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IVANPAH SOLAR ELECTRIC GENERATING SYSTEM
AVIAN & BAT MONITORING PLAN

2021 – 2022 Annual Report

Year 9

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Section 1.0 Introduction

1.1 Project Background

The Ivanpah Solar Electric Generating System (referred to in this report as "Ivanpah" or "Project") consists of three solar power electrical generating facilities (Units 1, 2, and 3) with a combined net capacity of 377 megawatts. Each unit includes a central power tower with an air-cooled condenser (ACC) and associated electrical generating equipment, surrounded by a heliostat array that reflects sunlight to a boiler at the top of the power tower. Ivanpah is located on approximately 1,457 hectares (3,600 acres) of Bureau of Land Management (BLM) land west of Interstate 15 near the town of Nipton in San Bernardino County, California (Figure 1). Construction was initiated in 2010 and completed in late 2013.

1.2 Monitoring Plan Overview and Goals

An Avian & Bat Monitoring and Management Plan (ABMMP or Plan) was prepared by the Project proponents in collaboration with the U.S. Fish and Wildlife Service (USFWS), California Department of Fish and Wildlife (CDFW), California Energy Commission (CEC), and Bureau of Land Management (BLM) to guide comprehensive monitoring of impacts to birds and bats associated with the operation of the Project. In December 2017, the TAC approved the field methods described in Revision 14 of the Plan (2020), which provides a framework for comparing detections in the tower area of all three units to baseline levels of mortality observed during the first four years of standardized monitoring.

The reporting, methods and analysis for Revision 14 of the Plan was officially approved by the TAC on October 23, 2020. Specifically, Revision 14 details the surveys, data analysis and reporting processes that will be implemented by Ivanpah in collaboration with the USFWS, CDFW, CEC, and BLM and provides the following goals and objectives as excerpted from the Plan (2020):

Plan Goals

1. Assess levels of mortality: Detections (i.e., fatalities or injuries) documented and an annual assessment of the level of mortality will be determined and provided consistent with the "high, medium and low" framework as described in Section 5.3.
2. 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.

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 five detections per season and is considered low. Additionally, the patterns associated with avian use have been consistent over the seasons and documented in the annual reports. During the third and fourth year of monitoring, consistent patterns of mortality associated with the tower areas and heliostat areas were documented. Therefore, as revised, this Plan has the following objectives:

1. Document patterns of avian and bat mortality and injury at the facility.
2. Provide quantitative and qualitative information for developing and implementing adaptive management responses commensurate with identified impacts.
3. Provide a framework for the TAC to jointly review, characterize, and recommend responses, based on monitoring results, to the appropriate lead agency representatives.

The approved Plan (2020) continues to: 1) satisfy the BLM Right-of-Way (ROW) Permit requirement that the Project proponent develop an avian plan as well as a Migratory Bird Treaty Act (MBTA) Conservation Agreement; 2) satisfy the requirements for the Avian & Bat Monitoring and Management Plan approved by the CEC for Ivanpah per CEC Condition of Certification BIO-21; 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 Federal 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 the USFWS and other relevant state and federal agencies, Project proponents can effectively comply with the intent of the federal MBTA, Eagle Act, ESA, and relevant state regulations (USFWS 2012).

1.3 Purpose of This Report

This report provides a summary of the detections (by cause and location for known and unknown cause according to the biologically informed seasons (16 December 2021– 15 December 2022) as described in the 2014 – 2015 Annual Report (WEST 2016), and further described in Section 2.1.2. Biologically informed seasons are defined in this report as winter (16 December 2021 – 20 March 2022), spring (21 March – 25 May 2022), summer (26 May – 17 August 2022), and fall (18 August – 15 December 2022), and are collectively referred to as the 2021 – 2022 monitoring year or year 9 throughout this report.

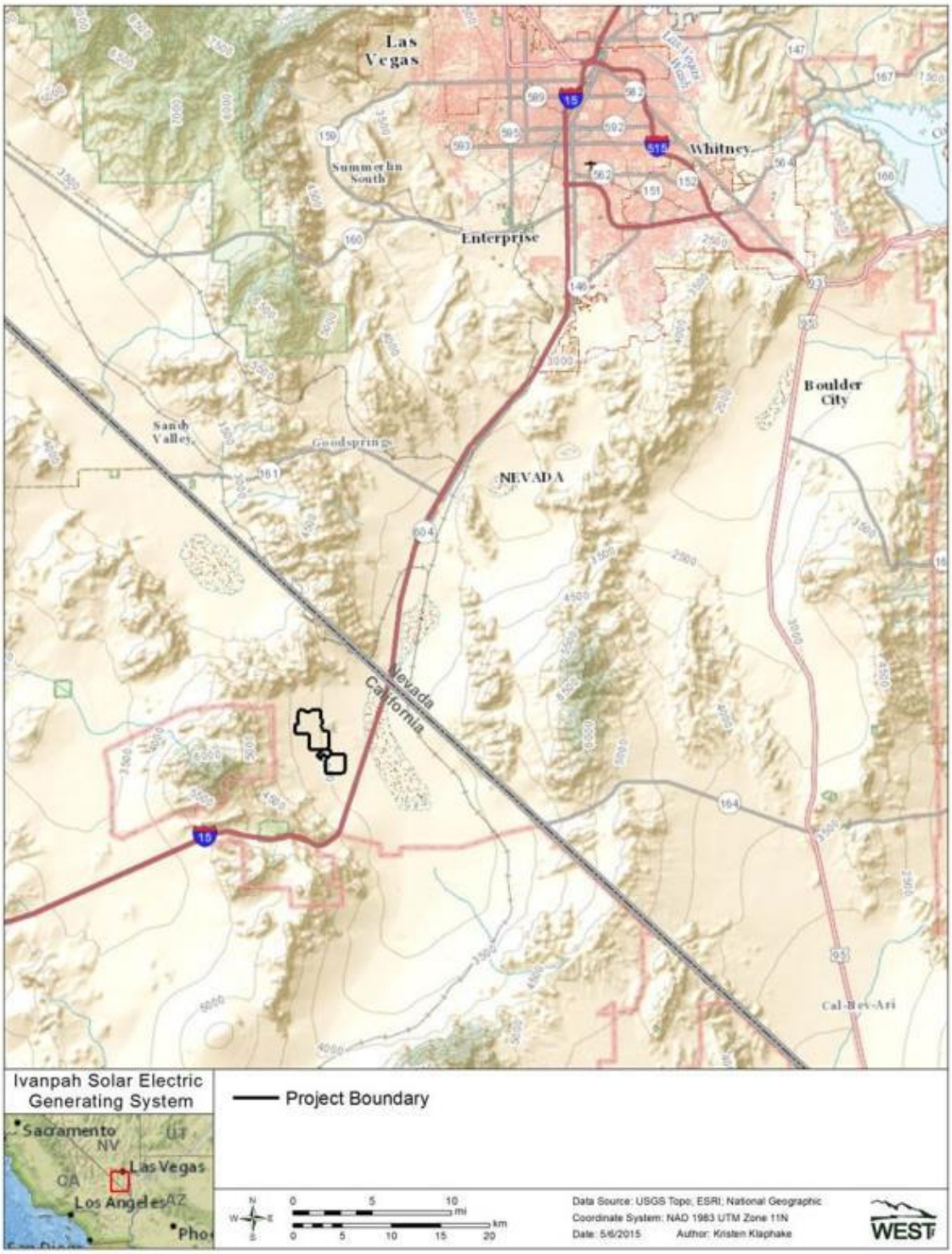

Figure 1. Ivanpah Vicinity Map.

Section 2.0 Methods

The approved Plan (2020) describes the methods by which monitoring and certain analyses, including comparison of detections the fatality index based on the first four years of monitoring, will occur. Below is an abridged description of the 2017 methods and subsequent modifications approved by the TAC.

2.1 Facility Monitoring

This section describes areas surveyed, the frequency and timing of the searches, and the methods by which standardized searches were conducted to identify dead/injured birds and bats (hereafter detections) at the Project. This section also describes the methods for conducting carcass removal and searcher efficiency trials; how data were reported and analyzed for incidental detections; and the methods for producing fatality estimates for the Project.

2.1.1 Standardized Searches

2.1.1.1 Areas Surveyed

Per the approved Plan (2020), monitoring was conducted in the "tower area", defined as the power block (the area consisting of the tower, the ACC unit, the associated control building, and immediately adjacent areas defined by the ring road and berm/slopes surrounding these facilities) and inner high-density (HD) heliostats surrounding each power block.

2.1.1.2 Search Frequency and Timing

Standardized searches occurred at each unit on a 21-day interval in summer and winter seasons, with a 7-day interval in the spring and fall seasons until December 31, 2017. With approval from the TAC on December 21, 2017, standardized search frequency was undertaken at each unit on a 14-day interval beginning January 14, 2018 as per the approved Plan (2020).

2.1.1.3 Search Methods

Biologists performed surveys in the tower area. Standardized walking surveys for fatalities were performed by biologists approved by CEC and BLM, in accordance with the methods outlined in the approved Plan (2020). Surveys were conducted approximately every 14 days, resulting in 24-26 surveys of the power block, ACC, and inner HD heliostats at each of the three units. Variability in search schedule visits was due to operational maintenance and weather conditions. Within the power block, biologists or operations staff walked through and around the power tower and ACC unit searching for dead and injured birds and bats and walked transects through the gravel surrounding the structures to achieve 100% coverage within physically accessible areas. Within the inner HD heliostats surrounding each power block, biologists or operations personnel walked transects to ensure 100% coverage. Thus, the tower area, comprising the area within 260 m of each tower, was completely covered during each survey, excepting any areas that were physically inaccessible or unsafe to survey. Inaccessible areas were, to the extent possible, scanned using binoculars. Detections are processed following methods described in the approved Plan (2020).

Carcass and Feather Spot Examination. Every carcass and feather spot were examined visually by a biologist approved by the CEC and BLM for evidence of singeing or collision. Singeing to feathers can

occur when a bird enters the flux around the power tower. When no obvious evidence of singeing or collision was evident to the naked eye, the carcass or feather spot was then examined using an AmScope SE306R-AZ-E2 20X-40X-80X Digital Binocular Stereo Microscope. When singed detections involving carcasses (as opposed to only feather spots) were found, the singeing was assigned a grade based on Kagan et al. (2014), as follows.

- Grade 1 – curling of less than 50% of the flight feathers
- Grade 2 – curling of 50% or more of the flight feathers
- Grade 3 – curling and visible charring of contour feathers

Kagan et al. (2014) originally found no singeing of contour feathers in the absence of curling of 50% or more of the flight feathers. In contrast, we have found singeing of contour feathers with curling of less than 50% of flight feathers, and in the absence of curling or singeing of any flight feathers. We therefore assigned grade 3 independent of grades 1 and 2.

When a carcass was detected, biologists looked for evidence of collision, including obvious physical trauma or detection adjacent to a heliostat with a bird-strike imprint, smudge mark, and/or feathers on or near the surface of the mirror. If there was no evidence of collision or singeing (e.g., charring, curling, or melting of feathers), as confirmed through microscopic examination, the cause of injury or fatality was listed as "unknown".

For the purpose of these surveys, feather spots were considered detections when they met the following definition:

> At least two or more primary flight feathers, 5 or more tail feathers, or 10 or more feathers of any type concentrated together in an area 1-m^2 or smaller (Smallwood 2007), without any bone, beak, or significant amounts of flesh or skin.

In some cases, an individual detection was broken up into aggregations of feathers that would meet the criteria for a feather spot, but with pieces of the carcass that contained bone or significant amounts of flesh or skin also present. In these cases, the detection was categorized as a partial carcass (rather than a feather spot), per the "feather spot" definition above.

2.1.2 Incidental Reporting

All incidental detections are reported in the Special Purpose Utility (SPUT) permit database as per the requirements of the USFWS. Incidental detections are those discovered outside standardized search areas or are found within search areas but not during standardized searches. Detections at locations not searched under the approved Plan (2020) such as the heliostat area or fence line are also considered incidental detections for this report. These detections are reported in accordance with the facility's Wildlife Incident Reporting System (described in Section 3.2 of the Plan) and are considered "incidental" detections.

Incidental detections are processed the same as all detections following methods described in the approved Plan (2020).

Biologically Informed Seasons. In an effort to address the annual variation in migration seasons for non-resident birds, a stepwise, data-driven process was used to define biologically informed seasons in association with the 2014 – 2015 Annual Report. As described in that report, all bird species found as detections at Ivanpah were categorized as resident or non-resident. Resident species were defined as those that occur year-round, such as a black-throated sparrow. These species would be expected to have a more similar fatality risk profile year-round than non-resident species. Non-resident species were defined as either those that are transient (e.g., passing through the area during migration such as yellow-rumped warbler) or seasonal resident (e.g., those species that migrate into the areas to overwinter or breed on an annual basis such as tree swallow), and therefore would be expected to have periodic risk. Based on the dates of non-resident species observed in the Year 1 data, and supported by observations in subsequent years, a decision was made to use December 15 as the end of fall migration for the purposes of comparing seasonal fatality data among years. This schedule of monitoring and reporting using biologically informed seasons was incorporated into the approved Plan (2020).

Section 3.0 Monitoring Results

3.1 Summary of Avian Detections

During the 2021 – 2022 monitoring year, a total of 265 avian detections (including injured birds and incidentals) of 42 identified species and eight unidentifiable species groups (Table 1) were recorded. Two-hundred fifty-nine (259) detections occurred in the tower area, and six were detected incidentally outside of the tower area. Of the six incidental detections outside of the tower area, one showed signs of singeing (red-tailed hawk), one showed signs of collision (mourning dove), and for the remaining four detections (2 mourning dove, 1 unidentified small bird, and 1 white-crowned sparrow), the cause could not be determined (Figure 2).

Of the total 259 detections in the tower area, there were 131 carcasses (50.6%), 124 feather spots/partial carcasses (47.9%), and four live birds (1.5%). Of the feather spots/partial carcasses detections, evidence of singeing was noted through direct and microscopic examination on 73 of these 124 feather spots/partial carcasses (58.9%); evidence of entrapment (i.e., the detection was found in an enclosed area with the ACC) was noted in the case of two feather spots/partial carcasses (1.6%). No feather spots or partial carcasses were associated with collision. Otherwise, the causes of mortality for the feather spots/partial carcasses for the other 49 detections (39.5%) are unknown. These values are consistent with ranges found in previous annual assessments.

Table 1. Number of Individual Bird Detections, by Species, 2021 – 2022 Monitoring Year.

Identification and Status				Type of Detections			Source and Cause of Detections			
Species	Scientific Name	Potential Local Breeder*	Status**	Total Detections	Injuries	Fatalities	Tower Area	Other Project Lands	Singed/Collision/ Other	Unknown
unidentified small bird	*unidentified*	No		61	0	61	60	1	42/0/1	18
mourning dove	*Zenaida macroura*	Yes		21	2	19	18	3	2/1/0	18
yellow-rumped warbler	*Setophaga coronata*	No		18	0	18	18	0	17/0/0	1
yellow warbler	*Setophaga petechia*	No	SSC	13	0	13	13	0	12/0/1	0
tree swallow	*Tachycineta bicolor*	No		12	1	11	12	0	12/0/0	0
unidentified warbler	*unidentified*	No		12	0	12	12	0	11/0/0	1
Wilson's warbler	*Cardellina pusilla*	No		11	0	11	11	0	10/0/0	1
lazuli bunting	*Passerina amoena*	No		10	0	10	10	0	8/0/0	2
house finch	*Haemorhous mexicanus*	Yes		9	0	9	9	0	4/0/1	4
unidentified hummingbird	*unidentified*	No		9	0	9	9	0	9/0/0	0
black-throated sparrow	*Amphispiza bilineata*	Yes		8	0	8	8	0	8/0/0	0
unidentified swallow	*unidentified*	No		8	0	8	8	0	6/0/0	2
northern rough-winged swallow	*Stelgidopteryx serripennis*	No		5	0	5	5	0	5/0/0	0
orange-crowned warbler	*Leiothlypis celata*	No		4	0	4	4	0	4/0/0	0
unidentified dove	*Columbidae genus*	No		4	0	4	4	0	1/0/0	3
unidentified sparrow	*unidentified*	No		4	0	4	4	0	1/0/0	3
brown-headed cowbird	*Molothrus ater*	No		3	0	3	3	0	1/0/0	2
cliff swallow	*Petrochelidon pyrrhonota*	No		3	0	3	3	0	2/0/0	1
common raven	*Corvus corax*	No		3	1	2	3	0	1/0/0	2
lesser goldfinch	*Spinus psaltria*	No		3	0	3	3	0	3/0/0	0
verdin	*Auriparus flaviceps*	No		3	0	3	3	0	2/0/0	1

Identification and Status				Type of Detections			Source and Cause of Detections			
Species	Scientific Name	Potential Local Breeder*	Status**	Total Detections	Injuries	Fatalities	Tower Area	Other Project Lands	Singed/Collision/ Other	Unknown
white-crowned sparrow	*Zonotrichia leucophrys*	No		3	0	3	2	1	1/0/0	2
American kestrel	*Falco sparverius*	No		2	0	2	2	0	2/0/0	0
American robin	*Turdus migratorius*	No		2	0	2	2	0	1/0/0	1
bank swallow	*Riparia riparia*	No	ST	2	0	2	2	0	0/0/0	2
barn swallow	*Hirundo rustica*	No		2	0	2	2	0	1/0/0	1
Costa's hummingbird	*Calypte costae*	No	BCC	2	0	2	2	0	1/0/1	0
ruby-crowned kinglet	*Corthylio calendula*	No		2	0	2	2	0	2/0/0	0
American kestral	*Falco sparverius*	No		1	0	1	1	0	0/0/0	1
Anna's hummingbird	*Calypte anna*	No		1	0	1	1	0	1/0/0	0
black-chinned hummingbird	*Archilochus alexandri*	No		1	0	1	1	0	1/0/0	0
black-tailed gnatcatcher	*Polioptila melanura*	No		1	0	1	1	0	1/0/0	0
cinnamon teal	*Spatula cyanoptera*	No		1	0	1	1	0	1/0/0	0
common ground dove	*Columbina passerina*	No		1	0	1	1	0	0/0/0	1
Eurasian collared-dove	*Streptopelia decaocto*	No		1	0	1	1	0	1/0/0	0
green-tailed towhee	*Pipilo chlorurus*	No		1	0	1	1	0	0/0/0	1
house sparrow	*Passer domesticus*	No		1	0	1	1	0	1/0/0	0
least sandpiper	*Calidris minutilla*	No		1	0	1	1	0	1/0/0	0
lesser nighthawk	*Chordeiles acutipennis*	No		1	0	1	1	0	0/0/0	1
loggerhead shrike	*Lanius ludovicianus*	No	SSC	1	0	1	1	0	0/0/0	1
MacGillivray's warbler	*Geothlypis tolmiei*	No		1	0	1	1	0	1/0/0	0
northern parula	*Setophaga americana*	No		1	0	1	1	0	1/0/0	0
peregrine falcon	*Falco peregrinus*	No	FP, BCC	1	1	0	1	0	1/0/0	0
red-tailed hawk	*Buteo jamaicensis*	No		1	0	1	0	1	1/0/0	0

Identification and Status				Type of Detections			Source and Cause of Detections			
Species	Scientific Name	Potential Local Breeder*	Status**	Total Detections	Injuries	Fatalities	Tower Area	Other Project Lands	Singed/Collision/ Other	Unknown
red-winged blackbird	*Agelaius phoeniceus*	No		1	0	1	1	0	1/0/0	0
rufous hummingbird	*Selasphorus rufus*	No		1	0	1	1	0	1/0/0	0
unidentified empidonax	*Empidonax spp*	No		1	0	1	1	0	0/0/1	0
unidentified flycatcher	*unidentified*	No		1	0	1	1	0	0/0/0	1
unidentified gnatcatcher	*Polioptila spp.*	No		1	0	1	1	0	1/0/0	0
unidentified medium bird	*unidentified*	No		1	0	1	1	0	1/0/0	0
unidentified sapsucker	*Sphyrapicus spp*	No		1	0	1	1	0	1/0/0	0
unidentified thrush	*unidentified*	No		1	0	1	1	0	1/0/0	0
violet-green swallow	*Tachycineta thalassina*	No		1	0	1	1	0	1/0/0	0
western tanager	*Piranga ludoviciana*	No		1	0	1	1	0	0/0/0	1
Total				265	5	260	259	6	187/1/5	72

* A species whose breeding range overlaps the Project area. The number of detections could include locally breeding and non-local individuals.
** SSC = CDFW-designated California species of special concern, ST = State threatened, BCC = USFWS bird of conservation concern for BCR 33, FP= California fully protected species.

