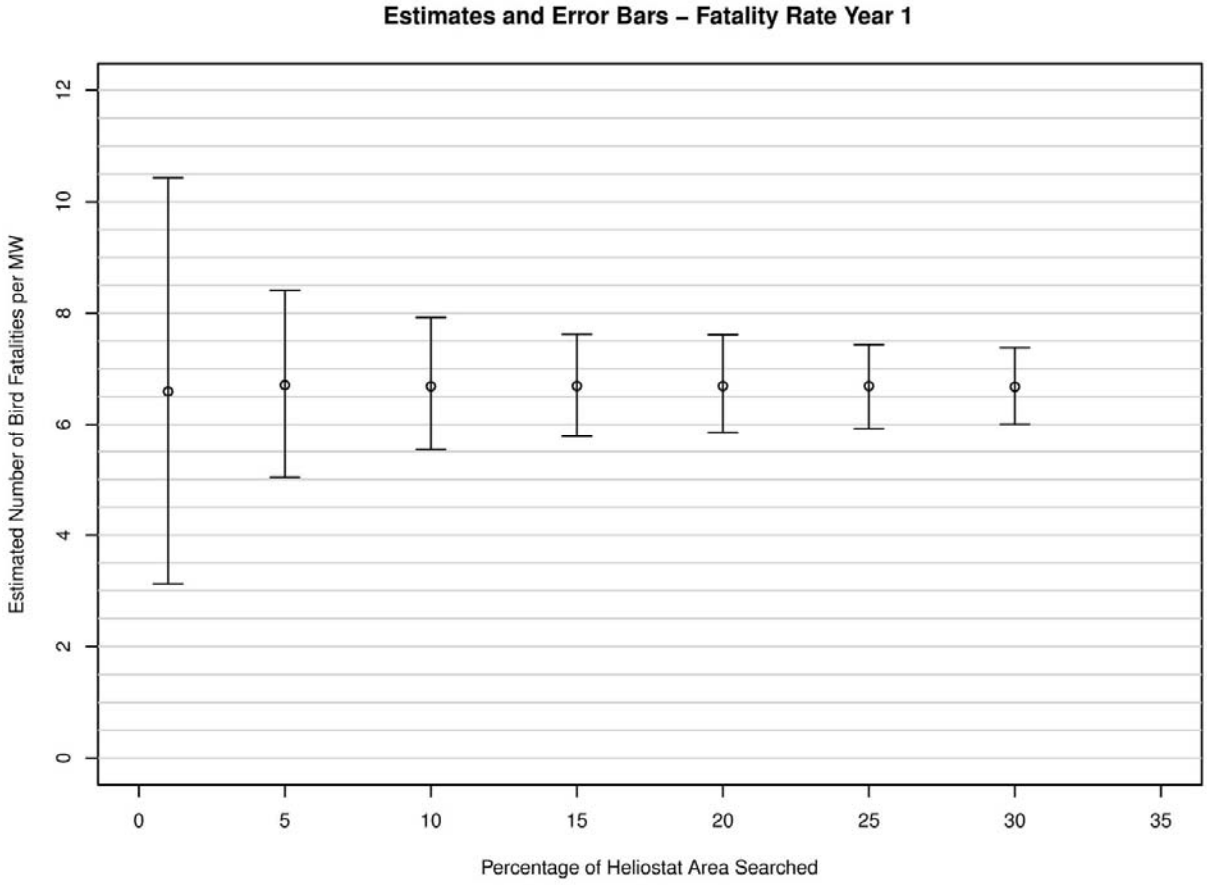


Figure 3d.
Fatality Estimates and 90% Confidence Intervals for Fatality Rate C Simulation.

