(28%) had other evidence of acute trauma. Remaining carcasses (6) were incomplete and a grade could not be assigned.

Twenty-nine birds with solar flux burns also had evidence of impact trauma. Trauma consisted of skull fractures or indentations (8), sternum fractures (4), one or more rib fractures (4), vertebral fractures (1), leg fracture (3), wing fracture (1) and/or mandible fracture (1). Other signs of trauma included acute macroscopic and/or microscopic internal hemorrhage. Location found was reported for 39 of these birds; most of the intact carcasses were found near or in a tower. One was found in the inner heliostat ring and one was found (alive) on a road between tower sites. The date of carcass collection was provided for 42/47. None were found prior to the reported first flux (2013).

Figure 5: The dorsal aspect of the wing from a Peregrine Falcon (the same bird as shown in Figure 4) with Grade 2 lesions. Note extensive curling of feathers without visible charring. This bird was found alive, unable to fly, emaciated and died shortly thereafter. These findings demonstrate fatal loss of function due to solar flux exposure in the absence of skin or other soft tissue burns.

Among the solar flux cases, a variety of bird species were affected though all but one (a raptor) was a passerine (Appendix 2). House Finches and yellow-rumped Warblers were most often represented (10/47 and 12/47 respectively). For the birds in which species could be determined (41/47), insects were a major

dietary component in all but two species. These were an unidentified hummingbird (*Selasphorus*) species (known to include insects in the diet) and a Peregrine Falcon (a species that feeds on small birds).

Four birds were reportedly found alive and taken to a wildlife rehabilitation center where they died one to a few days later (exact dates were not consistently provided). Three had Grade 2 feather burns and one had Grade 3 feather burns. None had other evidence of trauma. Body condition was reduced in all of the birds (two considered thin and two emaciated) based on a paucity of fat stores and depletion of skeletal muscling. The four birds were of four different species and consisted of three passerines and one raptor.

The second most commonly diagnosed cause of death at the Ivanpah facility was impact (or blunt force) trauma (24/141 birds). Necropsy findings were as previously described at the Desert Sunlight facility. Impact marks were reported on heliostat mirrors adjacent to the carcasses in 5 cases and mirrors were described as being vertically-oriented in 5 cases. Specific carcass locations were reported for 18 of the birds. Those birds were found in a variety of areas; below heliostats (8/18), in or near tower and powerblock buildings (4/18), on roads (2/18), below power lines (2/18), in the open (1/18) and by a desert tortoise pen (1/18).

Predation was determined to be the cause of death for five of the birds. A coot and a Mourning Dove were found with extensive trauma and hemorrhage to the head and upper body consisting of lacerations, crush trauma and/or decapitation. One of the birds (an American Coot) was found near a kit fox shelter site. One bird (Northern Mockingbird) was found near the fence line and the third (a Mourning Dove) in an alley way. Two more birds (an unidentified sparrow and an American Pipit) were observed being eaten by one of the resident Common Ravens.

Discussion of Cause of Death of Birds Found at the Solar Power Plants

Impact trauma:

Sheet glass used in commercial and residential buildings has been well-established as a hazard for birds, especially passerines (Klem 1990, 2004, 2006; Loss et al. 2014). A recent comprehensive review estimated that between 365-988 million birds die annually by impacting glass panels in the United States alone (median estimate 599 million; Loss et al. 2014). Conditions that precipitate window strike events include the positioning of vegetation on either side of the glass and the reflective properties of the window. Glass panels that reflect trees and other attractive habitat are involved in a higher number of bird collisions.

The mirrors and photovoltaic panels used at all three facilities are movable and generally directed upwardly, reflecting the sky. At the Ivanpah facility, when heliostats are oriented vertically (typically for washing or installation, personal communication, RAK) they appear to pose a greater risk for birds. Of the eight birds reported found under a heliostat, heliostats were vertically-oriented in at least 5 cases. (D Klem Jr., DC Keck, KL Marty, AJ Miller Ball, EE Niciu, and CT Platt. 2004. Effects of window angling, feeder placement, and scavengers on avian mortality at plate glass. Wilson Bulletin, 116(1):69-73; D Klem Jr. 2006. Glass: A deadly conservation issue for birds. Bird Observer 34(2):73-81; D Klem Jr. 1990.

Collisions between birds and windows: mortality and prevention. Journal of Field Ornithology 61:120–128; Loss, S.R., T. Will, S.S.Loss, and P.P. Marra. 2014. Bird-building collisions in the United States: Estimates of annual mortality and species vulnerability. Condor 116: 8-23). Studies with aquatic insects have found that vertically-oriented black glass surfaces (similar to solar panels) produced highly polarized reflected light, making them highly attractive (Kriska, G., P. Makik, I. Szivak, and G. Horvath. 2008. Glass buildings on river banks as "polarized light traps" for mass-swarming polarotactic caddis flies. Naturwissenschaften 95: 461-467).