3.1.1 Spatial Patterns of Detections

During the 2021 – 2022 monitoring year, 259 detections were found in the tower area with 97 (37.5%) in Unit 1, 79 (30.5%) in Unit 2, and 83 (32.0%) in Unit 3. Of the tower area detections, 186 (71.8%) showed signs of singed feather damage, 0 (0%) showed signs of collision, 5 (1.9%) were attributed to entrapment, and cause could not be determined for 68 (26.3%). Results from the 2021 – 2022 monitoring year are consistent with previous years.

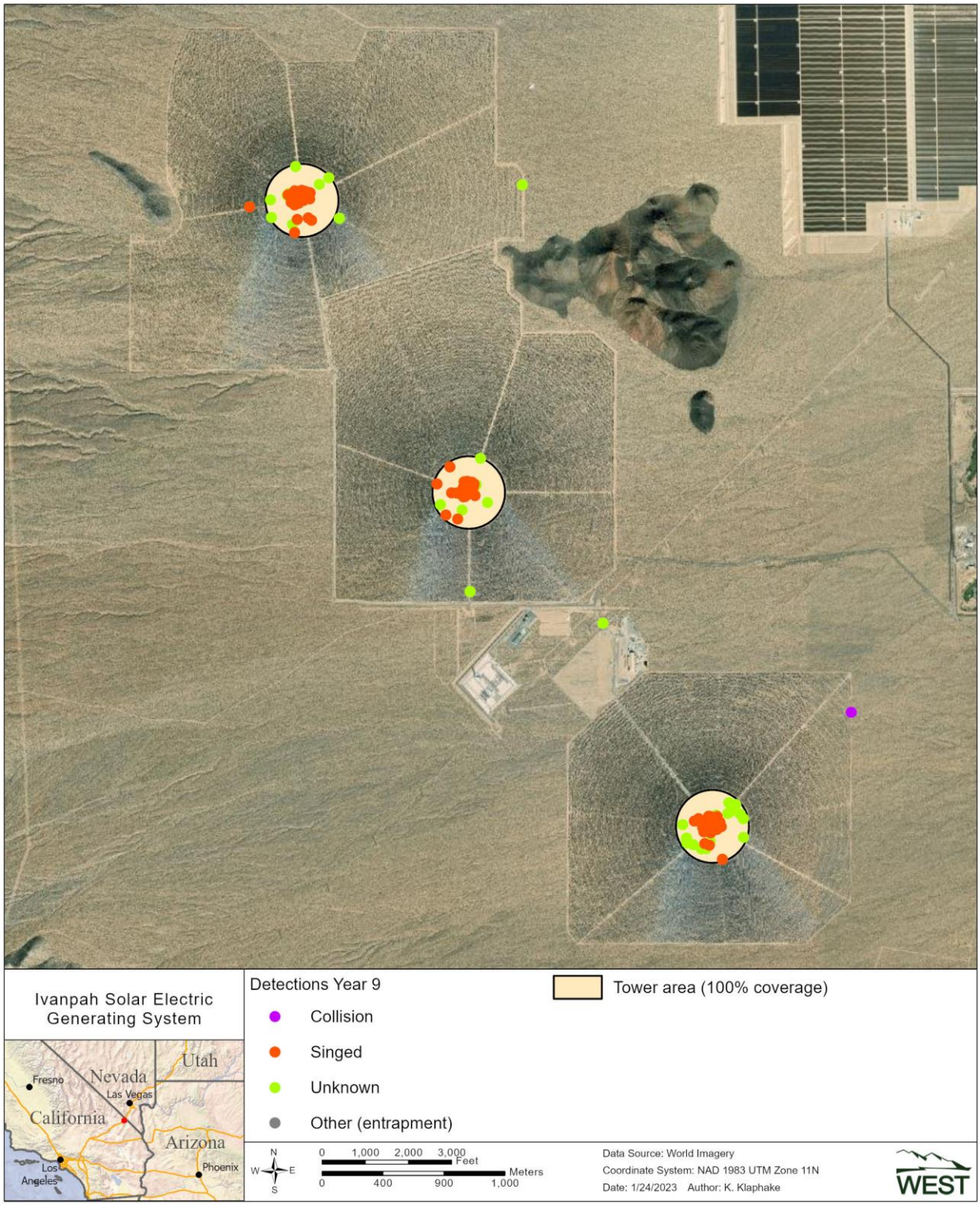

Figure 2. Locations of Detections, by Cause, within Solar Units.

3.1.2 Temporal Patterns of Detections

The number of detections reported per day varied during the 2021 – 2022 monitoring year. The number of detections per day represents the accumulation of detections over the search interval minus those detected incidentally and removed between searches. Consistent with previous years, detections per day in the tower area showed a strong seasonal pattern with detections highest in the spring and fall (Figure 3).

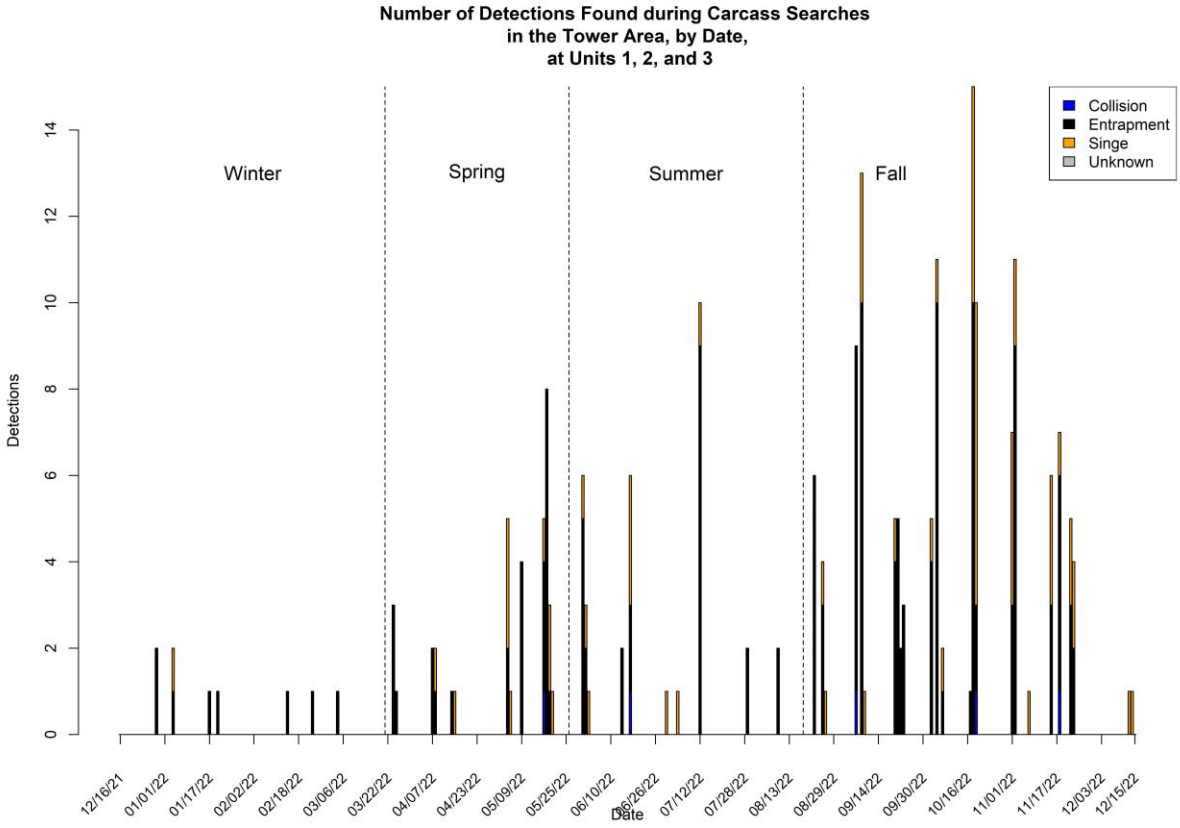

Figure 3. Number of Detections on Each Survey Date, 2021 – 2022 Monitoring Year.

3.1.2 Summary of Bat Detections

One bat, an unidentified Myotis, was detected as fatalities during the 2021 – 2022 monitoring year. The single bat detection was found in the ACC of Unit 1. Given the few detections of bats, they are not discussed further. Bat deterrence units were installed at all three ACC units in 2014 and 2015 and continue to operate.

Section 4.0 Comparison to Fatality Index

This section utilizes the detection data as described in Section 3 to evaluate the potential for impacts in accordance with the approved Plan (2020). Detection data from the tower area for year 9 are compared to the fatality index model developed in the Plan (2020) to determine if the results of monitoring are consistent with previous years of intensive monitoring in the tower area of all three units.

4.1 Fatality Index Comparison

There was a total of 259 detections (resulting from fatality searches or incidental detection) in the tower area during the 2021 – 2022 monitoring year. The fatality index model developed in the approved Plan (2020) predicted that the number of detections resulting from operations monitoring should be, on average, 504, and be between 276 and 746 detections to be 90% confident that the results of fatality monitoring were consistent with the first four years of monitoring. The total for year 9 is slightly lower than the lower limit of the 90% prediction interval (276), suggesting the overall number of fatalities in year 9 does not exceed the level of mortality observed in the first four years of monitoring (Figure 4).

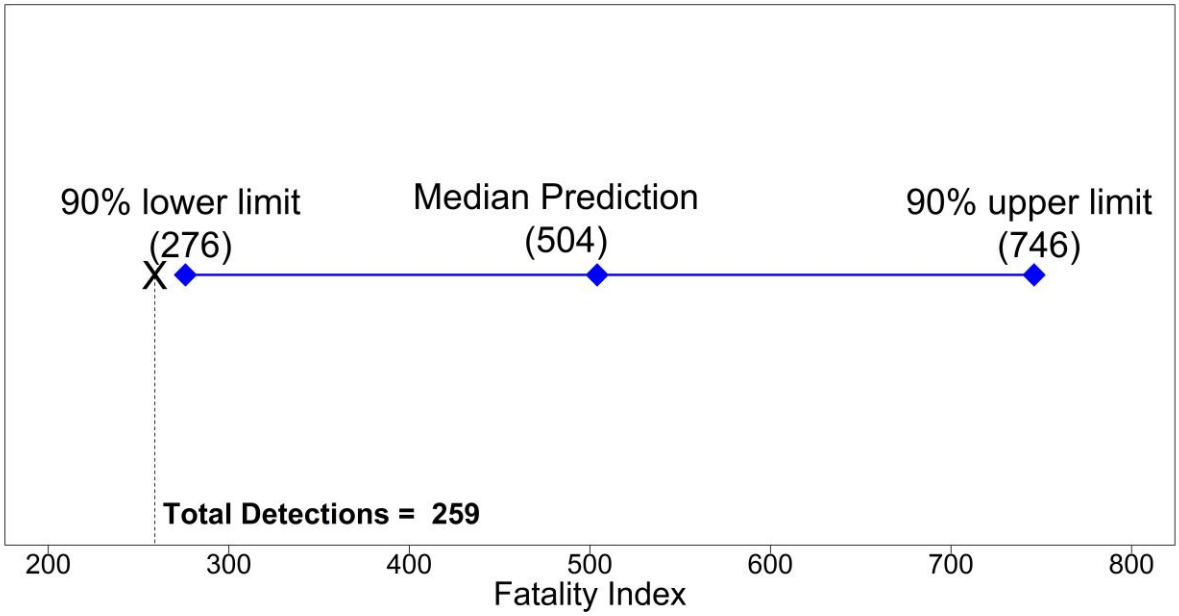

Figure 4. Total number of detections in the tower area during the 2021 – 2022 monitoring year relative to the fatality index.

Section 5.0 Framework for Management and Risk Response

According to Section 5.3 of the approved Plan (2020), migratory bird mortality at Ivanpah is categorized as high, medium, or low to provide an appropriate biological basis for TAC review and decision making, based on 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."

5.1 Comparison to the Fatality Index

As presented in the approved Plan (2020) in Appendix D, the number of detections can be used to understand the potential effects of the facility on birds in the context of the first four years of monitoring through the fatality index. Typically, the number of detections provides little insight into potential population level effects because the fatality estimate is not known. However, in monitoring years 1 – 4 when fatality estimates were calculated, it was determined that in each year the facility had a low potential to impact each species or species group at the local, regional, or national scale. Thus, the range of values for the fatality index generated from the first four years of monitoring represents a range of values to have a low potential impact on populations (HTH 2015, WEST 2016, WEST 2017, WEST 2018).

The number of tower area detections in the 2021 – 2022 monitoring year (259) is below the lower 90% confidence limit of the fatality index (276). Total tower detections lower than the 90% confidence limits implies the number of detections found during the 2021 – 2022 study does not exceed the range of fatalities observed during the intensive monitoring of years 1 – 4. Thus, the number of detections in the tower area during the 2021 – 2022 monitoring year is consistent with the determination of a low level of impacts determined from the first four years of intensive monitoring.

5.2 Assessment of Potential Effects to National and Regional Populations

As presented in Appendix D of the approved Plan (2020), species with more than five detections are evaluated for potential effects on the national and regional populations. Factors established for evaluating potential population effects in Appendix D of the Plan (2020) include: species listing status, population size, and life history strategy. During the 2021 – 2022 monitoring year, one special status species, yellow warbler (California species of special concern) had > five detections. However, when considering the scale

of evaluation (national and regional), the 13 total detections represent 0.00000028% and 0.000024% of the national and regional populations, respectively. Thus, mortality of yellow warblers at the Project has low potential to influence national and regional populations. Consistent with previous assessments, all of the remaining 10 bird species with > five total detections are not special status and have robust populations nationally and regionally (Table 2; PIF 2022). Thus, there is low potential for mortality at the Project to have population level effects at the national and regional scale based on the species detected and the population sizes.

Table 2. Number of detections, occurrence at the Project, and population estimates for bird species with greater than five detections at the Project.

			Population Estimates from Partners in Flight Database[1]	
Species	Occurrence at Project	Total Detections	Regional (California)	National
mourning dove	fall migrant, year round resident	21	4,400,000	130,000,000
yellow-rumped warbler	spring and fall migrant	18	2,200,000	47,000,000
yellow warbler[2]	uncommon spring migrant, common fall migrant	13	550,000	40,000,000
tree swallow	spring and fall migrant	12	400,000	8,700,000
Wilson's warbler	spring and fall migrant	10	890,000	39,000,000
lazuli bunting	spring and fall migrant	10	990,000	5,400,000
house finch	year round resident	9	9,600,000	33,000,000
violet-green swallow	spring and fall migrant	8	440,000	5,400,000
black-throated sparrow	year round resident	8	2,700,000	31,000,000

[1] PIF 2022.

[2] California species of special concern (Shuford and Gardali 2008), CDFW CNDDB 2021.

5.3 Assessment of Effects to Local Populations

As presented in Appendix D of the approved Plan (2020), a decision framework is used to determine if a species is a local breeder near the Project. Following the decision framework, species with > five detections were reviewed to determine, based on range maps, those that could breed locally in the vicinity of the Project. As per previous practice, > five detections is used as a threshold for analysis, consistent with four years of baseline quantitative assessments (HTH 2015, WEST 2016, WEST 2017, WEST 2018).

As per the approved Plan (2020) framework, the timing of the fatalities was reviewed to determine those that occurred during the species breeding season, based on information provided in species accounts at https://nrm.dfg.ca.gov/taxaquery/Default.aspx. This framework assumes that if a fatality is found during the breeding season, these detections are locally breeding individuals. Of the three locally breeding species with > five detections (mourning dove, house finch, black-throated sparrow), one had > five detections during the breeding season: mourning dove (six detections; Table 3).

Table 3. Number of Detections of Locally Breeding Species with >5 detections found during the respective breeding period during the 2021 – 2022 **Monitoring Year.**

Species	Start of Breeding Season	End of Breeding Season	Total Detections
mourning dove	Late January	Late September	6

Criteria established for evaluating the potential population effects in Appendix D of the approved Plan (2020) include: 1) species status, 2) population size, and 3) survival strategy. First, mourning dove is not designated as special status species nor does it have a special management designation in the Mojave Desert ecoregion. Second, the distribution of the species and overall population in the Mojave Desert in California and Nevada (Bird Conservation Region (BCR) 33) – obtained from the Partners in Flight database – was reviewed to determine the distribution and abundance in BCR 33. The mourning dove population estimate in BCR 33 is 4,700,000. Thus, mourning dove is not special status and has a robust population that is not likely to be affected by local removal of individuals at the Project.

Third, examining the survival strategy of mourning dove also adds support to a low potential for impacts conclusion. Mourning doves reach sexual maturity after one year, are short-lived and highly fecund, and populations of birds with these life history traits are not typically sensitive to adult mortality (Stahl and Oli 2006). In addition, mourning doves have a long breeding season that provides the opportunity for multiple breeding attempts to produce offspring that could be recruited into the local population. When these factors are evaluated together, there is a low potential for impacts from the Project to the locally breeding mourning doves.