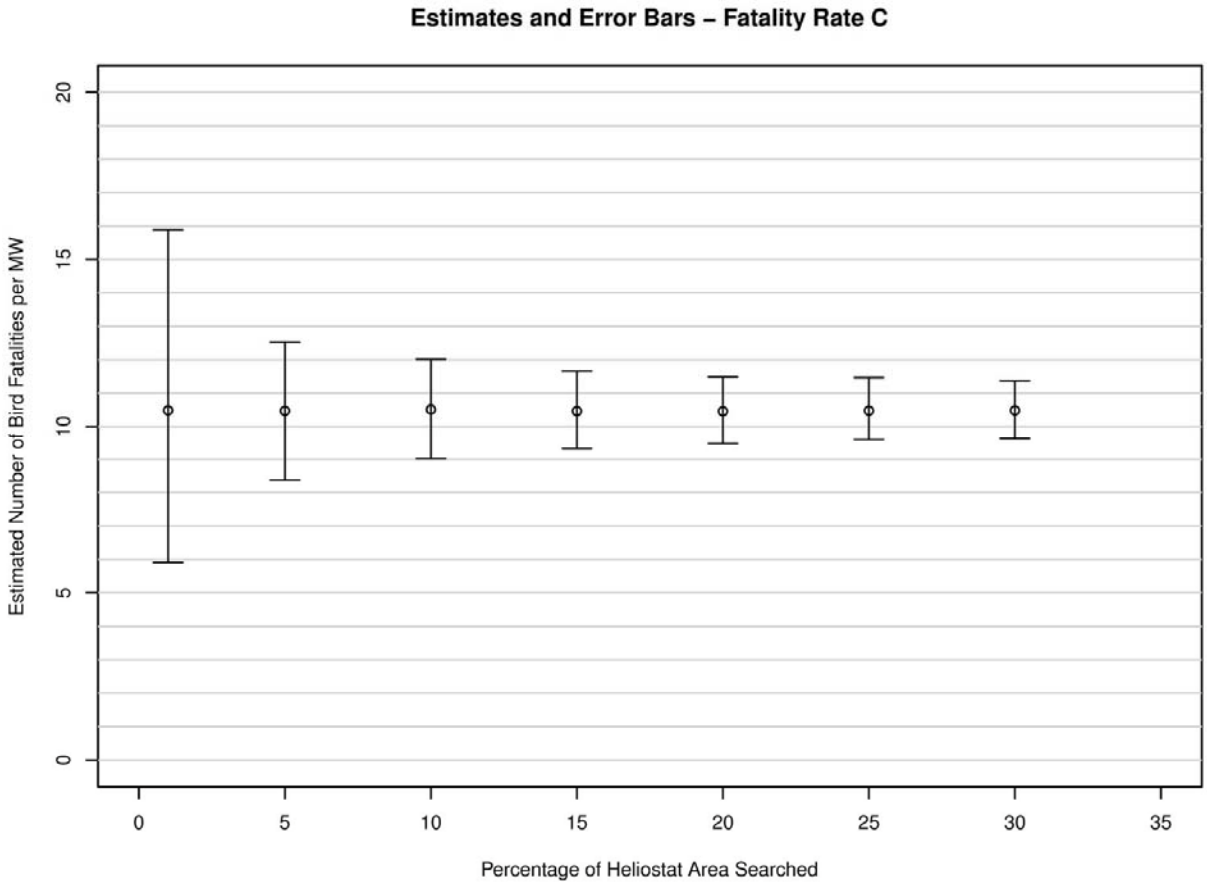


Figure 4.
Coefficient of Variation for Fatality Estimates Based on Simulated Fatality Rates A, B, C, and Actual Year 1 Fatality Rate.

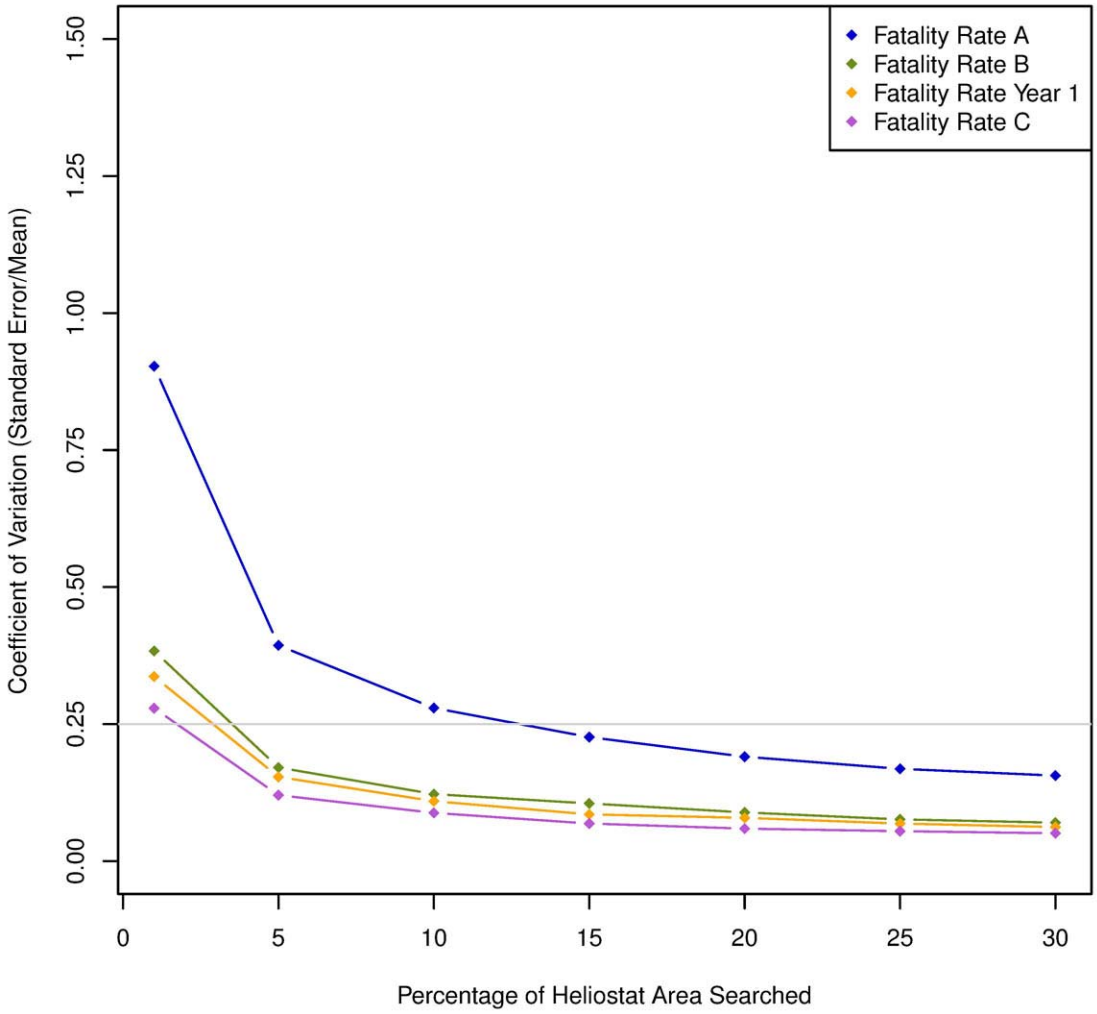
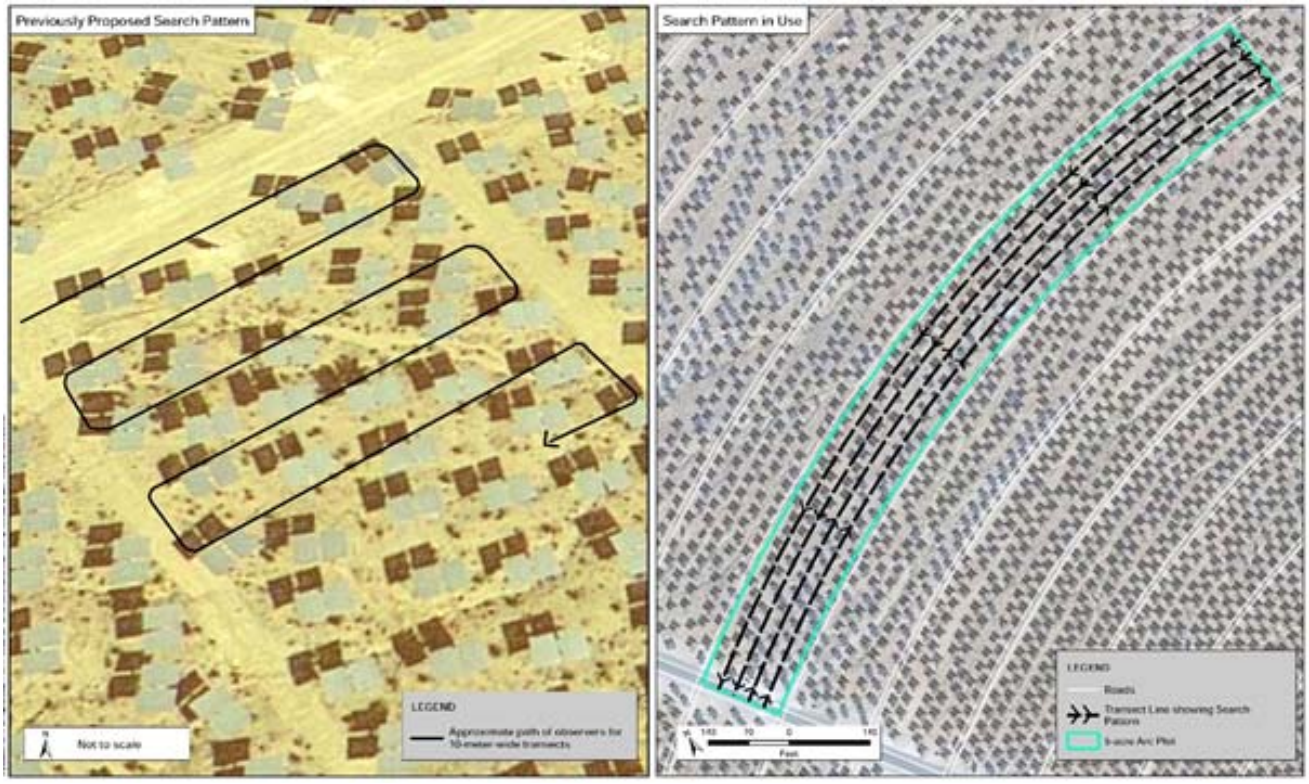