5.4 Assessment of Effects to Special Status Species

As presented in Appendix D of the approved Plan (2020), all special-status species are always considered for potential population level effects for any number of detections. Special status species recorded as detections included 13 yellow warblers (California species of special concern, four other species had two or fewer detections (Table 4). The yellow warbler was discussed earlier (Section 5.2), and the remaining special status species had 2 or fewer detections. Considering the low number of fatalities coupled with the life-history strategy of relatively high fecundity and a short lifespan of the special status species, the potential for population level impacts from these few detections does not rise above a "low" potential effect on a national, regional or local level.

Table 4. Detections of Sensitive Species during the 2021 – 2022 Monitoring Year.

Species	Status*	Fatalities	Injuries	Total
yellow warbler	BCC	13	0	13
Costa's hummingbird	BCC	2	0	2
bank swallow	ST	2	0	2
loggerhead shrike	SSC	1	0	1
rufous hummingbird	BCC	1	0	1
Total	SSC, ST, BCC	19	0	19

*SSC = California species of special concern, BCC = USFWS bird of conservation concern for BCR 33.

Section 6.0 Recommendations

Based on the results on the year 9 monitoring, the following recommendations are provided.

1. **Continue Implementation of the Approved Plan.** The tower area is the location which contains the vast majority of all known causes – singeing, collision, and entrapment in the ACC – unknown causes, and incidental detections. The methods in the 2020 approved Plan provides ongoing systematic surveys in the tower area, and provides data that will allow for continued annual risk analysis, adaptive management and a comparison in the trends in detections with Years 1 – 9.

Section 7.0 Literature Cited

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Appendix A. Individual Avian Detections.

USFWS #	Common Name	Species Code	How Found	Detection Date	Collection Date	Condition	Time Since Death/Injury	Description of Carcass/Injury	Cause of Death/Injury	Burn Grade	Unit	Nearest Project Feature	Coordinates	SPUT Revisions
2021_291_ISEGS	American kestrel	AMKE	Fatality Search	12/29/2021	12/29/2021	broken up	3-7 days	curling to leading edge of 1 primary and singe to covert; Flux Grade: 2	scorched or singed	2	3	Powerblock	637529, 3937923	NA
2021_292_ISEGS	unidentified small bird	UNID	Fatality Search	12/29/2021	12/29/2021	feather spot	3-7 days	singe to tip of 1 primary; Flux Grade: 2	scorched or singed	2	3	Powerblock	637480, 3937912	NA
2022_001_ISEGS	yellow-rumped warbler	YRWA	Fatality Search	1/4/2022	1/4/2022	dead-fresh	0-0.33 days	singe to all of tail feathers and left wing and to underbelly feathers; Flux Grade: 3	scorched or singed	3	1	Powerblock	640425, 3933521	NA
2022_002_ISEGS	yellow-rumped warbler	YRWA	Fatality Search	1/4/2022	1/4/2022	dead-fresh	0-0.33 days	no evidence of singe or collision; Flux Grade: Unk	unknown	NA	1	Heliostat	640481, 3933584	NA
2022_003_ISEGS	unidentified small bird	UNID	Fatality Search	1/17/2022	1/17/2022	broken up	8-14 days	curling or singe to all feathers; Flux Grade: Unk	scorched or singed	Unknown	1	Powerblock	640376, 3933512	NA
2022_004_ISEGS	unidentified small bird	UNID	Fatality Search	1/20/2022	1/20/2022	broken up	8-14 days	singe on top of head; Flux Grade: Unk, N/A	scorched or singed	Unknown	1	Powerblock	640422, 3933522	NA
2022_005_ISEGS	unidentified small bird	UNID	Fatality Search	2/14/2022	2/14/2022	feather spot	8-14 days	curling or singe to all flight feathers; Flux Grade: 1	scorched or singed	1	1	Powerblock	640305, 3933481	NA
2022_006_ISEGS	unidentified small bird	UNID	Fatality Search	2/23/2022	2/23/2022	broken up	8-14 days	curling to wings, singe to chest and upper parts; Flux Grade: 2, 3	scorched or singed	2,3	2	ACC	638689, 3935909	NA
2022_007_ISEGS	unidentified swallow	UNSW	Fatality Search	3/4/2022	3/4/2022	broken up	3-7 days	singe to coverts and secondaries of right wing; Flux Grade: 2, 3	scorched or singed	2,3	2	Powerblock	638600, 3935835	NA
2022_008_ISEGS	violet-green swallow	VGSW	Fatality Search	3/24/2022	3/24/2022	dead-fresh	0.33-1 days	singe to tail, wings, head, and back; Flux Grade: 2, 3	scorched or singed	2,3	3	ACC	637484, 3937958	NA
2022_009_ISEGS	tree swallow	TRES	Fatality Search	3/24/2022	3/24/2022	dead-fresh	0-0.33 days	singe to wings, tail, and contour feathers; Flux Grade: 2, 3	scorched or singed	2,3	2	Powerblock	638619, 3935867	NA
2022_010_ISEGS	tree swallow	TRES	Fatality Search	3/24/2022	3/24/2022	dead-fresh	0-0.33 days	singe to head, chest, wings and contour feathers; Flux Grade: 1, 3	scorched or singed	1,3	2	Powerblock	638567, 3935847	NA
2022_011_ISEGS	unidentified small bird	UNID	Incidental	3/25/2022	3/25/2022	broken up	1-3 days	curling to flight feathers on wing, singe to contour feathers; Flux Grade: 1, 3	scorched or singed	1,3	1	Powerblock	640383, 3933504	NA
2022_012_ISEGS	tree swallow	TRES	Fatality Search	3/25/2022	3/25/2022	alive-injured	0-0.33 days	singe to flight feathers in wings and tail, top of head, rump, and back; Flux Grade: 2, 3	scorched or singed	2,3	1	Heliostat	640318, 3933371	NA
2022_013_ISEGS	cliff swallow	CLSW	Fatality Search	4/7/2022	4/7/2022	dead-fresh	0.33-1 days	singe to entire carcass except chest; Flux Grade: 2, 3	scorched or singed	2,3	2	ACC	638650, 3935895	NA
2022_014_ISEGS	tree swallow	TRES	Fatality Search	4/7/2022	4/7/2022	dead-semi-fresh	1-3 days	singe to both wings, tail, back and chest; Flux Grade: 2, 3	scorched or singed	2,3	2	ACC	638638, 3935896	NA
2022_015_ISEGS	cliff swallow	CLSW	Incidental	4/7/2022	4/7/2022	dead-semi-fresh	8-14 days	singe to head, back, and rump; Flux Grade: 1, 3	scorched or singed	1,3	3	Powerblock	637487, 3937914	NA
2022_016_ISEGS	white-crowned sparrow	WCSP	Fatality Search	4/8/2022	4/8/2022	dead-semi-fresh	3-7 days	no evidence of singe or collision; Flux Grade: N/A	unknown	NA	1	Heliostat	640191, 3933410	NA
2022_017_ISEGS	tree swallow	TRES	Fatality Search	4/8/2022	4/8/2022	broken up	3-7 days	singe to head, wings, and contour feathers; Flux Grade: 1	scorched or singed	1	1	Heliostat	640443, 3933260	NA
2022_018_ISEGS	white-crowned sparrow	WCSP	Incidental	4/14/2022	4/14/2022	dead-fresh	0.33-1 days	no evidence of singe or collision; Flux Grade: N/A	unknown	NA	2	CLA Fence	639599, 3934927	NA

USFWS #	Common Name	Species Code	How Found	Detection Date	Collection Date	Condition	Time Since Death/Injury	Description of Carcass/Injury	Cause of Death/Injury	Burn Grade	Unit	Nearest Project Feature	Coordinates	SPUT Revisions
2022_019_ISEGS	orange-crowned warbler	OCWA	Fatality Search	4/14/2022	4/14/2022	dead-fresh	0-0.33 days	singe to outer flight feathers in wings, tips of rectrices, head, and chest; Flux Grade: 1, 3	scorched or singed	1,3	2	Powerblock	638651, 3935839	NA
2022_020_ISEGS	house finch	HOFI	Fatality Search	4/15/2022	4/15/2022	dead-fresh	0.33-1 days	no evidence of singe or collision; Flux Grade: N/A	unknown	NA	3	Heliostat	637260, 3937793	NA
2022_021_ISEGS	yellow-rumped warbler	YRWA	Incidental	5/3/2022	5/3/2022	dead-semi-fresh	3-7 days	evidence of curling to all flight feathers, singe to top of head, back, rump, and sides of breast; Flux Grade: 2, 3	scorched or singed	2,3	1	ACC	640352, 3933549	NA
2022_022_ISEGS	unidentified hummingbird	UNHU	Fatality Search	5/4/2022	5/4/2022	dead-semi-fresh	3-7 days	curling to wings and tail, singe to top of head, axillaries, back, and rump; Flux Grade: 2, 3	scorched or singed	2,3	2	ACC	638679, 3935897	NA
2022_023_ISEGS	unidentified small bird	UNID	Fatality Search	5/4/2022	5/4/2022	broken up	31-60 days	no evidence of singe or collision; Flux Grade: Unk	unknown	NA	2	Powerblock	638643, 3935854	NA
2022_024_ISEGS	Costa's hummingbird	COHU	Fatality Search	5/4/2022	5/4/2022	dead-semi-fresh	3-7 days	curling to several feathers in wings and tail, singe to back, rump and top of head; Flux Grade: 1, 3	scorched or singed	1,3	2	Powerblock	638651, 3935853	NA
2022_025_ISEGS	western tanager	WETA	Fatality Search	5/4/2022	5/4/2022	feather spot	1-3 days	no evidence of singe or collision; Flux Grade: Unk	unknown	NA	2	Powerblock	638688, 3935849	NA
2022_026_ISEGS	mourning dove	MODO	Fatality Search	5/4/2022	5/4/2022	broken up	3-7 days	no evidence of singe or collision; Flux Grade: Unk	unknown	NA	2	Heliostat	638606, 3935726	NA
2022_027_ISEGS	American kestral	AMKE	Fatality Search	5/5/2022	5/5/2022	broken up	3-6 days	barbus intact, feathers lofty with minimal wear; Flux Grade: N/A	unknown	NA	1	Heliostat	640567, 3933580	NA
2022_028_ISEGS	Wilson's warbler	WIWA	Fatality Search	5/9/2022	5/9/2022	dead-semi-fresh	3-7 days	singe to wings, head, chest, and back; Flux Grade: 2, 3	scorched or singed	2,3	1	ACC	640349, 3933549	NA
2022_029_ISEGS	barn swallow	BARS	Fatality Search	5/9/2022	5/9/2022	dead-fresh	0.33-1 days	singe to wings and tail, head, and majority of back; Flux Grade: 2, 3	scorched or singed	2,3	1	ACC	640370, 3933536	NA
2022_030_ISEGS	Wilson's warbler	WIWA	Fatality Search	5/9/2022	5/9/2022	dead-semi-fresh	3-7 days	singe to wings, tail, head, and back; Flux Grade: 2, 3	scorched or singed	2,3	1	ACC	640402, 3933536	NA
2022_031_ISEGS	Wilson's warbler	WIWA	Fatality Search	5/9/2022	5/9/2022	dead-semi-fresh	1-3 days	singe to head, wings, back, and head; Flux Grade: 1, 3	scorched or singed	1,3	1	ACC	640381, 3933536	NA
2022_032_ISEGS	lazuli bunting	LAZB	Incidental	5/9/2022	5/9/2022	dead-semi-fresh	2-2 days	curling to all flight feathers, singe to coverts, top of head, bak; Flux Grade: 2,3	scorched or singed	2,3	1	Powerblock	640373, 3933487	NA
2022_033_ISEGS	yellow warbler	YWAR	Incidental	5/12/2022	5/16/2022	dead-semi-fresh	3-6 days	singe to entire carcass except back and throat with all flight feathers singer off; Flux Grade: 2, Unk	scorched or singed	2	1	Powerblock	640371, 3933508	NA
2022_034_ISEGS	unidentified empidonax	UNEM	Fatality Search	5/17/2022	5/17/2022	dead-semi-fresh	3-7 days	no evidence of singe or collision; Flux Grade: Unk	unknown	NA	3	ACC	637473, 3937976	NA
2022_035_ISEGS	Wilson's warbler	WIWA	Fatality Search	5/17/2022	5/17/2022	dead-fresh	0.33-1 days	slight singe to nape and top of head; Flux Grade: 3	scorched or singed	3	3	ACC	637533, 3937967	NA
2022_036_ISEGS	lesser goldfinch	LEGO	Fatality Search	5/17/2022	5/17/2022	dead-fresh	0.33-1 days	curling to all flight feathers, singe to all of body except throat; Flux Grade: 2, 3	scorched or singed	2,3	3	ACC	637507, 3937957	NA

USFWS #	Common Name	Species Code	How Found	Detection Date	Collection Date	Condition	Time Since Death/Injury	Description of Carcass/Injury	Cause of Death/Injury	Burn Grade	Unit	Nearest Project Feature	Coordinates	SPUT Revisions
2022_037_ISEGS	unidentified warbler	UNWA	Fatality Search	5/17/2022	5/17/2022	dead-semi-fresh	1-3 days	singe to all of dorsal side of carcass and axillaries, all flight feathers singed off; Flux Grade: 2, 3	scorched or singed	2,3	3	ACC	637472, 3937943	NA
2022_038_ISEGS	barn swallow	BARS	Fatality Search	5/17/2022	5/17/2022	dead-fresh	0.33-1 days	no evidence of singe or collision; Flux Grade: Unk	unknown	NA	3	Powerblock	637386, 3937963	NA
2022_039_ISEGS	Wilson's warbler	WIWA	Fatality Search	5/18/2022	5/18/2022	dead-fresh	0.33-1 days	curling to right wing feathers, singe to coverts, rump, and top of head; Flux Grade: 1, 3	scorched or singed	1,3	2	ACC	638636, 3935884	NA
2022_040_ISEGS	Wilson's warbler	WIWA	Fatality Search	5/18/2022	5/18/2022	dead-semi-fresh	3-7 days	curling to all flight feathers, singe to top of head, nape, and breast; Flux Grade: 2, 3	scorched or singed	2,3	2	ACC	638681, 3935885	NA
2022_041_ISEGS	Wilson's warbler	WIWA	Fatality Search	5/18/2022	5/18/2022	dead-semi-fresh	3-7 days	curling to all flight feathers, singe to top of head, back, and axillaries; Flux Grade: 2, 3	scorched or singed	2,3	2	ACC	638633, 3935898	NA
2022_042_ISEGS	black-chinned hummingbird	BCHU	Fatality Search	5/18/2022	5/18/2022	dead-semi-fresh	3-7 days	curling to tail and some primaries, singe to top of head, back, and right flank; Flux Grade: 1, 3	scorched or singed	1,3	2	ACC	638630, 3935911	NA
2022_043_ISEGS	Wilson's warbler	WIWA	Fatality Search	5/18/2022	5/18/2022	dead-semi-fresh	1-3 days	singe to top of head, nape, and coverts; Flux Grade: 3	scorched or singed	3	2	ACC	638632, 3935924	NA
2022_044_ISEGS	unidentified warbler	UNWA	Fatality Search	5/18/2022	5/18/2022	broken up	3-7 days	curling to flight feathers, singe to coverts; Flux Grade: 2, 3	scorched or singed	2,3	2	Powerblock	638662, 3935866	NA
2022_045_ISEGS	unidentified small bird	UNID	Fatality Search	5/18/2022	5/18/2022	broken up	3-7 days	curling to all flight feathers; Flux Grade: 1	scorched or singed	1	2	Powerblock	638626, 3935873	NA
2022_046_ISEGS	unidentified warbler	UNWA	Fatality Search	5/18/2022	5/18/2022	feather spot	1-3 days	singe to several contour feathers; Flux Grade: 3	scorched or singed	3	2	Powerblock	638626, 3935873	NA
2022_047_ISEGS	Wilson's warbler	WIWA	Fatality Search	5/19/2022	5/19/2022	dead-semi-fresh	1-3 days	singe to wings, head, chest, tail, and contour feathers; Flux Grade: 2, 3	scorched or singed	2,3	1	ACC	640414, 3933523	NA
2022_048_ISEGS	unidentified warbler	UNWA	Fatality Search	5/19/2022	5/19/2022	broken up	3-7 days	no evidence of singe or collision; Flux Grade: N/A	unknown	NA	1	Heliostat	640497, 3933595	NA
2022_049_ISEGS	unidentified small bird	UNID	Fatality Search	5/19/2022	5/19/2022	broken up	3-7 days	no evidence of singe or collision; Flux Grade: N/A	unknown	NA	1	Heliostat	640592, 3933415	NA
2022_050_ISEGS	unidentified small bird	UNID	Fatality Search	5/20/2022	5/20/2022	feather spot	3-7 days	no evidence of singe or collision; Flux Grade: N/A	unknown	NA	1	Heliostat	640187, 3933406	NA
2022_051_ISEGS	yellow warbler	YWAR	Fatality Search	5/31/2022	5/31/2022	feather spot	3-7 days	singeing to tips of flight feathers; Flux Grade: 1, 3	scorched or singed	1,3	3	Powerblock	637461, 3937936	NA
2022_052_ISEGS	unidentified warbler	UNWA	Fatality Search	5/31/2022	5/31/2022	feather spot	3-7 days	curling to rectrices; Flux Grade: 1	scorched or singed	1	3	Powerblock	637461, 3937936	NA
2022_053_ISEGS	unidentified small bird	UNID	Fatality Search	5/31/2022	5/31/2022	feather spot	3-7 days	singeing to contour feathers; Flux Grade: 1, 3	scorched or singed	1,3	3	Powerblock	637461, 3937935	NA
2022_054_ISEGS	unidentified small bird	UNID	Fatality Search	5/31/2022	5/31/2022	feather spot	3-7 days	singe to tips of contour feathers; Flux Grade: 3	scorched or singed	3	3	Powerblock	637461, 3937935	NA
2022_055_ISEGS	unidentified small bird	UNID	Fatality Search	5/31/2022	5/31/2022	broken up	3-7 days	no evidence of singe or collision; Flux Grade: N/A	unknown	NA	3	Powerblock	637461, 3937935	NA
2022_056_ISEGS	yellow warbler	YWAR	Fatality Search	5/31/2022	5/31/2022	dead-semi-fresh	3-7 days	singe to entirety of carcass except chest an parts of face; Flux Grade: 2, 3	scorched or singed	2,3	2	ACC	638634, 3935897	NA

USFWS #	Common Name	Species Code	How Found	Detection Date	Collection Date	Condition	Time Since Death/Injury	Description of Carcass/Injury	Cause of Death/Injury	Burn Grade	Unit	Nearest Project Feature	Coordinates	SPUT Revisions
2022_057_ISEGS	common raven	CORA	Incidental	5/27/2022	5/31/2022	dead-semi-fresh	1-3 days	no evidence of singe or collision; Flux Grade:	unknown	NA	2	Powerblock	638660, 3935845	NA
2022_058_ISEGS	unidentified warbler	UNWA	Fatality Search	6/1/2022	6/1/2022	dead-semi-fresh	3-7 days	singe to entire carcass with flight feathers singed off; Flux Grade: 2, 3	scorched or singed	2,3	1	ACC	640355, 3933522	NA
2022_059_ISEGS	unidentified swallow	UNSW	Fatality Search	6/1/2022	6/1/2022	feather spot	3-7 days	curling to 3 flight feathers; Flux Grade: 1	scorched or singed	1	1	Powerblock	640346, 3933513	NA
2022_060_ISEGS	mourning dove	MODO	Fatality Search	6/1/2022	6/1/2022	feather spot	3-7 days	no evidence of singe or collision; Flux Grade: Unk	unknown	NA	1	Powerblock	640379, 3933549	NA
2022_061_ISEGS	unidentified sparrow	UNSP	Fatality Search	6/2/2022	6/2/2022	broken up	3-7 days	no evidence of singe or collision; Flux Grade: N/A	unknown	NA	1	Heliostat	640192, 3933375	NA
2022_062_ISEGS	peregrine falcon	PEFA	Incidental	6/10/2022	6/2/2022	alive-injured	0-0.33 days	singe to flight feathers and contour feathers.; Flux Grade: 2	scorched or singed	2	3	Powerblock	637493, 3937940	NA
2022_063_ISEGS	unidentified warbler	UNWA	Fatality Search	6/14/2022	6/14/2022	broken up	3-7 days	singe to tips of secondaries and some contour feathers; Flux Grade: Unk	scorched or singed	Unknown	1	Powerblock	640387, 3933545	NA
2022_064_ISEGS	unidentified small bird	UNID	Fatality Search	6/14/2022	6/14/2022	broken up	3-7 days	singe to several primaries and secondaries.; Flux Grade: Unk	scorched or singed	Unknown	1	Powerblock	640352, 3933493	NA
2022_065_ISEGS	Costa's hummingbird	COHU	Fatality Search	6/17/2022	6/17/2022	dead-semi-fresh	3-7 days	no evidence of singe or collision.; Flux Grade: Unk	unknown	NA	3	ACC	637517, 3937971	NA
2022_066_ISEGS	unidentified small bird	UNID	Fatality Search	6/17/2022	6/17/2022	feather spot	3-7 days	no evidence of singe or collision.; Flux Grade: Unk	unknown	NA	3	Powerblock	637463, 3937932	NA
2022_067_ISEGS	unidentified hummingbird	UNHU	Fatality Search	6/17/2022	6/17/2022	dead-semi-fresh	3-7 days	evidence of curling to rectrices.; Flux Grade: 1	scorched or singed	1	3	Powerblock	637467, 3937929	NA
2022_068_ISEGS	unidentified small bird	UNID	Fatality Search	6/17/2022	6/17/2022	feather spot	3-7 days	evidence of singe to tips of serval contour feathers.; Flux Grade: 3	scorched or singed	3	3	Powerblock	637471, 3937928	NA
2022_069_ISEGS	unidentified flycatcher	UNFL	Fatality Search	6/17/2022	6/17/2022	broken up	1-3 days	no evidence of singe or collision.; Flux Grade: Unk	unknown	NA	2	Powerblock	638639, 3935861	NA
2022_070_ISEGS	common raven	CORA	Fatality Search	6/17/2022	6/17/2022	feather spot	8-14 days	no evidence of singe or collision.; Flux Grade: Unk	unknown	NA	2	Powerblock	638655, 3935845	NA
2022_071_ISEGS	Wilson's warbler	WIWA	Incidental	6/30/2022	6/30/2022	mummified	8-14 days	NA; Flux Grade: Unk	unknown	NA	3	Powerblock	637456, 3937903	NA
2022_072_ISEGS	unidentified small bird	UNID	Fatality Search	6/30/2022	6/30/2022	feather spot	3-7 days	no evidence of singe or collision.; Flux Grade: Unk	unknown	NA	3	Powerblock	637479, 3937926	NA
2022_073_ISEGS	house finch	HOFI	Fatality Search	7/4/2022	7/4/2022	mummified	8-14 days	no evidence of singe or collision.; Flux Grade: Unk	unknown	NA	1	Heliostat	640330, 3933334	NA
2022_074_ISEGS	unidentified swallow	UNSW	Fatality Search	7/12/2022	7/12/2022	broken up	3-7 days	singe to all flight feathers.; Flux Grade: Unk	scorched or singed	Unknown	3	Powerblock	637428, 3937962	NA
2022_075_ISEGS	unidentified swallow	UNSW	Fatality Search	7/12/2022	7/12/2022	feather spot	3-7 days	singe to all flight feathers.; Flux Grade: Unk	scorched or singed	Unknown	3	Powerblock	637421, 3937955	NA
2022_076_ISEGS	unidentified small bird	UNID	Fatality Search	7/12/2022	7/12/2022	feather spot	3-7 days	singe to all primaries.; Flux Grade: Unk	scorched or singed	Unknown	3	Powerblock	637419, 3937946	NA
2022_077_ISEGS	lazuli bunting	LAZB	Fatality Search	7/12/2022	7/12/2022	broken up	3-7 days	singe to tip of primaries.; Flux Grade: Unk	scorched or singed	Unknown	3	Powerblock	637511, 3937945	NA
2022_078_ISEGS	unidentified thrush	UNTH	Fatality Search	7/12/2022	7/12/2022	broken up	3-7 days	singe to several contour feathers.; Flux Grade: Unk	scorched or singed	Unknown	3	Powerblock	637464, 3937934	NA
2022_079_ISEGS	unidentified small bird	UNID	Fatality Search	7/12/2022	7/12/2022	feather spot	3-7 days	singe to all contour feathers.; Flux Grade: Unk	scorched or singed	Unknown	3	Powerblock	637462, 3937934	NA

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2022_080_ISEGS	unidentified small bird	UNID	Fatality Search	7/12/2022	7/12/2022	broken up	3-7 days	singe to contour feathers.; Flux Grade: Unk	scorched or singed	Unknown	3	Powerblock	637440, 3937904	NA
2022_081_ISEGS	least sandpiper	LESA	Fatality Search	7/12/2022	7/12/2022	dead-fresh	0-0.33 days	singe to all flight feathers in wings, coverts, back, nape, and top of head.; Flux Grade: 2, 3	scorched or singed	2,3	1	Powerblock	640336, 3933504	NA
2022_082_ISEGS	common raven	CORA	Fatality Search	7/12/2022	7/12/2022	alive-injured	0-0.33 days	curling to flight feathers in wings and tail, singe to chest and top of head.; Flux Grade: Unk	scorched or singed	Unknown	2	Powerblock	638636, 3935839	NA
2022_083_ISEGS	cliff swallow	CLSW	Fatality Search	7/12/2022	7/12/2022	broken up	3-7 days	no evidence of singe or collision.; Flux Grade: N/A	unknown	NA	1	Powerblock	640360, 3933496	NA
2022_084_ISEGS	red-tailed hawk	RTHA	Incidental	7/13/2022	7/14/2022	dead-semi-fresh	3-7 days	singe to flight feathers in tail and wings and to contour feathers.; Flux Grade: 2, 3	scorched or singed	2,3	3	Heliostat	637105, 3937867	NA
2022_085_ISEGS	tree swallow	TRES	Fatality Search	7/29/2022	NA	dead-semi-fresh	3-7 days	tail, wings, head, chest, and contour feathers singed.; Flux Grade: Unk	scorched or singed	Unknown	2	ACC	638629, 3935885	NA
2022_086_ISEGS	unidentified warbler	UNWA	Fatality Search	7/29/2022	7/29/2022	broken up	3-7 days	contour feathers singed.; Flux Grade: 1	scorched or singed	1	2	Powerblock	638627, 3935822	NA
2022_087_ISEGS	Anna's hummingbird	ANHU	Fatality Search	8/9/2022	8/9/2022	dead-fresh	0.33-1 days	singe to tips of several rectrices.; Flux Grade: 2, 3	scorched or singed	2,3	3	Heliostat	637521, 3937789	NA
2022_088_ISEGS	tree swallow	TRES	Fatality Search	8/9/2022	8/9/2022	dead-semi-fresh	3-7 days	curling to flight feathers in wings and tail, singe to forehead and in flanks.; Flux Grade: Unk	scorched or singed	Unknown	3	ACC	637483, 3937944	NA
2022_089_ISEGS	lesser nighthawk	LENI	Incidental	8/2/2022	8/9/2022	dead-semi-fresh	8-14 days	no evidence of singe or collision; Flux Grade: Unk	unknown	NA	3	Powerblock	637422, 3937935	NA
2022_090_ISEGS	mourning dove	MODO	Incidental	8/18/2022	NA	alive-injured	0-0.33 days	bird was observed struggling to fly and disorientated suggesting collision with heliostat.; Flux Grade: Unk	collision-panel	NA	1	Perimeter Fence	641352, 3934299	NA
2022_091_ISEGS	tree swallow	TRES	Fatality Search	8/22/2022	8/22/2022	dead-semi-fresh	1-3 days	singe to head, tail, wings, and chest.; Flux Grade: 2, 3	scorched or singed	2,3	3	ACC	637485, 3937970	NA
2022_092_ISEGS	tree swallow	TRES	Fatality Search	8/22/2022	8/22/2022	dead-semi-fresh	1-3 days	singe to wings, tail, side of head, and contour feathers.; Flux Grade: 2, 3	scorched or singed	2,3	3	ACC	637506, 3937971	NA
2022_093_ISEGS	rufous hummingbird	RUHU	Fatality Search	8/22/2022	8/22/2022	dead-semi-fresh	3-7 days	singe to head, wings, tail and back.; Flux Grade: 2, 3	scorched or singed	2,3	3	Powerblock	637420, 3937958	NA
2022_094_ISEGS	black-throated sparrow	BTSP	Incidental	8/22/2022	8/22/2022	dead-semi-fresh	3-7 days	singe to head, wings, tail and back.; Flux Grade: 2, 3	scorched or singed	2,3	3	Powerblock	637412, 3937935	NA
2022_095_ISEGS	unidentified hummingbird	UNHU	Fatality Search	8/22/2022	8/22/2022	dead-semi-fresh	3-7 days	singe to head, chest, wings, and tail.; Flux Grade: 2, 3	scorched or singed	2,3	3	Powerblock	637423, 3937882	NA
2022_096_ISEGS	unidentified warbler	UNWA	Fatality Search	8/22/2022	8/22/2022	dead-semi-fresh	3-7 days	singe to head, wings, tail, and contour feathers.; Flux Grade: 2, 3	scorched or singed	2,3	2	ACC	638647, 3935886	NA
2022_097_ISEGS	tree swallow	TRES	Fatality Search	8/22/2022	8/22/2022	dead-semi-fresh	1-3 days	singe to head, tail, head, and chest.; Flux Grade: 2, 3	scorched or singed	2,3	2	ACC	638652, 3935909	NA
2022_098_ISEGS	yellow warbler	YWAR	Incidental	8/23/2022	8/23/2022	dead-fresh	0-0.33 days	singe to both wings, tail, head, and forehead.; Flux Grade: 2, 3	scorched or singed	2,3	3	Powerblock	637419, 3937911	NA
2022_099_ISEGS	verdin	VERD	Incidental	8/24/2022	8/25/2022	dead-semi-fresh	3-7 days	curling to some rectrices, singe to rump.; Flux Grade: 1, 3	scorched or singed	1,3	3	Powerblock	637427, 3937885	NA

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2022_100_ISEGS	black-tailed gnatcatcher	BTGN	Fatality Search	8/25/2022	8/25/2022	dead-semi-fresh	3-7 days	curling to rectrices and some primaries.; Flux Grade: 2, 3	scorched or singed	2,3	1	ACC	640346, 3933549	NA
2022_101_ISEGS	tree swallow	TRES	Fatality Search	8/25/2022	8/25/2022	dead-semi-fresh	1-3 days	curling to majority of flight feathers in wings and tail, singe to top of head and nape.; Flux Grade: 2, 3	scorched or singed	2,3	1	ACC	640355, 3933534	NA
2022_102_ISEGS	yellow warbler	YWAR	Fatality Search	8/25/2022	8/25/2022	dead-semi-fresh	1-3 days	curling to left wing, singe to head, nape, and right axillary.; Flux Grade: 1	scorched or singed	1	1	ACC	640373, 3933534	NA
2022_103_ISEGS	unidentified swallow	UNSW	Fatality Search	8/25/2022	8/25/2022	broken up	8-14 days	no evidence of singe or collision.; Flux Grade: Unk	unknown	NA	1	Powerblock	640373, 3933531	NA
2022_104_ISEGS	bank swallow	BANS	Fatality Search	8/26/2022	8/26/2022	dead-semi-fresh	3-7 days	no evidence of singe or collision.; Flux Grade: Unk	unknown	NA	1	Heliostat	640357, 3933388	NA
2022_105_ISEGS	black-throated sparrow	BTSP	Incidental	8/29/2022	8/29/2022	dead-semi-fresh	3-7 days	curling to all flight feathers, singe to upper breast and right side of face; Flux Grade: 2, 3	scorched or singed	2,3	2	Powerblock	638615, 3935820	NA
2022_106_ISEGS	black-throated sparrow	BTSP	Incidental	9/6/2022	9/6/2022	dead-semi-fresh	3-7 days	curling to right wing and rectrices, singe to breasts and top of head.; Flux Grade: 2, 3	scorched or singed	2,3	2	Powerblock	638607, 3935843	NA
2022_107_ISEGS	tree swallow	TRES	Incidental	9/1/2022	9/6/2022	dead-semi-fresh	3-7 days	curling to several flight feathers in wings and tail, singe to nape, back, and rump.; Flux Grade: 1, 3	scorched or singed	1,3	2	Powerblock	638660, 3935845	NA
2022_108_ISEGS	unidentified hummingbird	UNHU	Incidental	9/1/2022	9/6/2022	dead-semi-fresh	3-7 days	singe to all of body with rectrices singed off.; Flux Grade: 1, 3	scorched or singed	1,3	2	ACC	638658, 3935925	NA
2022_109_ISEGS	unidentified hummingbird	UNHU	Incidental	9/1/2022	9/6/2022	dead-semi-fresh	3-7 days	singe to entirety of carcass with majority of flight feathers singed off.; Flux Grade: 2, 3	scorched or singed	2,3	2	ACC	638640, 3935883	NA
2022_110_ISEGS	lazuli bunting	LAZB	Incidental	9/1/2022	9/6/2022	dead-semi-fresh	1-3 days	curling to primaries in both wings, singe to top of head, nape, and back.; Flux Grade: 1, 3	scorched or singed	1,3	2	ACC	638680, 3935883	NA
2022_111_ISEGS	yellow warbler	YWAR	Fatality Search	9/6/2022	9/6/2022	dead-semi-fresh	1-3 days	no evidence of singe or collision.; Flux Grade: Unk	unknown	NA	3	ACC	637472, 3937958	NA
2022_112_ISEGS	MacGillivray's warbler	MGWA	Fatality Search	9/6/2022	9/6/2022	dead-fresh	0-0.33 days	curling to left wing, singe to all of dorsal side with right wing and tail feathers singed off.; Flux Grade: 2, 3	scorched or singed	2,3	3	ACC	637480, 3937957	NA
2022_113_ISEGS	northern rough-winged swallow	NRWS	Fatality Search	9/6/2022	9/22/2022	dead-semi-fresh	3-6 days	head & tips of wings singed; Flux Grade: 1	scorched or singed	1	3	ACC	637498, 3937977	NA
2022_114_ISEGS	northern rough-winged swallow	NRWS	Fatality Search	9/6/2022	9/6/2022	dead-semi-fresh	3-7 days	singe to left side of face, coverts, and rump.; Flux Grade: 3	scorched or singed	3	3	ACC	637473, 3937984	NA
2022_115_ISEGS	black-throated sparrow	BTSP	Fatality Search	9/6/2022	9/6/2022	dead-fresh	0-0.33 days	curling to flight feathers in both wings with singe to breast and left side of face with all rectrices singed off.; Flux Grade: 2, 3	scorched or singed	2,3	3	ACC	637476, 3937944	NA
2022_116_ISEGS	yellow warbler	YWAR	Fatality Search	9/6/2022	9/6/2022	dead-fresh	0.33-1 days	curling to all flight feathers, singe to head, nape, back, and coverts.; Flux Grade: 2, 3	scorched or singed	2,3	3	ACC	637479, 3937943	NA
2022_117_ISEGS	unidentified small bird	UNID	Fatality Search	9/6/2022	9/6/2022	broken up	3-7 days	singe to rectrices.; Flux Grade: Unk	scorched or singed	Unknown	3	Powerblock	637455, 3937935	NA