TABLE 3
Basic Search Parameters for ISEGS Mortality and Injury Monitoring Study

Topic	Details	Comments
Survey coverage in Heliostat field in Unit 2	24 percent	Subject to TAC recommendations in response to mortality rates identified from searches
Survey interval	See Table 1	Subject to TAC recommendations in response to scavenger trials
Rate of travel	1.7 to 2.2 miles/hour	Slow pace to allow careful visual inspection on each side of transect
Transect spacing	Tower area: Standardized at approximately 10 meters apart Heliostat field: Standardized at approximately 10 meters* apart, except in high-density heliostat fields in the inner arc plots where transects will be approximately 8 meters apart	Heliostat field transect timing (early morning, mid-day or afternoon) and spacing may vary for searchers to maximize visibility considering vegetation density and/or logistical issues associated with mirror height and position
Transect length	On-site sample areas: Standard within each randomly selected sample area	Parallel to ring roads and perimeter fence
Surveyor breaks	Approximately once per hour	Short breaks at one-hour intervals to hydrate, snack, and stay alert; approx. 30 minutes for lunch
Surveyor continuity	Emphasized	Same staff used for each survey (as is practical given staffing constraints) to maximize consistency

*Transect spacing of 10 meters is selected based on experience surveying for avian fatalities in low-growing desert vegetation and flat topography, comparable to conditions present on and off the facility area. The vegetated area between ring roads is 39.6 meters (130 feet); therefore, surveying with four transects spaced at approximately 10-meter spacing (offset 5, 15, 25, and 35 meters from the outside edge of each ring road, and at 10-meter intervals in the cleared area surrounding the towers) allows thorough visual inspection of the sample areas. Six to 10 meters is a generally accepted standard for fatality monitoring at other renewable projects in similar vegetation and topography, and the California guidelines recommend 6-meter spacing with adjustments based on vegetation and topographic conditions (CEC and CDFG, 2007). Additionally, the USFWS (2012) guidelines recommend spacing at 4- to 10-meter intervals based on vegetation and topography.

Figure 5
Ivanpah Tower 1: Example of Fatality Monitoring Search Pattern: originally planned search pattern (left) and search pattern implemented (right)



2.1.5 Data Recordation and Detection Protocols

When a detection is made, information about the type of bird, its condition, and the location will be recorded in a digital data dictionary. The term "detection" is used throughout this document to indicate that observers may find injured birds, intact dead birds, partial birds, and feather spots indicative of avian mortality, as well as injured or dead bats. Field personnel will undertake visual and manual inspection of all carcasses, feathers, and/or body parts discovered in the field. For all detections, data recorded will include species, sex, age, and breeding condition (for example, if a brood patch is present) when possible; distance from observer when detected; date and time collected; GPS location; distance to tower (or structure that caused mortality, if determined); dominant vegetation/ground cover at the location (i.e., within 2 meters of the carcass); condition (fresh, early decomposition, late decomposition, desiccated, scavenged, intact); and any indication of cause of death, such as type of injury, using the criteria outlined in Section 2.1. All detections will be plotted on a detailed map of the study area that shows the location of the surveyed areas, heliostats, tower, roads, and perimeter fence and photographed, using a 12-megapixel digital camera, in situ as well as with full-frame photographs of the dorsal, ventral and head areas of the bird or bat.

Under direction of the TAC detections will be collected, labeled with a unique number, bagged, and frozen for up to one year for future reference and possible necropsy if cause of death cannot be determined upon physical inspection. Carcasses may also be used for scavenger and searcher efficiency trials. The contractors, with TAC approval, or Fish and Wildlife Service Law Enforcement branch will determine whether certain birds detected during the surveys should be removed from the project area so that a third-party wildlife laboratory, under the direction and expense of the USFWS or TAC agencies, may conduct formal necropsy assessments. Copies of all results of any formal necropsy assessment will be provided to the TAC and ISEGS within one week of completion. Detections discovered incidentally outside of the surveyed areas, such as those identified while driving through the site or observed outside a survey area boundary during other project-related activities, will also be documented following the above protocol as closely as possible. These detections will be coded as incidental discoveries, and not included in statistically based estimation procedures for the facility because they would not represent systematic survey results.