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2022_118_ISEGS	unidentified swallow	UNSW	Fatality Search	9/6/2022	9/6/2022	feather spot	3-7 days	singe to trailing edge of primary.; Flux Grade: Unk	scorched or singed	Unknown	3	Powerblock	637455, 3937935	NA
2022_119_ISEGS	unidentified hummingbird	UNHU	Fatality Search	9/6/2022	9/6/2022	broken up	3-7 days	singe to wings, tail, head and back.; Flux Grade: 2, 3	scorched or singed	2,3	3	Powerblock	637439, 3937907	NA
2022_120_ISEGS	black-throated sparrow	BTSP	Incidental	9/2/2022	9/6/2022	dead-semi-fresh	3-7 days	slight singe to upper breast.; Flux Grade: 3	scorched or singed	3	3	Powerblock	637494, 3937947	NA
2022_121_ISEGS	northern rough-winged swallow	NRWS	Incidental	9/2/2022	9/6/2022	dead-semi-fresh	3-7 days	curling to all flight feathers, singe to top of head, coverts, back, and rump.; Flux Grade: 2, 3	scorched or singed	2,3	3	Powerblock	637422, 3937960	NA
2022_122_ISEGS	yellow warbler	YWAR	Incidental	9/2/2022	9/6/2022	dead-semi-fresh	3-7 days	curling to flight feathers in wings, singe to top of head and sides of face, coverts, with rectrices singed off.; Flux Grade: 2, 3	scorched or singed	2,3	1	Powerblock	640401, 3933470	NA
2022_123_ISEGS	yellow warbler	YWAR	Incidental	9/2/2022	9/6/2022	broken up	3-7 days	curling to flight feathers and singe to coverts.; Flux Grade: 1, 3	scorched or singed	1,3	1	Powerblock	640412, 3933481	NA
2022_124_ISEGS	mourning dove	MODO	Fatality Search	9/8/2022	9/8/2022	dead-semi-fresh	3-7 days	no evidence of singe or collision.; Flux Grade: Unk	unknown	NA	3	Powerblock	637478, 3937922	NA
2022_125_ISEGS	yellow warbler	YWAR	Fatality Search	9/8/2022	9/8/2022	dead-semi-fresh	1-3 days	singe to wings, head, and chest.; Flux Grade: 1	scorched or singed	1	1	ACC	640405, 3933563	NA
2022_126_ISEGS	yellow warbler	YWAR	Fatality Search	9/8/2022	9/8/2022	dead-semi-fresh	1-3 days	singe to tips of wings, head, chest, and nape.; Flux Grade: 1	scorched or singed	1	1	ACC	640351, 3933548	NA
2022_127_ISEGS	lazuli bunting	LAZB	Fatality Search	9/8/2022	9/8/2022	dead-semi-fresh	3-7 days	singe to back, nape, chest, and wing coverts.; Flux Grade: 3	scorched or singed	3	1	ACC	640383, 3933547	NA
2022_128_ISEGS	unidentified gnatcatcher	UNGN	Fatality Search	9/8/2022	9/8/2022	dead-semi-fresh	3-7 days	singe to entire carcass except chest.; Flux Grade: 2, 3	scorched or singed	2,3	2	ACC	638626, 3935909	NA
2022_129_ISEGS	American kestrel	AMKE	Fatality Search	9/8/2022	9/8/2022	dead-semi-fresh	3-7 days	singe to head, wings, tail, and nape.; Flux Grade: 2, 3	scorched or singed	2,3	2	Powerblock	638531, 3935848	NA
2022_130_ISEGS	black-throated sparrow	BTSP	Incidental	9/8/2022	9/8/2022	dead-fresh	0.33-1 days	curling to many flight feathers in wings and tail, singe to rump and breast.; Flux Grade: 2, 3	scorched or singed	2,3	2	Powerblock	638632, 3935833	NA
2022_131_ISEGS	unidentified small bird	UNID	Fatality Search	9/8/2022	9/8/2022	broken up	3-7 days	no evidence of singe or collision.; Flux Grade:	unknown	NA	1	Powerblock	640347, 3933539	NA
2022_132_ISEGS	unidentified warbler	UNWA	Fatality Search	9/8/2022	9/8/2022	broken up	3-7 days	singe to tips of contour feathers.; Flux Grade: Unk	scorched or singed	Unknown	1	Powerblock	640347, 3933553	NA
2022_133_ISEGS	unidentified small bird	UNID	Fatality Search	9/8/2022	9/8/2022	broken up	3-7 days	singe to some wing covert feathers.; Flux Grade: Unk	scorched or singed	Unknown	1	Powerblock	640350, 3933546	NA
2022_134_ISEGS	unidentified small bird	UNID	Fatality Search	9/8/2022	9/8/2022	feather spot	3-7 days	singe to tips of contour feathers.; Flux Grade: Unk	scorched or singed	Unknown	2	Powerblock	638641, 3935842	NA
2022_135_ISEGS	northern rough-winged swallow	NRWS	Fatality Search	9/8/2022	9/8/2022	broken up	3-7 days	singe to wing and head.; Flux Grade: Unk	scorched or singed	Unknown	2	Powerblock	638652, 3935849	NA
2022_136_ISEGS	lazuli bunting	LAZB	Fatality Search	9/8/2022	9/8/2022	dead-semi-fresh	3-7 days	singe to primaries, tail and contour feathers.; Flux Grade: 2, 3	scorched or singed	2,3	1	Powerblock	640364, 3933512	NA
2022_137_ISEGS	lazuli bunting	LAZB	Incidental	9/8/2022	9/8/2022	dead-semi-fresh	3-7 days	curling to rectrices and some flight feathers, singe to upper breasts and top of head.; Flux Grade: 1, 3	scorched or singed	1,3	2	Powerblock	638640, 3935869	NA

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2022_138_ISEGS	black-throated sparrow	BTSP	Incidental	9/8/2022	9/8/2022	broken up	3-7 days	singe to both wings, head, and tail.; Flux Grade: 2, 3	scorched or singed	2,3	1	Powerblock	640435, 3933490	NA
2022_139_ISEGS	brown-headed cowbird	BHCO	Fatality Search	9/8/2022	9/8/2022	dead-semi-fresh	8-14 days	no evidence of singe or collision.; Flux Grade: Unk	unknown	NA	2	Powerblock	638638, 3935916	NA
2022_140_ISEGS	green-tailed towhee	GTTO	Fatality Search	9/9/2022	9/9/2022	dead-fresh	0-0.33 days	no evidence of singe or collision.; Flux Grade: N/A	unknown	NA	1	Heliostat	640487, 3933660	NA
2022_141_ISEGS	bank swallow	BANS	Incidental	9/15/2022	9/15/2022	dead-semi-fresh	3-7 days	NA; Flux Grade: Unk	unknown	NA	1	Powerblock	640365, 3933486	NA
2022_142_ISEGS	unidentified hummingbird	UNHU	Incidental	9/15/2022	9/15/2022	dead-semi-fresh	0-0.33 days	Curling to both wings, singe to all of dorsal side w/ rects singed off; Flux Grade: 2, 3	scorched or singed	2,3	3	Powerblock	637405, 3937959	NA
2022_143_ISEGS	unidentified medium bird	UNMB	Incidental	9/19/2022	NA	broken up	8-14 days	curling to all flight feathers.; Flux Grade: 2	scorched or singed	2	1	Powerblock	640373, 3933487	NA
2022_144_ISEGS	brown-headed cowbird	BHCO	Fatality Search	9/20/2022	9/20/2022	dead-semi-fresh	3-7 days	curling to flight feathers in wing and tail, singe to nape, back, and rump.; Flux Grade: 2, 3	scorched or singed	2,3	3	ACC	637485, 3937943	NA
2022_145_ISEGS	lazuli bunting	LAZB	Fatality Search	9/20/2022	9/20/2022	dead-fresh	0.33-1 days	singe to top of head, left flank.; Flux Grade: 3	scorched or singed	3	3	ACC	637489, 3937944	NA
2022_146_ISEGS	unidentified small bird	UNID	Fatality Search	9/20/2022	9/20/2022	feather spot	3-7 days	singe to trailing edge of primaries.; Flux Grade: Unk	scorched or singed	Unknown	3	Powerblock	637464, 3937934	NA
2022_147_ISEGS	unidentified swallow	UNSW	Fatality Search	9/20/2022	9/20/2022	broken up	8-14 days	no evidence of singe or collision.; Flux Grade: N/A	unknown	NA	3	Powerblock	637451, 3937930	NA
2022_148_ISEGS	unidentified small bird	UNID	Fatality Search	9/20/2022	9/20/2022	broken up	3-7 days	singe to tips of primaries.; Flux Grade: Unk	scorched or singed	Unknown	3	Powerblock	637399, 3937900	NA
2022_149_ISEGS	mourning dove	MODO	Fatality Search	9/21/2022	9/21/2022	dead-semi-fresh	1-3 days	singe to majority of rectrices.; Flux Grade: 1	scorched or singed	1	2	ACC	638672, 3935914	NA
2022_150_ISEGS	unidentified sparrow	UNSP	Fatality Search	9/21/2022	9/21/2022	dead-fresh	0-0.33 days	singe to entire carcass.; Flux Grade: 2, 3	scorched or singed	2,3	2	ACC	638636, 3935910	NA
2022_151_ISEGS	unidentified hummingbird	UNHU	Fatality Search	9/21/2022	9/21/2022	dead-semi-fresh	1-3 days	singe to entire carcass except for parts of chest.; Flux Grade: 2, 3	scorched or singed	2,3	2	ACC	638672, 3935910	NA
2022_152_ISEGS	black-throated sparrow	BTSP	Incidental	9/20/2022	9/21/2022	dead-fresh	0.33-1 days	Chest, tail, head, tips of wings singed; Flux Grade: 1, 3	scorched or singed	1,3	2	ACC	638683, 3935884	NA
2022_153_ISEGS	unidentified small bird	UNID	Fatality Search	9/21/2022	9/21/2022	dead-semi-fresh	3-7 days	singe to entire carcass.; Flux Grade: 2, 3	scorched or singed	2,3	2	Powerblock	638667, 3935849	NA
2022_154_ISEGS	unidentified small bird	UNID	Fatality Search	9/21/2022	9/21/2022	broken up	3-7 days	singe to all primaries.; Flux Grade: Unk	scorched or singed	Unknown	2	Heliostat	638429, 3935910	NA
2022_155_ISEGS	mourning dove	MODO	Incidental	9/22/2022	9/22/2022	broken up	3-7 days	no evidence of singe or collision.; Flux Grade: N/A	unknown	NA	1	Powerblock	640347, 3933563	NA
2022_156_ISEGS	Wilson's warbler	WIWA	Fatality Search	9/22/2022	9/22/2022	dead-fresh	0-0.33 days	singe to tips of some primaries, back, and chest.; Flux Grade: 1, 3	scorched or singed	1,3	1	ACC	640351, 3933360	NA
2022_157_ISEGS	yellow warbler	YWAR	Fatality Search	9/22/2022	9/22/2022	dead-semi-fresh	1-3 days	singe to all of carcass except for lower chest.; Flux Grade: 2, 3	scorched or singed	2,3	1	ACC	640357, 3933562	NA
2022_158_ISEGS	lazuli bunting	LAZB	Fatality Search	9/23/2022	9/23/2022	dead-semi-fresh	1-3 days	singe to tips of wings and tail.; Flux Grade: 1	scorched or singed	1	1	ACC	640360, 3933547	NA
2022_159_ISEGS	unidentified small bird	UNID	Fatality Search	9/23/2022	9/23/2022	feather spot	3-7 days	singe to tips of flight feathers.; Flux Grade: Unk	scorched or singed	Unknown	1	Powerblock	640274, 3933547	NA

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2022_160_ISEGS	unidentified dove	UNDV	Fatality Search	9/23/2022	9/23/2022	feather spot	3-7 days	singe to tips of flight feathers.; Flux Grade: Unk	scorched or singed	Unknown	1	Powerblock	640345, 3933550	NA
2022_161_ISEGS	mourning dove	MODO	Incidental	9/22/2022	9/22/2022	alive-injured	0-0.33 days	no evidence of singe or collision.; Flux Grade: N/A	unknown	NA	3	Powerblock	637370, 3937949	NA
2022_162_ISEGS	verdin	VERD	Incidental	9/25/2022	9/29/2022	broken up	3-7 days	singe to nape.; Flux Grade: 3	scorched or singed	3	1	Powerblock	640312, 3933453	NA
2022_163_ISEGS	yellow-rumped warbler	YRWA	Fatality Search	10/3/2022	10/3/2022	dead-fresh	0.33-1 days	singe to both wings, tail, head, and chest.; Flux Grade: 2, 3	scorched or singed	2,3	3	ACC	637511, 3937958	NA
2022_164_ISEGS	orange-crowned warbler	OCWA	Fatality Search	10/3/2022	10/3/2022	dead-fresh	0-0.33 days	singe to wings, tail, head, and back.; Flux Grade: 2, 3	scorched or singed	2,3	3	ACC	637519, 3937959	NA
2022_165_ISEGS	mourning dove	MODO	Fatality Search	10/3/2022	10/3/2022	broken up	3-7 days	no evidence of singe or collision.; Flux Grade: N/A	unknown	NA	3	Powerblock	637426, 3937920	NA
2022_166_ISEGS	cinnamon teal	CITE	Incidental	10/1/2022	10/3/2022	dead-semi-fresh	3-7 days	slight singe to wing tips.; Flux Grade: 1	scorched or singed	1	3	Powerblock	637487, 3937914	NA
2022_167_ISEGS	house finch	HOFI	Fatality Search	10/3/2022	10/3/2022	dead-semi-fresh	1-3 days	singe to entire carcass.; Flux Grade: 2, 3	scorched or singed	2,3	1	Powerblock	640340, 3933479	NA
2022_168_ISEGS	orange-crowned warbler	OCWA	Fatality Search	10/3/2022	10/3/2022	dead-semi-fresh	2-2 days	singe to wings, tail, head, chest, and some contour feathers.; Flux Grade: 2, 3	scorched or singed	2,3	3	ACC	637492, 3937958	NA
2022_169_ISEGS	mourning dove	MODO	Incidental	10/4/2022	10/4/2022	dead-semi-fresh	1-3 days	singe to wing coverts.; Flux Grade: 1	scorched or singed	1	2	Heliostat	638574, 3935663	NA
2022_170_ISEGS	orange-crowned warbler	OCWA	Fatality Search	10/5/2022	10/5/2022	dead-fresh	0.33-1 days	singe to wings, tail, chest, head, and some contour feathers.; Flux Grade: 2, 3	scorched or singed	2,3	2	ACC	638677, 3935922	NA
2022_171_ISEGS	unidentified small bird	UNID	Fatality Search	10/5/2022	10/5/2022	feather spot	3-7 days	singe to some contour feathers.; Flux Grade: Unk	scorched or singed	Unknown	2	ACC	638659, 3935910	NA
2022_172_ISEGS	lesser goldfinch	LEGO	Fatality Search	10/5/2022	10/5/2022	dead-fresh	0.33-1 days	singe to carcass.; Flux Grade: 1	scorched or singed	1	2	ACC	638669, 3935910	NA
2022_173_ISEGS	lesser goldfinch	LEGO	Fatality Search	10/5/2022	10/5/2022	dead-fresh	0-0.33 days	singe to tail, head, chest, and back.; Flux Grade: 2, 3	scorched or singed	2,3	2	Powerblock	638613, 3935882	NA
2022_174_ISEGS	unidentified small bird	UNID	Fatality Search	10/5/2022	10/5/2022	broken up	3-7 days	singe to wing shoulder.; Flux Grade: Unk	scorched or singed	Unknown	2	Powerblock	638621, 3935871	NA
2022_175_ISEGS	yellow-rumped warbler	YRWA	Fatality Search	10/5/2022	10/5/2022	dead-fresh	0-0.33 days	singe to tips of wings, chest, and head.; Flux Grade: 1, 3	scorched or singed	1,3	2	Powerblock	638640, 3935929	NA
2022_176_ISEGS	unidentified dove	UNDV	Fatality Search	10/5/2022	10/5/2022	broken up	3-7 days	no evidence of singe or collision.; Flux Grade: N/A	unknown	NA	2	Powerblock	638706, 3935906	NA
2022_177_ISEGS	red-winged blackbird	RWBL	Fatality Search	10/5/2022	10/5/2022	dead-fresh	0.33-1 days	singe to both wings, tail, chest, head, and back.; Flux Grade: 2, 3	scorched or singed	2,3	1	ACC	640380, 3933548	NA
2022_178_ISEGS	house finch	HOFI	Fatality Search	10/5/2022	10/5/2022	dead-fresh	0.33-1 days	singe to wings, tail, chest, head, and back.; Flux Grade: 2, 3	scorched or singed	2,3	1	ACC	640383, 3933523	NA
2022_179_ISEGS	house finch	HOFI	Fatality Search	10/5/2022	10/5/2022	dead-fresh	0.33-1 days	singe to entire carcass.; Flux Grade: 2, 3	scorched or singed	2,3	1	Powerblock	640382, 3933519	NA
2022_180_ISEGS	white-crowned sparrow	WCSP	Fatality Search	10/5/2022	10/5/2022	dead-fresh	0.33-1 days	singe to wings, tail, head, and back.; Flux Grade: 2, 3	scorched or singed	2,3	1	Powerblock	640361, 3933446	NA
2022_181_ISEGS	mourning dove	MODO	Fatality Search	10/5/2022	10/5/2022	broken up	3-7 days	no evidence of singe or collision.; Flux Grade: N/A	unknown	NA	2	Heliostat	638662, 3935151	NA
2022_182_ISEGS	unidentified warbler	UNWA	Fatality Search	10/7/2022	10/7/2022	feather spot	3-7 days	singe to some primaries.; Flux Grade: 2	scorched or singed	2	3	Heliostat	637423, 3937686	NA