In the event a dead or injured bald or golden eagle is found, USFWS Office of Law Enforcement (OLE) shall be contacted as soon as possible, but no later than 48 hours after discovery. If a dead eagle is found, the OLE agent will provide instructions on collection and disposition of the eagle carcass. Until then, the carcass will be left in place, unless a project-affiliated biologist has the necessary federal and state permits to authorize handling the carcass in coordination with the OLE.

Any state- or federally listed threatened or endangered species found dead or injured shall also be reported to OLE as soon as possible, but no later than 48 hours after discovery. If a dead animal is found, the OLE agent will provide instructions on collection and disposition of the carcass. A list of federal threatened and endangered species by state may be found in the USFWS's Threatened and Endangered Species System (TESS) database at: http://www.fws.gov/endangered. A list of California threatened and endangered species may be found at http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/TEAnimals.pdf.

Migratory birds, including eagles and threatened or endangered species, that are injured shall be captured, stabilized, and immediately transferred to a licensed veterinarian or federally permitted migratory bird rehabilitator for care. All injured birds observed within a survey area or elsewhere within the facility will be recorded and treated as detections for analytical purposes. The primary avian rehabilitation facility that was identified to care for injured birds potentially detected during Revision 12 of the plan was the Ojai Raptor Center, 370 Baldwin Road, Ojai, California (www.ojairaptorcenter.org), with Kim Stroud, Director (805-798-3600/raptorcenter@roadrunner.com) serving as the primary point of contact. Other avian rehabilitation centers that may also be used are listed in Table 7.

TABLE 4
Avian Rehabilitation Centers

County	City	Name	Phone
Kern	Bakersfield	California Living Museum	661-872-2256
Kern	Bakersfield	Facility for Animal Care and Treatment	661-654-3167
Kern	Tehachapi	Tehachapi Wildlife Rehab & Education	661-822-8993
Kern	Ridgecrest	VCA Crestwood Animal Hospital	760-446-7616
San Bernardino	Big Bear Lake	Moonridge Zoo	909-584-1299
San Bernardino	Chino Hills	All Gods Creatures	909-393-1590
Clark	Las Vegas, NV	Animal Kingdom Veterinary Hospital	702-735-7184
Clark	Las Vegas, NV	Wild Wing Project	702-238-0570

On September 12, 2014 CDFW notified the facility that non-listed injured avian species may be transported to Nevada for treatment. Since September 24, 2014, injured birds have been transported to Nevada facilities listed above.

2.1.6 Permitting to Handle Carcasses and Specimens Used in Bias Trials

To ensure accurate documentation of fatalities and probable causes of death, and to enable robust searcher efficiency and carcass removal assessments, biologists involved in mortality monitoring and related bias trials are covered by federal and state permits that authorize handling and collection of carcasses of birds protected by the MBTA. At the federal level, ISEGS has obtained a USFWS SPUT permit that specifically authorizes collection of bird fatalities associated with commercial energy and utility operations, and use of bird carcasses for related bias trials. If additional bird specimens acquired outside the project are necessary to achieve sufficient sample sizes for the described bias trials, these collections also will be appropriately authorized by the SPUT permit. All such specimens will then be formally transferred to and reported under the ISEGS SPUT permit, once it is in place.

Handling of migratory birds (and bats) is also prohibited under the California Fish and Game Code unless specifically authorized by a CDFW Scientific Collecting Permit. These permits generally are issued only to individuals. The designated biologist for the ISEGS facility holds this permit.

2.1.7 Study Duration

Standardized surveys within each of the three ISEGS solar facilities (power towers and heliostats), will be conducted for one year. Monitoring intervals and survey areas may be adjusted as necessary to incorporate the results of the carcass removal trials and prior seasonal evaluations and conclusions. After each season, the monitoring program will be evaluated by the TAC to determine if modification or continuance is necessary.

2.2 Weather-related Fatality Monitoring

Low-visibility weather conditions have been implicated in most larger-scale avian collision events at communication towers and other tall structures (Longcore et al., 2012; Gauthreaux and Besler, 2006).

High wind conditions may also be of concern with regard to collision risk. To document potential weather-related collision risks that may be associated with the three power towers at the facility, additional surveys will be conducted during the peak spring (late-March to early-May) and fall (late-August to early-October) migration periods, within two days of up to two low-visibility or high-wind nocturnal weather events per season. For study purposes, a low-visibility weather event is defined as foggy, highly overcast, or rainy night-time weather typically associated with an advancing frontal system and can occur during the day or night. For the purposes of this monitoring program, high-wind events are defined as winds above 40 miles per hour for a sustained period of greater than four hours. In addition, the online Avian Hazard Avoidance System (AHAS), accessed at http://www.usahas.com/bam/, will be used to identify and monitor potential high-risk weather-related events for birds.

Surveys will be conducted by walking transects, approximately 10 meters apart (see Table 6 for spacing information), throughout an approximately 259-meter (850-foot) -radius circular plot, a distance that is approximately 1.9 times greater than the tower height. The search radius is based on a conservative application of the CEC and CDFG's (2007) California guidelines for wind energy projects, which recommend a search distance extending out one-half the distance of the maximum height of the structures. The search radius also is based on the USFWS (2012) recommendation that avian surveys extend out a distance equal to twice a structure's height in the context of tall wind energy towers. Studies have found that over 80 percent of bat fatalities fall within half the distance of a wind turbine's height (as cited in USFWS, 2012). Consequently, the proposed survey area would also allow identification of potential bat collisions during the weather-related fatality monitoring effort. All avian and bat detections will be documented and collected in a similar manner as described for the year-round standardized surveys.

3.0 Data Analysis and Reporting

Data analysis and reporting will consist of assessing collision and flux-related mortality and injury. The collision- and flux-related data analysis procedures are detailed in Section 3.1, along with the methodology for the assessment of weather-related events..

3.1 Statistical Methods for Collision- and Flux-related Investigations

Statistical methods will be used to generate facility-wide estimates of potential avian impacts based on the following:

1. Observed number of detections found during standardized searches in the monitoring season for which the cause of death can be determined and is facility-related
2. Non-removal rates, expressed as the estimated average probability that a potential detection is expected to remain in the study area and be available for detection by the observers, based on removal trials
3. Searcher efficiency, expressed as the proportion of placed trial carcasses found by observers during the searcher efficiency trials

Fatality estimates will be reported as collision, flux, flux and collision, other project impacts, or unknown (as described in Section 2.1) for a minimum of four categories: (1) all birds, (2) small birds, (3) large birds, and (4) raptors specifically. The total number of avian fatality detections identified during the surveys will be adjusted for removal and searcher efficiency biases to generate estimates of facility-wide mortality, as well as project-caused avian impacts. All survey area or incidental detections, regardless of species, will be reported; however, separate estimates will be prepared for the 100-percent tower area survey and the heliostat field.

3.2 Fatality Estimator

Fatality rate estimation is a complex task due to several variables inherent to every fatality monitoring study. Carcasses may persist for variable amounts of time due to local scavenger activity or environmental conditions leading to carcass degradation over time. Carcasses and feather spots are also detected with varying levels of success based on carcass characteristics and ground cover (e.g., vegetated areas underneath heliostats versus cleared areas around towers). For these reasons, it is generally inappropriate to draw conclusions based on the raw number of fatalities alone. The desire to estimate fatalities given these variables has driven the development of several statistical methods for estimating fatalities (e.g., Smallwood 2007, Huso 2010, Korner-Nievergelt 2011). All of these fatality estimation methods share a similar underlying model. Generally, the fatality estimation for a given site may be expressed as:

$$F=C/rp,$$

where F is the total number of fatalities, C is the number fatalities detected and included in fatality estimation, r is the probability a carcass is unscavenged (carcass persistence) and available to be found at the end of the search interval, and p is the probability of detecting a carcass or searcher efficiency (Huso 2010).

Carcass persistence for small and large carcasses exhibit distinctive patterns based on the first year of data (see ISEGS annual report [HT Harvey and Associates, 2015]). Given the substantial carcass persistence trial sample sizes accumulated by size after the first year, and projected increase in sample size over subsequent years, carcass persistence models will be separate for small bird and large bird persistence trials. Fitting separate models by size class permits additional flexibility in modeling probability of persistence, namely the opportunity to fit different distributions with different sets of covariates to account for spatial or temporal variation by size class. The sample size for each size-specific model will be smaller than the sample size of a combined dataset model, resulting in a decrease in precision; however, given the large accumulated datasets for each size class, the potential loss in precision is negligible compared to the potential increase in accuracy.

The bias correction factors r and p are estimated by covariates that may influence the detectability and persistence of each carcass, such as carcass size, presence of vegetation, and stage of decay or scavenging (i.e., feather spot versus carcass). For this study, the Huso estimator will be used to correct for detection and scavenging bias; the estimator was demonstrated to perform well under a variety of conditions (Huso 2010). The Huso model was developed in the context of estimating fatalities for post-construction fatality studies at wind energy facilities; however, the Huso estimator is suitable for other sources of anthropogenic avian mortality, including power lines and utility scale solar facilities (Huso 2010).

All fatality estimators have limitations, particularly when fatality counts are low. In particular, when detections are five or fewer, regardless of survey effort, estimates and confidence intervals can be subject to uncontrolled bias and must be interpreted with caution (Korner-Nievergelt et. al 2011). Rather than report estimates with little inferential value, no estimates will be provided for combinations of covariates (e.g. size, location, cause) resulting in fewer than five detections.

All fatality estimates will be calculated using the Huso estimator, as well as 90% confidence intervals using bootstrapping (Manly 1997). Bootstrapping is a computer simulation technique that is useful for calculating point estimates, variances, and confidence intervals for complicated test statistics. A total of 1,000 bootstrap replicates will be used. The lower 5th and upper 95th percentiles of the 1,000 bootstrap estimates provide estimates of the lower limit and upper limit of an approximate 90% confidence interval on all estimates.

3.2.1 Estimating Carcass Removal Times

Measurements of carcass removal rates are often subject to censoring. In this context, censoring refers to the fact that a value (e.g., days a carcass is present before being removed) may not be known exactly, but within a finite range. For example, suppose a carcass was checked on day 7 and was present, and was checked again on day 10, but was found to be missing. The exact time until removal is unknown; however, it is known that the carcass was available to be found for between 7 and 10 days. This carcass would be considered "interval censored". Similarly, if a carcass lasts the entire six-week trial period, that carcass is "right censored"—we know the carcass lasted at least six weeks, but it could have persisted longer. Due to the fact that camera traps (e.g., cameras that automatically document activity at the trial carcass) are used for carcass removal trials, the majority of scavenging times were known precisely, and the data were not censored. However, when cameras fail to record the moment of scavenging, interval censoring is applied. In addition, the distribution for the removal differed between large and small birds carcasses tested during the first two years of this study. As a result, small and large bird persistence is estimated separately during the third year of monitoring.

There are four commonly used distributions implemented in the survival models used to estimate the value of r : exponential, Weibull, loglogistic, and lognormal. These four distributions exhibit varying degrees of flexibility in order to model a wide variety of removal time distributions. Akaike's Information Criterion adjusted for sample size (AICc; Akaike 1973) is used to rank the fit of each survival model fit to carcass removal data. The exact time of death for detected fatalities is usually unknown, so the probability of persistence cannot be calculated exactly for each carcass; however, it can be estimated from the selected survival model and bootstrapped to obtain a range of estimates of r for each carcass.

3.2.2 Estimating Searcher Efficiency

Searcher efficiency, or the proportion of carcasses detected, p, is represented most simply by the following equation:

$$p = \frac{Number\ of\ Carcasses\ Observed}{Number\ of\ Carcasses\ available}$$

3.2.2.1 Model Selection for Searcher Efficiency Trials

Searcher efficiency trials will be conducted during each season in which vegetation differs from the prior season, because changes in vegetative cover may affect carcass detectability. *A priori* decisions were not made regarding whether vegetative cover would differ between seasons, but rather, searcher efficiency trials are conducted in all season. The nearly complete lack of vegetation cover in the tower area suggests that searcher efficiency may be higher in the tower area than in other Project areas. If this hypothesis is true, accounting for this difference in searcher efficiency across Project areas is important for producing accurate fatality estimates.