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2022_183_ISEGS	mourning dove	MODO	Fatality Search	10/7/2022	10/7/2022	feather spot	0.33-1 days	no evidence of singe or collision.; Flux Grade: N/A	unknown	NA	3	Heliostat	637253, 3937917	NA
2022_184_ISEGS	verdin	VERD	Incidental	10/7/2022	10/10/2022	dead-semi-fresh	3-7 days	no evidence of singe or collision.; Flux Grade: Unk	unknown	NA	2	Powerblock	638630, 3935841	NA
2022_185_ISEGS	house finch	HOFI	Incidental	10/10/2022	10/10/2022	dead-semi-fresh	0.33-1 days	curling to flight feathers in wings and tail, singe to top of head and breast.; Flux Grade: 2, 3	scorched or singed	2,3	1	Powerblock	640349, 3933471	NA
2022_186_ISEGS	house finch	HOFI	Incidental	10/10/2022	10/10/2022	dead-semi-fresh	0.33-1 days	no evidence of singe or collision.; Flux Grade: Unk	unknown	NA	1	Powerblock	640398, 3933572	NA
2022_187_ISEGS	yellow-rumped warbler	YRWA	Incidental	10/11/2022	10/11/2022	dead-semi-fresh	0.33-1 days	curling to all flight feathers, singe to head, nape, coverts, and axillaries. species based on expert opinion. immature and male based on plumage.; Flux Grade: 2, 3	scorched or singed	2,3	2	Powerblock	638636, 3935838	NA
2022_188_ISEGS	yellow-rumped warbler	YRWA	Incidental	10/12/2022	10/12/2022	dead-fresh	0-0.33 days	singe to rectrices and head.; Flux Grade: 1, 3	scorched or singed	1,3	1	Powerblock	640300, 3933507	NA
2022_189_ISEGS	unidentified small bird	UNID	Fatality Search	10/17/2022	10/17/2022	feather spot	3-7 days	curling and singeing to flight feathers.; Flux Grade: 1	scorched or singed	1	3	Heliostat	637442, 3937778	NA
2022_190_ISEGS	yellow-rumped warbler	YRWA	Fatality Search	10/18/2022	10/18/2022	feather spot	3-7 days	singe to flight feathers.; Flux Grade: 1	scorched or singed	1	2	Heliostat	638490, 3935691	NA
2022_191_ISEGS	unidentified swallow	UNSW	Fatality Search	10/18/2022	10/18/2022	feather spot	3-7 days	singe to several flight feathers.; Flux Grade: 1	scorched or singed	1	2	Heliostat	638519, 3936030	NA
2022_192_ISEGS	unidentified sparrow	UNSP	Fatality Search	10/18/2022	10/18/2022	feather spot	1-3 days	no evidence of singe or collision.; Flux Grade: Unk	unknown	NA	3	Powerblock	637462, 3937934	NA
2022_193_ISEGS	mourning dove	MODO	Fatality Search	10/18/2022	10/18/2022	broken up	8-14 days	no evidence of singe or collision.; Flux Grade: N/A	unknown	NA	2	Heliostat	638734, 3936092	NA
2022_194_ISEGS	lazuli bunting	LAZB	Fatality Search	10/18/2022	10/18/2022	mummified	31-60 days	no evidence of singe or collision.; Flux Grade: Unk	unknown	NA	3	Powerblock	637488, 3937961	NA
2022_195_ISEGS	unidentified small bird	UNID	Fatality Search	10/18/2022	10/18/2022	feather spot	3-7 days	no evidence of singe or collision.; Flux Grade: Unk	unknown	NA	3	Powerblock	637420, 3937947	NA
2022_196_ISEGS	unidentified small bird	UNID	Fatality Search	10/18/2022	10/18/2022	feather spot	3-7 days	singe to tips of contour feathers.; Flux Grade: 3	scorched or singed	3	3	Powerblock	637424, 3937980	NA
2022_197_ISEGS	yellow-rumped warbler	YRWA	Fatality Search	10/18/2022	10/18/2022	dead-fresh	0-0.33 days	curling to all flight feathers, singe to coverts, head, nape, upper back, and left flank.; Flux Grade: 2, 3	scorched or singed	2,3	2	ACC	638625, 3935923	NA
2022_198_ISEGS	mourning dove	MODO	Fatality Search	10/18/2022	10/18/2022	broken up	1-3 days	no evidence of singe or collision.; Flux Grade: Unk	unknown	NA	2	Powerblock	638629, 3935923	NA
2022_199_ISEGS	unidentified small bird	UNID	Fatality Search	10/18/2022	10/18/2022	broken up	3-7 days	curling to flight feathers.; Flux Grade: 1	scorched or singed	1	2	Powerblock	638637, 3935869	NA
2022_200_ISEGS	unidentified small bird	UNID	Fatality Search	10/18/2022	10/18/2022	broken up	8-14 days	curling to several distal secondaries.; Flux Grade: 1	scorched or singed	1	2	Powerblock	638637, 3935849	NA
2022_201_ISEGS	unidentified small bird	UNID	Fatality Search	10/18/2022	10/18/2022	feather spot	1-3 days	singe to tip pf primary.; Flux Grade: 1	scorched or singed	1	2	Powerblock	638642, 3935869	NA
2022_202_ISEGS	ruby-crowned kinglet	RCKI	Fatality Search	10/18/2022	10/18/2022	feather spot	3-7 days	curling to several flight feathers.; Flux Grade: 1	scorched or singed	1	2	Powerblock	638600, 3935859	NA

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2022_203_ISEGS	yellow-rumped warbler	YRWA	Fatality Search	10/18/2022	10/18/2022	dead-fresh	0.33-1 days	curling to all flight feathers, singe to all of body.; Flux Grade: 2, 3	scorched or singed	2,3	2	Powerblock	638696, 3935828	NA
2022_204_ISEGS	unidentified small bird	UNID	Fatality Search	10/18/2022	10/18/2022	feather spot	3-7 days	singe to tips of several contour feathers.; Flux Grade: 3	scorched or singed	3	2	Powerblock	638650, 3935847	NA
2022_205_ISEGS	mourning dove	MODO	Fatality Search	10/19/2022	10/19/2022	broken up	8-14 days	no evidence of singe or collision.; Flux Grade: Unk	unknown	NA	1	Heliostat	640590, 3933545	NA
2022_206_ISEGS	mourning dove	MODO	Fatality Search	10/19/2022	10/19/2022	feather spot	3-7 days	no evidence of singe or collision.; Flux Grade: Unk	unknown	NA	1	Heliostat	640238, 3933361	NA
2022_207_ISEGS	loggerhead shrike	LOSH	Fatality Search	10/19/2022	10/19/2022	feather spot	1-3 days	no evidence of singe or collision.; Flux Grade: Unk	unknown	NA	1	Heliostat	640163, 3933504	NA
2022_208_ISEGS	unidentified small bird	UNID	Fatality Search	10/19/2022	10/19/2022	feather spot	3-7 days	no evidence of singe or collision.; Flux Grade: Unk	unknown	NA	1	Heliostat	640293, 3933333	NA
2022_209_ISEGS	house finch	HOFI	Fatality Search	10/19/2022	10/19/2022	feather spot	1-3 days	no evidence of singe or collision.; Flux Grade: Unk	unknown	NA	1	ACC	640344, 3933563	NA
2022_210_ISEGS	lazuli bunting	LAZB	Fatality Search	10/19/2022	10/19/2022	mummified	31-60 days	no evidence of singe or collision.; Flux Grade: Unk	unknown	NA	1	Powerblock	640364, 3933495	NA
2022_211_ISEGS	unidentified small bird	UNID	Fatality Search	10/19/2022	10/19/2022	broken up	8-14 days	no evidence of singe or collision.; Flux Grade: Unk	unknown	NA	1	Powerblock	640365, 3933493	NA
2022_212_ISEGS	unidentified dove	UNDV	Fatality Search	10/19/2022	10/19/2022	broken up	8-14 days	no evidence of singe or collision.; Flux Grade: Unk	unknown	NA	1	Powerblock	640367, 3933484	NA
2022_213_ISEGS	unidentified small bird	UNID	Fatality Search	10/19/2022	10/19/2022	feather spot	3-7 days	curling to 1 rectrices.; Flux Grade: 1	scorched or singed	1	1	Powerblock	640369, 3933488	NA
2022_214_ISEGS	unidentified small bird	UNID	Fatality Search	10/19/2022	10/19/2022	feather spot	3-7 days	curling to all flight feathers.; Flux Grade: 1	scorched or singed	1	1	Powerblock	640369, 3933485	NA
2022_215_ISEGS	common ground dove	COGD	Fatality Search	11/1/2022	11/1/2022	feather spot	31-60 days	no evidence of singe or collision.; Flux Grade: Unk	unknown	NA	3	Powerblock	637423, 3937918	NA
2022_216_ISEGS	mourning dove	MODO	Fatality Search	11/1/2022	11/1/2022	broken up	3-7 days	no evidence of singe or collision.; Flux Grade: Unk	unknown	NA	3	Powerblock	637403, 3937963	NA
2022_217_ISEGS	yellow-rumped warbler	YRWA	Fatality Search	11/1/2022	11/1/2022	dead-semi-fresh	3-7 days	singe to all of dorsal side, coverts, and both flanks with all flight feathers singed off.; Flux Grade: 2, 3	scorched or singed	2,3	2	ACC	638685, 3935897	NA
2022_218_ISEGS	unidentified small bird	UNID	Fatality Search	11/1/2022	11/1/2022	feather spot	8-14 days	no evidence of singe or collision.; Flux Grade: Unk	unknown	NA	2	Powerblock	638630, 3935869	NA
2022_219_ISEGS	unidentified small bird	UNID	Fatality Search	11/1/2022	11/1/2022	broken up	8-14 days	singe to majority of contour feathers.; Flux Grade: 3	scorched or singed	3	2	Powerblock	638659, 3935906	NA
2022_220_ISEGS	unidentified small bird	UNID	Fatality Search	11/1/2022	11/1/2022	broken up	3-7 days	singe to coverts.; Flux Grade: 3	scorched or singed	3	2	Powerblock	638619, 3935926	NA
2022_221_ISEGS	unidentified sparrow	UNSP	Fatality Search	11/1/2022	11/1/2022	broken up	3-7 days	no evidence of singe or collision.; Flux Grade: Unk	unknown	NA	2	Powerblock	638619, 3935926	NA
2022_222_ISEGS	yellow-rumped warbler	YRWA	Fatality Search	11/2/2022	11/2/2022	dead-semi-fresh	1-3 days	curling to all flight feathers, singe to every part of body.; Flux Grade: 2, 3	scorched or singed	2,3	1	ACC	640372, 3933522	NA
2022_223_ISEGS	yellow-rumped warbler	YRWA	Fatality Search	11/2/2022	11/2/2022	dead-semi-fresh	3-7 days	curling to flight feathers, singe to right side of face and breast.; Flux Grade: 2, 3	scorched or singed	2,3	1	ACC	640364, 3933522	NA
2022_224_ISEGS	yellow-rumped warbler	YRWA	Fatality Search	11/2/2022	11/2/2022	dead-semi-fresh	3-7 days	curling to all flight feathers, singe to every part of body.; Flux Grade: 2, 3	scorched or singed	2,3	1	ACC	640354, 3933534	NA

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2022_225_ISEGS	yellow-rumped warbler	YRWA	Fatality Search	11/2/2022	11/2/2022	dead-semi-fresh	3-7 days	curling to flight feathers, singe to back, rump, and top of head.; Flux Grade: 2, 3	scorched or singed	2,3	1	ACC	640354, 3933550	NA
2022_226_ISEGS	mourning dove	MODO	Fatality Search	11/2/2022	11/2/2022	broken up	0.33-1 days	no evidence of singe or collision.; Flux Grade: Unk	unknown	NA	1	Powerblock	640382, 3933492	NA
2022_227_ISEGS	unidentified sapsucker	UNSS	Fatality Search	11/2/2022	11/2/2022	feather spot	3-7 days	curling to all flight feathers.; Flux Grade: 1	scorched or singed	1	1	Powerblock	640373, 3933491	NA
2022_228_ISEGS	American robin	AMRO	Fatality Search	11/2/2022	11/2/2022	feather spot	1-3 days	singe to majority of flight feathers.; Flux Grade: 3	scorched or singed	3	1	Powerblock	640373, 3933504	NA
2022_229_ISEGS	unidentified small bird	UNID	Fatality Search	11/2/2022	11/2/2022	feather spot	3-7 days	singe to several contour feathers.; Flux Grade: 3	scorched or singed	3	1	Powerblock	640368, 3933531	NA
2022_230_ISEGS	unidentified small bird	UNID	Fatality Search	11/2/2022	11/2/2022	broken up	3-7 days	singe to several contour feathers.; Flux Grade: 3	scorched or singed	3	1	Powerblock	640346, 3933563	NA
2022_231_ISEGS	mourning dove	MODO	Fatality Search	11/2/2022	11/2/2022	broken up	3-7 days	no evidence of singe or collision.; Flux Grade: Unk	unknown	NA	1	Powerblock	640351, 3933563	NA
2022_232_ISEGS	northern parula	NOPA	Fatality Search	11/2/2022	11/2/2022	dead-fresh	0.33-1 days	curling to all flight feathers, singe to top of head, back, and coverts.; Flux Grade: 2, 3	scorched or singed	2,3	1	ACC	640411, 3933522	NA
2022_233_ISEGS	mourning dove	MODO	Incidental	11/2/2022	11/2/2022	dead-semi-fresh	8-14 days	no evidence of singe or collision.; Flux Grade: Unk	unknown	NA	3	Perimeter Fence	639031, 3938023	NA
2022_234_ISEGS	unidentified warbler	UNWA	Incidental	11/3/2022	11/3/2022	dead-semi-fresh	3-7 days	curling to all flight feathers in wings, singe to all f dorsal side with tail singed off.; Flux Grade: 2, 3	scorched or singed	2,3	3	Powerblock	637451, 3937893	NA
2022_235_ISEGS	house sparrow	HOSP	Incidental	11/3/2022	11/3/2022	dead-fresh	0.33-1 days	curling to rectrices, singe to throat, breast, and top of head.; Flux Grade: 1, 3	scorched or singed	1,3	1	Powerblock	640373, 3933487	NA
2022_236_ISEGS	unidentified dove	UNDV	Incidental	11/3/2022	11/7/2022	broken up	3-7 days	no evidence of singe or collision.; Flux Grade: N/A	unknown	NA	1	Powerblock	640373, 3933487	NA
2022_237_ISEGS	brown-headed cowbird	BHCO	Fatality Search	11/7/2022	11/7/2022	broken up	3-7 days	no evidence of singe or collision.; Flux Grade: N/A	unknown	NA	2	Heliostat	638453, 3935764	NA
2022_238_ISEGS	ruby-crowned kinglet	RCKI	Fatality Search	11/15/2022	11/15/2022	broken up	3-7 days	curling to primaries with singe to contour feathers.; Flux Grade: 1	scorched or singed	1	3	Powerblock	637377, 3937953	NA
2022_239_ISEGS	unidentified small bird	UNID	Fatality Search	11/15/2022	11/15/2022	broken up	3-7 days	no evidence of singe or collision.; Flux Grade: Unk	unknown	NA	3	Heliostat	637740, 3937787	NA
2022_240_ISEGS	mourning dove	MODO	Fatality Search	11/15/2022	11/15/2022	broken up	3-7 days	no evidence of singe or collision.; Flux Grade: Unk	unknown	NA	3	Powerblock	637446, 3937974	NA
2022_241_ISEGS	house finch	HOFI	Fatality Search	11/15/2022	11/15/2022	dead-semi-fresh	8-14 days	no evidence of singe or collision.; Flux Grade: N/A	unknown	NA	3	Powerblock	637444, 3937904	NA
2022_242_ISEGS	northern rough-winged swallow	NRWS	Fatality Search	11/15/2022	11/15/2022	broken up	3-7 days	curling to primaries.; Flux Grade: 1	scorched or singed	1	2	Powerblock	638642, 3935856	NA
2022_243_ISEGS	mourning dove	MODO	Fatality Search	11/15/2022	11/15/2022	broken up	8-14 days	no evidence of singe or collision.; Flux Grade: Unk	unknown	NA	3	Heliostat	637598, 3938025	NA
2022_244_ISEGS	unidentified small bird	UNID	Fatality Search	11/15/2022	11/18/2022	feather spot	3-7 days	singe to contour feathers.; Flux Grade: Unk	scorched or singed	Unknown	3	Heliostat	637543, 3937773	NA
2022_245_ISEGS	unidentified small bird	UNID	Fatality Search	11/18/2022	11/18/2022	broken up	3-7 days	singe to contour feathers.; Flux Grade: Unk	scorched or singed	Unknown	1	ACC	640346, 3933563	NA

USFWS #	Common Name	Species Code	How Found	Detection Date	Collection Date	Condition	Time Since Death/Injury	Description of Carcass/Injury	Cause of Death/Injury	Burn Grade	Unit	Nearest Project Feature	Coordinates	SPUT Revisions
2022_246_ISEGS	yellow-rumped warbler	YRWA	Fatality Search	11/18/2022	11/18/2022	dead-semi-fresh	1-3 days	singe to wings, tail, chest and head.; Flux Grade: 2, 3	scorched or singed	2,3	1	ACC	640357, 3933560	NA
2022_247_ISEGS	unidentified small bird	UNID	Fatality Search	11/18/2022	11/18/2022	broken up	0-1 days	no evidence of singe or collision.; Flux Grade:	unknown	NA	1	ACC	640360, 3933556	NA
2022_248_ISEGS	unidentified hummingbird	UNHU	Fatality Search	11/18/2022	11/18/2022	dead-semi-fresh	3-7 days	singe to entire carcass.; Flux Grade: 2, 3	scorched or singed	2,3	1	ACC	640365, 3933547	NA
2022_249_ISEGS	unidentified small bird	UNID	Fatality Search	11/18/2022	11/18/2022	broken up	8-14 days	curling to secondaries, singe to contour feathers.; Flux Grade: Unk	scorched or singed	Unknown	1	Powerblock	640245, 3933530	NA
2022_250_ISEGS	unidentified small bird	UNID	Fatality Search	11/18/2022	11/18/2022	broken up	3-7 days	no evidence of singe or collision.; Flux Grade: N/A	unknown	NA	1	Powerblock	640344, 3933560	NA
2022_251_ISEGS	unidentified small bird	UNID	Fatality Search	11/18/2022	11/18/2022	broken up	3-7 days	curling to contour feathers, singe to head.; Flux Grade: Unk	scorched or singed	Unknown	1	Powerblock	640373, 3933487	NA
2022_252_ISEGS	yellow-rumped warbler	YRWA	Fatality Search	11/22/2022	11/22/2022	broken up	3-7 days	curling to primaries , singe to contour feathers.; Flux Grade: Unk	scorched or singed	Unknown	2	Powerblock	638624, 3935867	NA
2022_253_ISEGS	unidentified small bird	UNID	Fatality Search	11/22/2022	11/22/2022	broken up	3-7 days	curling to trailing edge of flight feathers. singe to contour feathers.; Flux Grade: Unk	scorched or singed	Unknown	2	Powerblock	638632, 3935862	NA
2022_254_ISEGS	unidentified small bird	UNID	Fatality Search	11/22/2022	11/22/2022	broken up	1-3 days	no evidence of singe or collision.; Flux Grade: N/A	unknown	NA	3	Heliostat	637664, 3938073	NA
2022_255_ISEGS	unidentified small bird	UNID	Fatality Search	11/22/2022	11/22/2022	broken up	3-7 days	no evidence of singe or collision.; Flux Grade: N/A	unknown	NA	3	Heliostat	637431, 3938152	NA
2022_256_ISEGS	yellow warbler	YWAR	Fatality Search	11/22/2022	11/22/2022	dead-semi-fresh	3-7 days	curling to flight feathers in wings and tail, singe to top of head, axillaries, back, and nape.; Flux Grade: 2, 3	scorched or singed	2,3	3	ACC	637470, 3937958	NA
2022_257_ISEGS	yellow-rumped warbler	YRWA	Fatality Search	11/23/2022	11/23/2022	dead-semi-fresh	3-7 days	singe to both wings and back.; Flux Grade: 2, 3	scorched or singed	2,3	1	ACC	640351, 3933525	NA
2022_258_ISEGS	unidentified small bird	UNID	Fatality Search	11/23/2022	11/23/2022	feather spot	1-3 days	singe to tips of contour feathers.; Flux Grade: Unk	scorched or singed	Unknown	1	ACC	640359, 3933560	NA
2022_259_ISEGS	unidentified small bird	UNID	Fatality Search	11/23/2022	11/23/2022	feather spot	3-7 days	no evidence of singe or collision.; Flux Grade: N/A	unknown	NA	1	Powerblock	640346, 3933546	NA
2022_260_ISEGS	unidentified small bird	UNID	Fatality Search	11/23/2022	11/23/2022	broken up	3-7 days	no evidence of singe or collision.; Flux Grade: N/A	unknown	NA	1	Heliostat	640535, 3933647	NA
2022_261_ISEGS	Eurasian collared-dove	ECDO	Incidental	12/6/2022	12/14/2022	dead-semi-fresh	3-7 days	curling to both wings and end of rectrices, singe to chest.; Flux Grade: 2, 3	scorched or singed	2,3	3	Powerblock	637487, 3937914	NA
2022_262_ISEGS	unidentified small bird	UNID	Fatality Search	12/13/2022	12/13/2022	broken up	3-7 days	no evidence of singe or collision.; Flux Grade: N/A	unknown	NA	2	Heliostat	638785, 3935779	NA
2022_263_ISEGS	American robin	AMRO	Fatality Search	12/14/2022	12/14/2022	broken up	0.33-1 days	no evidence of singe or collision.; Flux Grade: N/A	unknown	NA	3	Heliostat	637408, 3937743	NA

Appendix D

Rationale for Implementation of Operational Monitoring and Impact Methodology

Background:
The Ivanpah Solar Electric Generating System (Ivanpah), in cooperation with the Bureau of Land Management (BLM), California Energy Commission (CEC), United States Fish and Wildlife Service (USFWS) and the California Department of Fish and Wildlife (CDFW), prepared the Avian and Bat Monitoring and Management Plan (ABMMP). This plan was prepared in accordance with CEC Condition of Approval BIO-21 (Ivanpah Solar Electric Generating System Commission Decision, 2010, p. 21) and BLM mitigation measures BIO-21, and BIO-22 associated with the Right of Way (ROW) grants issued for the project (Final Environmental Impact Statement (EIS) 2010). The requirements and recommendations required by the BLM in BIO-21 and BIO-22 included visual bi-weekly surveys with data reported for three years on a quarterly basis and then annually thereafter. The CEC BIO-21 Condition of Approval required quarterly reporting and monitoring and reporting for one year. The USFWS recommended a specific degree of estimate precision, random stratified monitoring and two years of formal surveys.The agency approved and accepted plan also included specific definitions for migratory bird mortality issues, to be assessed by the avian survey consultants, and for TAC concurrence with these mortality assessments. The categories were defined as follows:

1. High: Assessed 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: Assessed 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: Assessed 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.