To evaluate various hypotheses regarding differences in carcass detectability among Project areas, seasons, and/or carcass size, logistic regression models are fit to searcher efficiency data and corrected Akaike's Information Criteria (AICc) is used to compare models. The Project area is defined using two categories to reflect the suspected differences in searcher efficiency due to differences in vegetation cover: the tower area, which consists of the power block and the inner HD heliostats, and other areas, which consists of all other Project areas not included in the tower area. Models will be constructed for season, carcass size, Project area, and Project area plus carcass size, and compared to the null model.

3.3 Reporting

All detections will be recorded in the USFWS Special Purpose – Utility (SPUT) permit report and submitted to the TAC monthly. A seasonal monitoring report will be prepared within three months of completion of each seasonal monitoring period (once per quarter) by the contractor responsible for field

studies and data analysis. The report will include the results of the studies, as well as a discussion of the data collection and analytical methods. The report will also include an appendix that lists each individual detection observed, identification number, species, date of find, GPS location, condition, type of injury and other evidence of cause of death, and additional notes or comments. This list will include all documented injuries and fatalities, even if the detection is not believed to have been caused by the solar energy facility, and will include all detections found during both standard surveys and incidentally. The report will include results of the carcass removal and searcher efficiency trials, including estimates of removal rates and searcher efficiency by size and season. Observed and adjusted fatality rates[1] (and associated standard error and 90-percent confidence intervals) resulting from collision, exposure to solar flux, both, unknown, and all causes will be estimated for all birds, small birds, large birds, and raptors. Maps will be provided showing the location of each detection relative to the facility. Subjective and potentially quantitative statistical evaluation will be made of locations to consider the spatial arrangement in relation to facility features to aid in future study design. These analyses will carefully consider the ramifications of including (or not) incidental finds discovered outside of the standard fatality surveys; in the case of rare species and events, consideration of incidental finds may be imperative to yield appropriate insight. Photographs of all detections will be separately provided. The quarterly reports will be provided to the TAC as described in Section 5.2.

3.3.1 Regional Awareness Effort and Assessment

In addition to direct monitoring, a communication protocol will be implemented to monitor local veterinarians, game wardens, and wildlife rehabilitation facilities during facility operations to determine if significant new incidences of avian injury or fatality are reported to occur in the facility vicinity and region. Facility biologists will communicate with these entities on a quarterly basis to evaluate potential increases in frequency of injured birds in the project vicinity in response to project operations. Findings will be reported to the TAC in quarterly reports.

3.4 Wildlife Incident Reporting System

In addition to the post-construction fatality monitoring study described above, ISEGS will implement a Wildlife Incident Reporting System (WIRS) into the WEAP training at the start of operations, and it will remain active for the life of the ISEGS facility. The purpose of the WIRS is to standardize the actions taken by site personnel in response to wildlife incidents encountered in the ISEGS and to fulfill the obligations for reporting wildlife incidents. In addition, this system is also intended to complement the standard searches as detailed in the mortality monitoring. However, employees will be instructed only to report incidences to the Designated Biologist and not to disturb any evidence of mortality within the 5-acre plots, to avoid interfering with the standardized searches and total fatality estimates. All observed fatalities will be reported in monthly, quarterly, and annual reports.The WIRS will be utilized by site operations and maintenance personnel who encounter dead or injured wildlife incidentally while conducting general facility maintenance activities, such as mirror washing. The WIRS is designed to provide a means of recording and collecting fatalities at the ISEGS project to increase the understanding of power tower solar facilities and wildlife interactions. In addition, this system will specifically train personnel to identify evidence of mortality of rare species, particularly large birds such as eagles.

Any native bird found injured within the ISEGS facility will be taken to the nearest appropriate wildlife rehabilitation facility, as directed in the WIRS. Any incident involving a state- or federally listed threatened or endangered species or a bald or golden eagle must be reported to the USFWS and CDFW within 24 hours of identification. ISEGS maintains an ongoing commitment to investigate wildlife incidents involving company facilities and to work cooperatively with federal and state agencies in an effort to prevent and mitigate future wildlife fatalities. It is the responsibility of ISEGS employees and

1 Adjusted for carcass removal and searcher efficiency biases.

subcontractors to report all wildlife incidents to their immediate supervisor and to the on-site Designated Biologist as per CEC Conditions of Certification (COCs).

4.0 Monitoring Schedule

All studies proposed in this plan will be reported to and evaluated by the TAC. The surveys described in Revision 13 of this plan will be completed for a minimum of one year, after which each component will be evaluated by the TAC to recommend to the lead agencies if modification or continuance is necessary. Depending on the findings, the monitoring program is adaptive and may be expanded, reduced, discontinued, or otherwise modified as appropriate to address specific questions that may arise from the results. Changes to the monitoring program will be recommended by the TAC in accordance with the decision framework described in Section 5.0, Adaptive Monitoring and Management. The monitoring program may be expanded to evaluate specific concerns, or to gather more refined information to focus management response or define appropriate responses. Conversely, all or portions of the program may be discontinued if the TAC recommends that such changes to the monitoring plan are appropriate.

5.0 Adaptive Monitoring and Management

The adaptive monitoring and management plan presented in this section provides for the formation of a TAC to advise the BLM AO and the CEC CPM in the implementation of changes in monitoring or adaptive management measures to protect avian and bat species, and an analytical framework within which to recommend measures related to migratory birds and a process by which to develop a step-wise table of advanced conservation practices and apply for an eagle permit, should take occur.

ISEGS operates under the terms and conditions of the federal Right-of-Way grants, which delegate the authority to modify the terms and conditions of the grants to the BLM's AO. ISEGS also operates under the CEC's Conditions of Certification, under which the decision making authority regarding the facility, this monitoring plan, and any adaptive mitigation measures resides with the CPM. Therefore, with the concurrence of the BLM and CEC, a TAC will be formed to provide adaptive monitoring and management recommendations. The BLM's AO and CEC's CPM will evaluate any recommendations of the TAC and decide what measure(s), if any, are necessary for modifying the monitoring or for implementing adaptive management of the facility, as per the terms and conditions of the right-of-way grants and CEC conditions of certification.

The adaptive monitoring and management plan presented in this section provides a process to form the TAC and an objective analysis framework for the TAC to use, so that the TAC can objectively assess monitoring data and recommend future actions, including actions related to modifying the scope of studies and determining management or mitigation responses that are commensurate with the extent of impacts that may be identified in the monitoring studies.

5.1 TAC Membership, Objectives, and Meetings

The TAC will consist of one member from each of the regulatory agencies—BLM, CEC, USFWS, and CDFW—that oversee compliance activities, with respect to BLM and CEC, or that have issue area expertise, with respect to the USFWS and CDFW. Each agency will provide a member completely at its own discretion. The BLM and CEC TAC members will serve as the designated TAC co-chairs for the duration of the project. TAC members will be available for an initial meeting at the site to confirm the specifics of this plan and to assess site conditions. The members of the TAC will also be available for quarterly conference calls or meetings to review the data and analysis provided in the quarterly reports from the facility. More frequent meetings may be needed and can be called by one or both of the co-chairs. In addition, the TAC, through the TAC co-chairs, may invite an avian expert to sit on the committee, and invite specialists involved in the monitoring effort to specific meetings to discuss results

and potential adaptive management responses. Only the four regulatory agencies on the TAC will have voting authority for making changes and determinations.

Two additional members will be provided by the ISEGS facility. One member will be nominated from the Environmental Compliance department and a second from the Operations department. The level of experience with the operation of large-scale concentrating solar power tower technologies is limited; therefore, the Operations member is necessary to provide guidance with respect to facility operations. The Environmental Compliance member will be the main point of contact for the agencies.

The TAC co-chair duties will include ensuring that project data gets disseminated to the TAC, including data on mortality events, setting up and moderating meetings, reviewing mortality data, inviting participation by outside experts, if warranted; and documenting mitigation recommendations for the facility.

5.2 Data Review Process

Seasonal summary reports will be completed by ISEGS within three months of the end of each monitoring season (spring, summer, fall, and winter) and provided to the TAC members through the TAC co-chairs. A WebEx or in-person meeting will be scheduled through the TAC co-chairs within 30 days of receipt of each seasonal summary report. This meeting will include the TAC members and a representative of the contractor responsible for conducting the field studies. The meeting will focus on ensuring that all TAC members have a consistent understanding of the content and findings of each summary report. The TAC comments on the report and any recommendations regarding implementing adaptive monitoring, management actions, or mitigation measures will be documented by the TAC co-chairs after discussion with TAC members, with any dissenting opinions noted in the decisions and meeting notes. Recordkeeping responsibility for documenting each meeting's content (issues, decisions, outcomes, and action items) and for ensuring completion of any resulting action items will be the responsibility of the ISEGS Environmental Compliance TAC member, in coordination with the TAC co-chairs. Draft meeting notes will be circulated to the TAC for review and comment, and final notes will be circulated to all members for recordkeeping purposes.

5.3 TAC Review Framework

At a minimum, the TAC will meet annually to review data and recommend whether additional adaptive monitoring or management actions are necessary. The TAC may meet more often to discuss adaptive management needs if the TAC Co-chairs determine that a significant event has occurred. Should the operational monitoring studies indicate significant adverse impacts to avian resources, either to a particular species or group of species at the regional population level (for example, Bird Conservation Region 33), ISEGS is committed to taking appropriate action to address the issue(s). ISEGS is committed to working with the TAC in a collaborative manner to identify and implement measures commensurate in scale with the identified impact.

The TAC shall ensure that management recommendations to mitigate impacts should be directed specifically at identified problems. For example, if heliostats placed in the upright position at night are documented to cause adverse avian impacts, a reasonable action might be to orient the structures horizontally or with varying angles to determine if the observed level of impacts can be reduced, or to assess other strategies that would address the identified problem. If nocturnal migrants are affected by a tower during low-visibility weather events, modifications to the tower lighting scheme could be implemented to evaluate methods for avoiding weather-related issues. Other responses to documented impacts could include conservation or enhancement of certain habitats or habitat modifications in or near the facility to deter affected species from using the facility or adjacent areas. The TAC will assess impacts and identify appropriate responses in a collaborative manner with the Operations and Environmental team at ISEGS for recommendation to the BLM AO and CEC CPM.

The TAC shall consider species impacts according the status of the species. In other words, migratory birds, bald and golden eagles, and endangered species will be considered by the TAC for recommendations as groups, according to their regulatory status. For migratory birds, the TAC shall review the seasonal report, discuss the results of the seasonal monitoring, and undertake collaborative decision making in accordance with the criteria described in Table 8. The seasonal report shall categorize potential migratory bird mortality issues as high, medium, or low to provide an appropriate biological basis for TAC review and decision making, and shall reflect the following definitions:

1. High: Estimated avian mortality or injury levels are facility-caused and likely to seriously and negatively affect local, regional, or national avian populations within a particular species or group of species.
2. Medium: Estimated avian mortality or injury levels are facility-caused and have the potential to negatively affect local, regional, or national populations within a particular avian species or group of species.
3. Low: Estimated avian mortality or injury levels that have minimal or no potential to negatively affect local, regional, or national populations within a particular species or group of species.

TABLE 5
Adaptive Management Responses

Issue	Management Response	Study Response
High levels of general or species-specific mortality associated with a particular facility feature (for example, heliostats) or characteristic (for example, flux, weather events)	Immediate management action taken if cause can be addressed*	Studies modified, refined, or expanded to better understand and address impact issue and assess effectiveness of management response
Medium levels of general or species-specific mortality associated with a facility feature or characteristic	Management action taken to address impact issue if deemed necessary*	Studies modified, refined, or expanded to better understand and address impact issue and assess effectiveness of response
Low mortality rates at or near background rate	No management responses taken	Studies completed according to plan, or stopped earlier than planned if appropriate

* Management actions must be feasible and commensurate with the impact. Some examples of measures include placement of visual and/or auditory bird flight diverters in critical locations, retrofitting power lines to APLIC standards, installing perch guards on overhead electric lines in the vicinity, modification of mirror resting angles, modifications to tower or other facility lighting.