Furthermore, the plan also required TAC responses to impacts to be appropriate and proportionate to the impacts assessed as follows:

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	Operational studies continue or are reduced

These guidelines and study responses were intended to determine the impacts to migratory species subject to the Migratory Bird Treaty Act. Take of special status species and particularly golden eagles, is considered separately from the assessment of migratory species; however, with

these species the level of effects to populations was also considered and discussed within each quarterly and annual report for each individual species. TAC concurrence of these assessments was also obtained prior to the respective quarterly or annual report publication (See CEC Docket log for Ivanpah at https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=07-AFC-05C). Special status species take at the site has been limited and no federally listed species take has been attributed to the project to date.

Field Surveys during Formal Surveys (ABMMP Revisions 12 and 13)

The resulting plan, Revision 12, was approved in November 2013 by all agencies and required avian use and raptor surveys in addition to two years of systematic avian fatality monitoring. Systematic fatality monitoring was required in all project areas: 100% of the tower area (powerblock area and inner high-density (HD) heliostat area), 20% of the heliostat area, 100% of fencelines, transmission lines, and offsite transects.

Based upon the results of the first two years of monitoring under Revision 12, the TAC an in accordance with the TAC response framework, the TAC approved Revision 13 in 2015 (Document available on CEC Docket dated 12-23-2015). The monitoring during Revision 12 documented that the mortality associated with the perimeter fences, transmission lines, and offsite transects was less than five detections a season and the patterns associated with avian and raptor use were consistent over the eight seasons of monitoring. This consistency of the patterns of use and low levels of avian fatalities (e.g., < five per season) facilitated the agency approved discontinuation of the avian use surveys and fatality monitoring of the transmission lines, offsite transects and fence lines, since these surveys would not provide additional information to characterize the avian use or mortality at the site.

Survey Interpretation and Results during Formal Surveys (ABMMP Revisions 12 and 13)

For Revisions 12 and 13 of the ABMMP, statistical methods were 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 were 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 were 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, were reported; however, separate estimates were prepared for the 100-percent tower area survey, the heliostat field, the perimeter fence, and the off-site transect survey areas. These areas were subsequently modified in Revision 13 of

the plan. For details regarding the statistical methods see Revision 12 (HTH, 2014) and Revision 13 (WEST, 2016).

The monitoring during the first two years (Revision 12) documented consistent patterns of on-site and offsite avian use along with "low" potential effects on populations. Surveys were also conducted for two years under Revision 13 of the plan, with the potential effects on populations estimated as "low" during this period. In addition, mortality levels throughout the solar field were determined to be consistent over the first two years and solar field monitoring was subsequently reduced to sampling areas in Unit 2. Per TAC approval, Unit 2 solar field surveys were discontinued in Year 4, since results were consistent (largely overlapping confidence intervals) throughout years 1 to 3.

Thus, the results from the first four years of formal monitoring indicated that based on the estimated fatalities the potential effect on a species or species group was "low" (see annual, quarterly reports and summary below). All reports reflecting this assessment were reviewed by the agencies and agency concurrence was obtained with these assessments prior to docketing the reports.

TAC Approved Three Year Assessment Results For Potential Population-Level Impacts				
Year/ Season	Winter	Spring	Summer	Fall
2013-2014	Low	Low	Low	Low
2014-2015	Low	Low	Low	Low
2015-2016	Low	Low	Low	Low
2017-2018	Low	Low	Low	Low

However, despite the consistently "low" assessments and with no requirement to do so as per the approved Plan, the project implemented deterrence measures with agency approval at the facility on a *voluntary* basis during the first two years of monitoring.

Assessment of the effectiveness of the deterrence was not required during the formal monitoring period, since the potential effect of mortality on populations was not deemed to be above "low". Furthermore, the plan and policies of the BLM and CEC do not require assessment of these measures unless a determination was made by the TAC that additional mitigation or adaptive management was necessary. The BLM BIO-23 (FEIS) requires:

> "If sufficient data are gathered to support the *need for additional mitigation*, the mitigation may ultimately be effective in reducing avian and bat injuries and mortalities, if an effective mitigation measure can be identified in the future."

CEC BIO-21 (Commission Decision) Verification requires:

> "Quarterly reporting shall continue until the CPM, in consultation with the CDFG and USFWS determine whether more years of monitoring are needed and *whether mitigation and adaptive management measures are necessary*."

Although the project did document and attempt to ascertain the effectiveness during the initial implementation of the measures, insufficient evidence was available to reach a robust statistical determination of the deterrence effectiveness. To quantify an effect of the deterrence, either a controlled experiment would need to be conducted or the passage rate of birds moving through the flux area would need to be measured. These controls would be necessary to determine if there was a change in the number of birds exposed to flux or a change in singe risk associated with either the passage rate or the deterrence.

Rationale for Operational Monitoring – Plan Revision 14

The rationale for operational monitoring is built on the foundation of the formal monitoring done for four years between October 2013 and December 2017. The study was designed so that the resulting fatality estimates were sufficiently precise to facilitate the avian consultant evaluation of the impacts and allow the TAC to concur with these results. Having concluded four years of formal monitoring with a consistent evaluation of "low" by the Avian contractor(s) for the potential to adversely affect species at a local, regional, or national level, and with the TAC concurrence of these assessments, there is sufficient evidence to justify the transition to operational monitoring. The objective of this section is to demonstrate the strength of the original (and subsequently adapted) study design and show the consistency of fatality estimates that are unique and attributable to the facility.

The study design employed at the Ivanpah facility was created to achieve specific levels of precision for avian mortality estimates per the recommendations of the USFWS Staff. The ultimate design used a combination of random stratified sampling of certain areas and a census of other areas. As per Rev 12 of the plan, the study was designed so that the coefficient of variation (CV; a measure of precision given by the standard deviation divided by the mean) of estimates in the solar field was no greater than 0.25. Using analysis statistical simulation of fatalities and search effort, it was determined that 20% of the total solar field area would achieve this standard under a range of anticipated conditions and with high, medium or low mortality (WEST 2013).

Concentrated-flux related mortality was identified as the unique source of impact on avian species directly attributable to the facility. Therefore, the tower area of each unit, which includes the ground under elevated levels of concentrated flux, was sampled at 100% to increase the precision of concentrated flux related fatality estimates. Sampling 100% of the tower area resulted in an average CV of 0.125 for annual estimates of singed fatalities across the first four years of monitoring, or a 50% improvement compared to the USFWS targeted precision for the solar field. In other words, the standard error of the estimated number of singed fatalities was on average only about 12.5% of the estimate. Accordingly, the 90% confidence interval width for the tower area estimate was relatively narrow in all years and there is a high degree of

confidence that an estimate of singed annual fatalities in the tower area was, on average, within approximately 209 birds of the actual number of fatalities.

Spatially, the first four years of formal monitoring showed over 98% of the concentrated-flux related detections occurred in the tower area, confirming the study design that called for focused, increased sampling for this effect in the tower area. Furthermore, approximately 95% of the known cause estimated fatalities in the tower area were singed (as opposed to collision, entrapment, or other identifiable causes). Thus, given the high precision of tower area estimates, the spatial distribution of singed fatalities, and monitoring that has been conducted in the tower area at 100% coverage for four years, the estimates from the tower area during formal monitoring provide a robust benchmark for evaluating the unique source of mortality at the facility and for comparing the results of future monitoring.

Therefore, the avian risk that is unique to the facility consists of solar flux risks and surveys have consistently shown this type of fatality is detected within the tower area: i.e., the powerblock and inner HD heliostats. Therefore, as discussed with the TAC, Revision 14 was proposed and approved by the TAC in December 2017. The consistently low potential impacts to populations allow for the transition of surveyors to appropriately-trained on-site operations personnel or to be maintained by biological staff and for impact assessments to be based upon the data collected over the previous four years of monitoring.

Operational Field Survey Methodologies – Revision 14

For the field surveys, Revision 14 continues to maintain systematic surveys within the areas currently monitored in Revision 13, including the powerblock and inner HD heliostat areas. The only changes made from Revision 13 to Revision 14 consist of changing personnel and the sampling interval from a 7-day (spring and fall migration) and 21-day (summer and winter) schedule to a 14-day schedule, year-round. Onsite personnel or approved biologists will conduct the surveys. Any personnel conducting surveys will have been appropriately trained, and their sole task will be to conduct surveys for avian fatalities.

The monitoring methodology in Revision 14 for the tower area is consistent with the monitoring which has occurred in the tower area under Revisions 12 and 13 of the Plan. That is, the spatial coverage is exactly the same (i.e. 100% of the powerblock and inner HD area), and although the search interval will vary slightly (14 days year-round as per BLM ROW requirements, rather than 7 days during the spring and fall, and 21 days during the winter and summer), the same total number of searches will occur annually (approximately 26 per year). The search interval modification is in accordance with BLM ROW requirements.

Operational Survey Interpretation, Fatality Index Development – Revision 14

The following section describes the development of an index that will be used as a basis of comparison from the statistical results obtained during the formal surveys and the detections resulting from the operational surveys. First, this section proceeds to describe how the model was developed in a step-wise process manner; second the verification of the model is demonstrated via the use of data from formal surveys, and third the index is calculated from the data developed during formal surveys. This index will be used for comparison to the detections resulting from

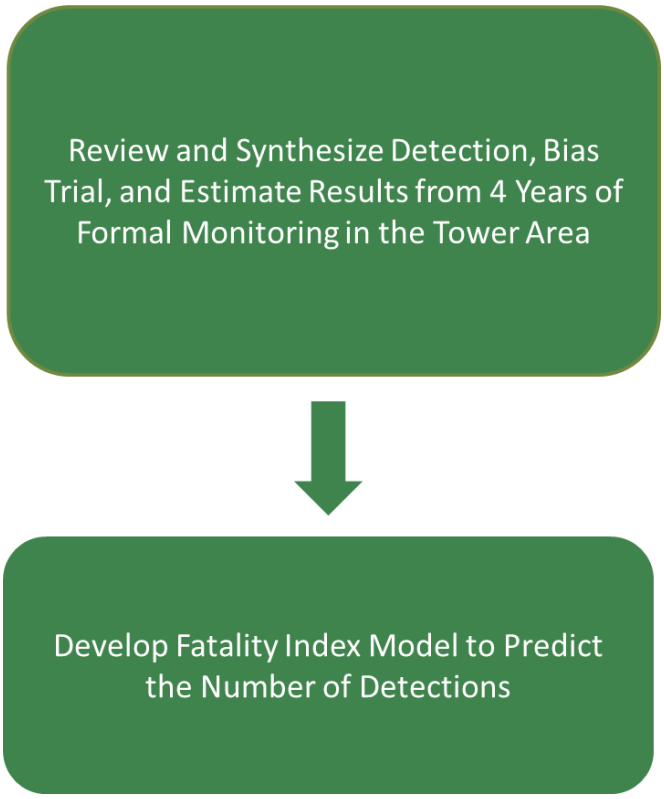
operational surveys. Finally, this section concludes with a discussion of the degree of inference that the index provides during the operational assessment for the life of the project.

The information derived during the operational surveys will not develop estimates of avian mortality, but instead is sufficient to characterize the relative level of avian mortality at the site associated with solar flux as compared to the baseline four years of monitoring. Solar flux is the unique source of mortality associated with the facility, and the clear majority of flux fatalities occur in the area proposed for operational monitoring. Incidental detections of avian mortality will also continue to be reported as per the onsite wildlife incidence reporting system (WIRS, see HTH, 2014 and WEST, 2016). Results under Revision 14 will be reported annually to the TAC. The monitoring proposed in Revision 14 is adaptive and the TAC may recommend modifications to the survey protocols through the BLM Authorized Officer (AO) and CEC Compliance Project Manager (CPM). Similarly, adaptive management responses may also be recommended per Table 3, if necessary, based on analysis of the survey data for avian species detected at the site.

As previously stated fatality estimates will not be calculated under Revision 14. However, statistical methods were developed as per TAC guidance and approval to allow for a robust comparison of the number of annual detections under Revision 14 to those collected under previous plan revisions. The comparison is made via a statistical model which uses data from the first four years of formal monitoring to predict the expected number of detections found annually in the tower area for a given search effort. The model is run a large number of times (e.g. 10,000) to simulate the variable potential scenarios (e.g. number of fatalities, searcher efficiency, carcass persistence rate, number of small vs. large carcasses, etc.) that might occur during a year at the facility. The resulting, predicted number of detections produced by this statistical model is called the ***fatality index***, and serves as a benchmark against which the number of detections found during operations monitoring are measured. In other words, the model has determined the number of detections and a range of precision that would be associated with a low potential for impacts as defined in the Plan and as previously accepted by the TAC for the past four years.

An essential step of the model building process is verification to ensure the model is making appropriate predictions (Neter et al. 1996). To verify the accuracy of the fatality index model, the model was used to "predict" the expected number of detections in the tower area for each previous year of formal monitoring, based on the survey effort expended in those years. The model predictions were then compared to the actual, known number of detections in each year. After the verification step, the model was used to generate a fatality index for operations monitoring to be used in subsequent years. Below, a flowchart shows how the first four years of formal monitoring data were used to develop the fatality index model, verify the model, and how the fatality index can be compared to operational monitoring results in the future.

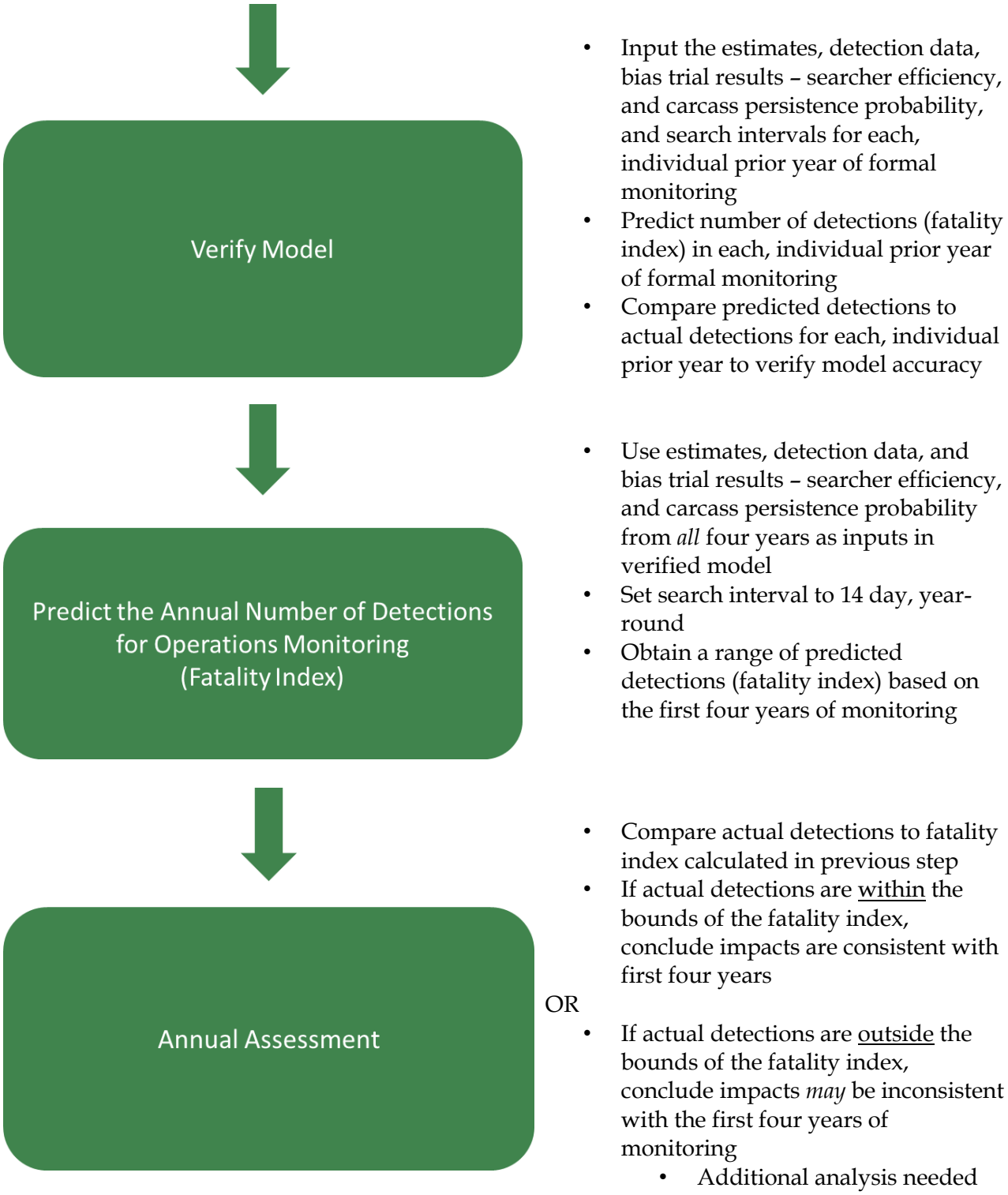
Process Chart – Development of Fatality Index Model



- Composition of detections (Small birds, large birds, feather spots)
- Location of detections (power block, ACC, inner HD)
- Phenology
- Incidental detection rate
- Estimates by year and season
- Bias trials – final searcher efficiency and carcass persistence models

- Input number of fatalities
  - Set 'what, where, and when'
- Set search interval
- Input bias trial results – searcher efficiency, and carcass persistence probability

Process Chart – Development of Fatality Index Model



- Input the estimates, detection data, bias trial results – searcher efficiency, and carcass persistence probability, and search intervals for each, individual prior year of formal monitoring
- Predict number of detections (fatality index) in each, individual prior year of formal monitoring
- Compare predicted detections to actual detections for each, individual prior year to verify model accuracy

- Use estimates, detection data, and bias trial results – searcher efficiency, and carcass persistence probability from *all* four years as inputs in verified model
- Set search interval to 14 day, year-round
- Obtain a range of predicted detections (fatality index) based on the first four years of monitoring

- Compare actual detections to fatality index calculated in previous step
- If actual detections are <u>within</u> the bounds of the fatality index, conclude impacts are consistent with first four years

OR

- If actual detections are <u>outside</u> the bounds of the fatality index, conclude impacts *may* be inconsistent with the first four years of monitoring
    - Additional analysis needed to determine the cause of aberrant results

To use the fatality index model, the actual number of detections found annually under operations monitoring can simply be compared to the fatality index. Annual detections that fall within the 90% prediction interval (i.e. the 5th and 95th percentiles of the simulated distribution of the fatality index) of the fatality index suggest that, after accounting for variability in the data observed during four years of formal monitoring and a 14-day search interval, the results are comparable to the estimated fatalities in the first four years of monitoring with a 90% confidence interval.. Below, we provide a brief example of the model verification step by showing how the fatality index reliably matches previous results (in this case, Year 4 monitoring results).