For bald or golden eagles, should such a species be taken by the facility, then ISEGS will report within 24 hours, prepare an Eagle Conservation Plan (ECP), and consult with the USFWS to determine the need for an eagle permit. The ECP and/or permit application, if required, shall be prepared in accordance with the current USFWS Eagle Conservation Plan guidance, as relevant to Solar Power Tower Technology. The modified ECP would contain a step-wise table with proposed advanced conservation practices appropriate for a solar power tower facility. The eagle permit will account for and credit the habitat conservation associated with other species (i.e., desert tortoise).

The TAC shall, at all times, identify the most appropriate response to a documented avian impact (including operational management actions) in the best professional judgment of the TAC members, and subject to the following decision criteria:

1. Any response shall be based on the causation of the applicable mortality.

2. All responses shall be commensurate (in terms of factors that include geographic scope, costs, and scale of effort) with identified impacts.

3. If the facility causes impacts to migratory bird species considered to be high or medium after ISEGS has undertaken appropriate measures as recommended by the TAC, ISEGS will use its best efforts to identify for TAC review additional measures, including coordination with other local or regional renewable energy or other projects, that would conserve bird species and that are commensurate with the identified impacts.

4. If the facility causes take of a bald or golden eagle, ISEGS will, within 10 days, develop a step-wise table for TAC review and will consult with the USFWS regarding whether an application for an eagle permit is warranted.

5.4 Addressing Resource Impacts

If, based on the analytical framework above, the TAC identifies significant impacts to avian resources that warrant an immediate response to either change the monitoring/reporting procedures or to protect the resources involved, a recommendation will be developed by the TAC. If the recommendation is adopted and required by the BLM AO and CEC CPM, it will be implemented by ISEGS in a timeframe agreed upon by the parties. If the identified problem cannot be effectively addressed, a follow-up action plan will be developed by ISEGS within 30 days that addresses the resource issue. ISEGS shall be responsible for documenting and implementing the response action or action plan. If no immediate response is needed to address an identified impact, then previously approved and scheduled monitoring and other activities related to this plan will be implemented without change, subject to modification as may be recommended by the TAC.

Based on the annual monitoring results, the TAC will recommend if and to what extent previously implemented studies may be warranted in subsequent seasons or years. If continued study is recommended by the TAC, the scope and objectives of the planned studies will be evaluated for adequacy and modifications (e.g., reduction in search area or number of surveys in a season), and recommended changes will be implemented as appropriate if approved at the discretion of the BLM AO and CEC CPM.

Any recommended expansion of scope for monitoring would be subject to a cost cap developed in consultation with the TAC (USFWS, 2013). These cost caps would be proportional to the risks. This cost cap will be established during the third year of monitoring.

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Attachment A
Example of Remote Camera Settings and Data

A specific protocol for the use of remote cameras will include the GPS location and the direction and distance to the nearest anthropogenic structure (e.g., building structure in the inner circle area) or heliostat number when carcasses are placed in heliostat fields. Photos will be taken to document the position of each carcass when placed. The camera will be placed within 1-1.5 meters of the carcass on a t-post and faced north to avoid sunlight shining directly into the camera lens (see below for camera settings). If the carcass is no longer in front of the camera and is not readily apparent, the surrounding area will be searched using a spiral search pattern. The search will start at the camera's location and spiral out to 100 feet from the camera. If the carcass has been moved to a new location within the search area but is intact, the camera will be repositioned on the carcass in its new location.

The camera batteries and SD card will be checked at least once a week. The batteries will be replaced if there is < ½ charge remaining. The SD card will be exchanged if there are > 2000 pictures (See Attachment A. Example of Remote Camera Settings and Data).

Camera Settings for Bushnell Trophy Camera (Model 119436) or Equivalent

1) Mode: Camera
2) Image size: SM Pixel
3) Capture #: 3 photo
4) Video size: 640x480
5) Video length: 10s
6) Interval: 1s
7) Sensor level: High
8) Format: Execute
9) TV out: NTSC
10) Time stamp: On
11) Field scan: Off
12) Video sound: On
13) Default set: Cancel

Data Collected at Carcass Placement

1) Site name (e.g., Heliostat Field, Section, and Arc Plot #).
2) Date of survey: Use the following format: DayMonthYear.
3) Time carcass and camera trap were placed. Use 24-hour clock.
4) Surveyors: First, middle (if applicable), and last name initials. Indicate initials for all crew members present.
5) Carcass number: Each carcass will be assigned a number that includes year, month, day when it was placed, and the four-letter code for the species (e.g., 20121212-MODO).
6) UTM coordinates: NAD 83 datum, using handheld devise accurate to 3-4m.
7) General location: For the Heliostat Fields, give location of project (e.g., Ivanpah 1) the section number (e.g., Section 7b), and the specific heliostat number.
8) Distance/Direction to nearest structure: (e.g., Distance and direction to nearest tower or distance direction to nearest overhead wires if along Unit 3 Collector Line.)
9) Substrate: Describe substrate where the carcass was placed, using the known habitat types described in environmental documents for the project.
10) Vegetation height: Low, < 25 cm, Medium, 25-50 cm, High, > 50 cm
11) Percent cover: Bare ground, 0-25 percent, 25-50 percent, 50-100 percent
12) Exposure: Describe visibility of carcass as either: Exposed, Hidden, Partially Hidden.

13) Camera serial number: Located inside camera housing.

Data to Note at Carcass Check

1) Date of check.
2) Time of check. Use 24 hour clock
3) Surveyor.
4) Carcass condition: Choose from: **Present-no change** (appears to be in the same location and position), **Present-moved** (still within search area for fatality survey but moved from placed location), **Removed** (carcass gone, no feathers or parts left or < 10 feathers of any type or < 2 primaries), **Not removed** (> 10 feathers of any type, > 2 primary feathers or any flesh or bone).
5) Camera function: Normal, Dead, Frozen
6) Battery charge: Full, ¾, ½, ¼, zero.
7) # of photos.