Fatality Index Verification

To test the predictive capability of the model, the fatality index was verified against all four years of formal monitoring. As an example, below we present the fatality index (i.e., expected number of detections) for the tower area based on the search intervals and fatality estimates for Year 4 (2016-2017) of formal monitoring. Since we know exactly how many detections were found in Year 4 (Table D-1), we can compare the predictions from the model to the actual number of detections to verify the accuracy of the predicted number of detections in the context of previous, known results.

As inputs, the simulation model took estimates and detection data specific to Year 4 and estimates of carcass persistence and searcher efficiency based on the final models derived from the complete four-year bias trial dataset (WEST 2018). The first column of Table D-1 presents the estimated fatalities and 90% confidence interval for Year 4 monitoring, which characterize the range of fatalities allowed to occur within each simulation. The second column presents the fatality index and 90% prediction intervals for the fatality index, based on the input fatalities and the monitoring that occurred during year 4. Effectively, the fatality and subsequent discovery process for fatalities in Year 4 was simulated 1000 times, from which the second column was derived. Finally, the last column of Table D-1 shows the actual number of detections found in the tower area during year 4 of formal monitoring (WEST 2018).

Table D-1.
Year 4 tower area fatality estimates, with 90% confidence intervals, used as inputs to predict the number of detections/fatality index for Year 4, and actual number of detections found during year 4 of formal monitoring.

Input: total tower area estimated fatalities – year 4		**Output: predicted number of tower area detections/fatality index**		**Actual number of tower area detections found during year 4 of formal monitoring**
Total Fatalities	**Total Fatalities 90% Interval**	**Total/Fatality Index**	**Total 90% Interval**	**Total**
1553	(1216-1978)	416	(314-544)	448

The simulation model predicts there should be 416 detections (or a fatality index of 416; 90% prediction interval 314-544) resulting from monitoring 100% of the tower area in all units, with nominal search intervals of 7 days in the spring and fall, and 21 days in the summer and winter, and all input parameters (e.g. fatality estimates, ratio of small to large birds, ration of power block to inner HD detections, etc.) restricted to those generated from year 4 of monitoring. For comparison, the third column of Table D-1 presents the actual number of detections found during Year 4. The fatality index (i.e., predicted number of detections) is approximately 7% low compared to the actual number of detections in Year 4 (448), and has a 90% prediction interval of 314-544, which includes the actual number of total detections. Predictions/fatality indices for years 1-3 a similarly accurate, with no fatality index more than 7% different from the true value, and 90% prediction intervals that always include the true number of detections. Thus, using the simulation model parameterized with all possible values for the first four years of monitoring, and subsequently calibrated to 14-day search intervals, we expect the resulting fatality index and 90% prediction interval to provide a robust means of comparing future operations monitoring to the results of formal monitoring during Years 1-4.

Calculating the Fatality Index for Operations Monitoring

The verified statistical model described was then used to generate a fatality index to compare against future years of operations monitoring, assuming a 14-day search interval, year-round. The model was allowed to take fatality estimates and detection information (e.g. ratio of small to large birds, ratio of power block to inner HD detections, etc.) from any of the first four years of monitoring, as well as random searcher efficiency and carcass persistence values generated from the final models (WEST 2018). All input values were allowed to vary for each simulation, and 10,000 simulations were run; in this way, the resulting fatality index represents the range of potential impacts observed during the initial four years of formal monitoring. The input values and resulting fatality index are presented in Table D-2.

The model shows that on any given year of operations monitoring, we expect 504 detections in the tower area with a 14-day search interval and within the range of bias parameters observed over the past four years, with a 90% prediction interval of 276 to 746 detections. The 90% prediction interval for the fatality index is what the annual tally of detections from operations monitoring are compared against. This interval represents the range of values within which we are 90% confident that fatalities in the tower area are consistent with the first four years of monitoring. In other words, if the number of detections in the tower area is between 276 and 746, then the estimated detections are within the range of the estimates from years 1-4 of the monitoring that were deemed as "low" by the avian consultants and accepted by the TAC.

Table D-2.
Input values and fatality index, with 90% confidence intervals, for operations monitoring.

Input: Fatality		**Output: predicted number of detections/fatality index**	
Total Fatalities	**Total Fatalities 90% Interval**	**Total/Fatality Index**	**Total 90% Interval**
1452	(784-2073)	504	(276-746)

Inference from the Fatality Index

Using the fatality index, the number of detections can be used to understand the potential effects of the facility on birds in the context of the first four years of monitoring and assess the level of effect determination. Typically, the number of fatalities provides little insight into potential population level effects because *the fatality estimate is not known*. However, in monitoring years 1 – 4, it was determined that in each year the facility had a low potential to impact each species or species group at the local, regional, or national scale. Thus, the range of values for the fatality index generated from the first four years of monitoring represents a range of values that were determined by the avian consultants with concurrence from the TAC to have a low potential impact on populations (HTH 2015, WEST 2016, WEST 2017, WEST 2018). If the detection results for a year of monitoring fall within the modeled range of values of the fatality index the determination of the potential impacts to each species or species group at the local, regional, or national scale are within the same as the previous four years and will therefore be deemed "low."

If the detection results fall outside of the range of values for the fatality index, it cannot be concluded that impacts necessarily rise above the classification of low because the upper range of the fatality index does not necessarily represent the upper range of a low potential impact determination. For example, the overall number of detections found in a year could exceed the upper range of the fatality index by a small number (e.g., 10 detections) and the detections could be distributed among 10 species. Therefore, a small increase above the upper range of the fatality index would not necessarily result in a medium potential impact determination. However, it must be concluded that the system has changed in some appreciable way relative to the first four years of monitoring. Detections levels outside of the expected range could indicate any of the following:

- Searcher efficiency has increased/decreased substantially compared to the first four years of monitoring
- Carcass persistence has increased/decreased substantially compared to the first four years of monitoring
- The actual number of fatalities has increased/decreased substantially compared to the first four years of monitoring
- Any combination of the above.

As described earlier, little inference about potential impacts to an individual species can be drawn from the overall number of detections. Thus, should the number of detections exceed the expected range of values for the fatality index, selective further analyses are conducted. For example, further analysis can be used to determine if detections occurred disproportionately in a particular season, or if an unexpected number of detections were found incidentally (as opposed to during fatality searches). Results could be used to inform the assessment of impacts, or modifications to monitoring. Furthermore, additional analyses can be performed on a species by species basis.

Operational Evaluation of Annual Detections Using the Fatality Index in Revision 14

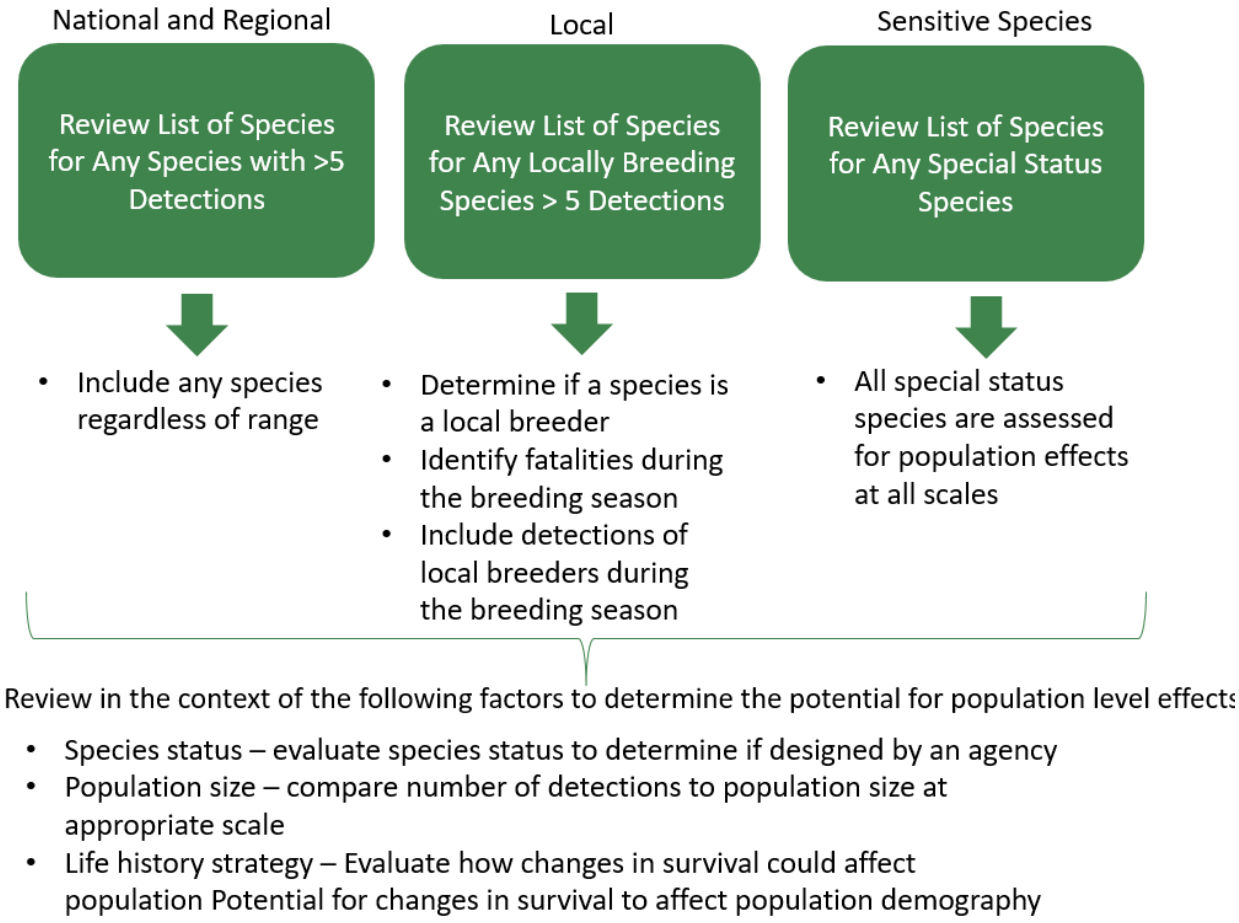
This section describes how operational monitoring survey results will be evaluated for populations at the national (United States), regional (California) and local levels. For the overall assessment of the impacts associated with the facility, Revision 14 continues the approach of previous formal survey assessment methods by providing a range of expected detections to compare on an annual basis with the results of the operational survey. This range of expected detections is based on the previous four years of monitoring that was deemed as "low" potential for impact by the avian consultant with TAC concurrence (see: Operational Survey Interpretation, Fatality Index Development – Revision 14, above). This approach is consistent with the evaluation framework detailed and approved by the agencies in the ABMMP and operates within the limitations of the agreed to data collection as prescribed in the Plan and conforms with current literature on the assessment of wildlife impacts.

Determining Species to Consider for Evaluation

The first step in evaluating the potential for population effects is to determine the appropriate species for consideration. All species with > 5 detections are evaluated at the **national and regional scales** (See process chart below). Although estimates are not produced, >5 detections is used as a threshold for analysis, consistent with the previous four years of assessments (>5 detections was the level where estimates could be reliably produced; however, no estimates will be produced during operational monitoring). There are no restrictions on which species with >5 detections are evaluated because the scale of evaluation is the entire United States and the state of California, and thus it is appropriate to consider migrating birds. For example, the national and regional scale evaluations could include species that only occur as fatalities during spring and fall migration. However, as the scale of evaluation is the entire United States and the state of California, including migrating birds is appropriate.

At the **local scale**, several steps are taken to carefully choose the species evaluated to those that could breed locally and to consider fatalities that occurred during the breeding season (See process chart below). First, range maps are examined to determine if the species could breed locally in habitat that occurs in the vicinity of the Project. Second, the timing of the fatalities was reviewed to determine those that occurred during the species' breeding season, based on information provided in species accounts at https://nrm.dfg.ca.gov/taxaquery/Default.aspx. In some cases, **special status species** do not meet the criteria for consideration described above (e.g., 1 fatality of non-local California species of special concern). However, to ensure that sensitive species are fully evaluated, all sensitive species are assessed regardless of the number of detections or breeding status (See process chart below).

Process Chart – Determining the Number of Detections by Species to Consider for Evaluation



Evaluating the Potential for National, Regional, Local and Special Status Population Effects

Several factors are also considered when determining if a population at the national, regional, or local level could be affected by anthropogenic structures such as the Project. This plan takes the approach of evaluating potential effects according to the following criteria: 1) species status, 2) population size, and 3) life-history strategy.

Species status should be considered as a starting point for determining if impacts from a project should be assessed (Diffendorfer et al. 2017). Thus, the first and most important factor is the status of the species (e.g., listed species, species of special concern) as per the process chart above, these individual species are assessed for impacts irrespective of national, regional or local nature of these individuals. Species that are not special status are also further evaluated, however, these species are assessed at the appropriate scale.

Assessing the population size in comparison to the fatalities at the facility can provide inference into potential population effects (Loss et al. 2012, Erickson et al. 2014). Species with large population sizes such as songbirds are unlikely to be affected by mortality at a single anthropogenic structure (Arnold and Zink 2011, Erickson et al. 2014). For example, fatalities of a common and widely distributed species with a population in the millions that is actively hunted as a game bird such as mourning dove is unlikely to reach a potential to affect determination because fatalities from one project would have a very small contribution to the overall population and would be minimal in the context of the harvest of mourning dove (900,000 in California in 2016; Raftovich et al. 2017).

For all species at the respective level of assessment, the life-history strategy of a species is another factor that is used to determine the potential effect of fatalities on a population. Populations of birds that are short-lived and are highly fecund (e.g., songbirds) are less sensitive to changes in adult survival compared to birds that are long-lived and have low fecundity (e.g., raptors), which are more sensitive to changes in adult survival (Stahl and Oli 2006, Diffendorfer et al. 2017). An analysis of a marked population of wood thrush (a short-lived, high reproductive output), with robust survival estimates from the wintering grounds in Central America and the breeding grounds in Illinois, concluded that population growth was more sensitive to fecundity than survival (Rushing et al. 2017). Conversely, a study of black vultures (long-lived, low reproductive output) in Virginia found that population growth was more sensitive to survival than fecundity (Runge et al. 2009). As such, life history strategy is used as part of the assessment of potential population level effects for each species or species group.

Taken together, species status, population size at the scale of interest, and life history strategy can be used to assess the potential of mortality at the Project to affect national, regional, or local populations of birds. Specific means of assessment that will be used in the operational monitoring assessment are detailed below.

Evaluation of Effects to Species at the National and Regional Levels

Considering the non-special status species, first a review of the number of fatalities in the context of the population size is conducted for the national and regional assessments of effects. To compare the fatalities to the population, the data from the Partners in Flight (PIF) bird population database (PIF 2013) are appropriate to assess potential affects at the national and regional scales. Data from the PIF database at the national level and regional (state) level. Locally, PIF Bird Conservation Region 33, which contains the Project is used for context to understand population with which local species interact.

For the annual operational assessment of non-special status species, the top 10 species detected will be compared to the regional and national populations in a tabular format as consistent with previous practice. The occurrence of the species as spring or fall migrant, or resident will be listed. The number of total detections will be listed and compared to the estimated population at the appropriate national or regional scale. Any special status species will be denoted and assessed separately (see below).

Evaluation of Effects to Species at the Local Level

For the assessment of the effects to local populations, first a determination is made as to whether the species is a local breeder near the project. Non-special status species with >5 detections are reviewed to determine those that could breed locally near the project. As per previous practice >5 detections are used as a threshold for analysis, consistent with four years of baseline quantitative assessments (HTH 2015, WEST 2016, WEST 2017, WEST 2018).

The timing of these specific detections is then reviewed to determine those that occurred during the species breeding season, based on information provided in species accounts at https://nrm.dfg.ca.gov/taxaquery/Default.aspx. This framework assumes that if a fatality is found during the breeding season and the fatality is of a locally breeding individual these detections are locally breeding species. The remaining species from this analysis are then listed along with the number of detections for each of these species.

As per the decision framework, these species are then compared to species status, potential population size and survival strategy. Any locally breeding special status species are then individually assessed as part of the special status species evaluation section (see those methods, below). The number of detections of these species is then compared to the best estimate of the local population, the Mojave Desert in California and Nevada (Bird Conservation Region (BCR) 33) – obtained from the Partners in Flight database. Finally, the survival strategies of each of these species is considered to also determine the potential effect for the local population. Taken together, this qualitative approach is used to determine the potential for the effects to local populations.

Evaluation of Effects to Specials Status Species

All special-status species are always considered for potential population level effects for any number of detections. Each species is listed and the number of detections for each enumerated. The status of each species is also recorded (California Species of Special Concern, State Threatened, Bird of Conservation Concern, etc.). The range of each species is considered as is the listing status, overall national and regional populations and the survival strategy of the species as per the assessment framework. From these factors, a qualitative assessment is made of the potential for the effects to these populations.

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