A desert environment punctuated by a large expanse of reflective, blue panels may be reminiscent of a large body of water. Birds for which the primary habitat is water, including coots, grebes, and cormorants, were over-represented in mortalities at the Desert Sunlight facility (44%) compared to Genesis (19%) and Ivanpah (10%). Several factors may inform these observations. First, the size and continuity of the panels differs between facilities. Mirrors at Ivanpah are individual, 4 x 8' panels that appear from above as stippling in a desert background (Figure 6). Photovoltaic panels at Desert Sunlight are long banks of adjacent 27.72 x 47.25" panels (70 x 120 cm), providing a more continuous, sky/water appearance. Similarly, troughs at Genesis are banks of 5 x 5.5' panels that are up to 49-65 meters long.

Figure 6: The Ivanpah Solar Electric Generating System as seen via satellite. The mirrored panels are 5 x 8 feet.

There is growing concern about "polarized light pollution" as a source of mortality for wildlife, with evidence that photovoltaic panels may be particularly effective sources of polarized light in the environment (see Horvath et al. 2010. Reducing the maladaptive attractiveness of solar panels to polarotactic insects. Conservation Biology 24: 1644-1653, and ParkScience, Vol. 27, Number 1, 2010; available online at: http://www.nature.nps.gov/parkscience/index.cfm?ArticleID=386&ArticleTypeID=5; as well as discussion of this issue in the Desert Sunlight Final Environmental Impact Statement, Chapter 4, pp. 14-15).

Variables that may affect the illusory characteristics of solar panels are structural elements or markings that may break up the reflection. Visual markers spaced at a distance of 28 cm or less have been shown to reduce the number of window strike events on large commercial buildings (City of Toronto Green Development Standard; Bird-friendly development guidelines. March 2007). Mirrors at the Ivanpah facility are unobscured by structures or markings and present a diffuse, reflective surface. Photovoltaic panels at Desert Sunlight are arranged as large banks of small units that are 60 x 90 cm. The visually uninterrupted expanse of both these types of heliostat is larger than that which provides a solid structure visual cue to passerines. Parabolic troughs at Genesis have large, diffusely reflective surfaces between seams that periodically transect the bank of panels at 5.5' intervals. Structures within the near field, including the linear concentrator and support arms, and their reflection in the panels and may provide a visual cue to differentiate the panel as a solid structure.

The paper by Horvath et al cited above provides experimental evidence that placing a white outline and/or white grid lines on solar panels significantly reduced the attractiveness of these panels to aquatic insects, with a loss of only 1.8% in energy-producing surface area (p. 1651). While similar detailed studies have yet to be carried out with birds, this work, combined with the window strike results, suggest that significant reductions in avian mortality at solar facilities could be achieved by relatively minor modifications of panel and mirror design. This should be a priority for further research.

Finally, ponds are present on the property of the Desert Sunlight and Genesis facilities. The pond at Genesis is netted, reducing access by migratory birds, while the pond at Desert Sunlight is open to flighted wildlife. Thus, birds are both attracted to the water feature at Desert Sunlight and habituated to the presence of an accessible aquatic environment in the area. This may translate into the misinterpretation of a diffusely reflected sky or horizonal polarized light source as a body of water.

Stranding and Predation:

Predation is likely linked to panel-related impact trauma and stranding. Water birds were heavily over-represented in predation mortalities at Desert Sunlight. Of the 15 birds that died due to predation, 14 make their primary habitat on water (coots, grebes, a cormorant, and an avocet). A single White-winged Dove was the only terrestrial-based predation mortality in the submitted specimens. This is in contrast to blunt trauma mortalities at Desert Sunlight in which 8 of the 19 birds determined to have died of impact trauma were water species.

Locations of the birds when found dead were noted on several submissions. Of the birds that died of predation for which locations were known, none were located near ponds. The physiology of several of

these water birds is such that locomotion on land is difficult or impossible. Grebes in particular have very limited mobility on land and require a run across water in order to take off (Jehl, J. R., 1996. Mass mortality events of Eared Grebes in North America. Journal of Field Ornithology 67: 471-476). Thus, these birds likely did not reach their final location intentionally. Ponds at the PV and trough sites are fenced, prohibiting terrestrial access by predators. Birds on the water or banks of the pond are inaccessible to resident predators. Therefore, it is unlikely that the birds were captured at the pond and transported by a predator into the area of the panels. Attempts to land or feed on the panels because of their deceptive appearance may have injured the birds to the point that they could not escape to safety, or inadvertently stranded the birds on a substrate from which they could not take flight. We believe that an inability to quickly flee after striking the panels and stranding on the ground left these birds vulnerable to opportunistic predators. At least two types of predators, kit foxes and ravens, have been observed in residence at the power tower and PV facilities and ravens have been reported at the trough site (personal communication and observation, RAK). Additionally, histories for multiple birds found at the tower site document carcasses found near kit fox shelters or being eaten or carried by a raven.

Solar Flux:

Avian mortality due to exposure to solar flux has been previously explored and documented (McCrary, M. D., McKernan, R. L., Schreiber, R. W., Wagner, W. D., and Sciarrotta, T. C. Avian mortality at a solar energy power plant. Journal of Field Ornithology, 57(2): 135-141). Solar flux injury to the birds of this report, as expected, occurred only at the power tower facility. Flux injury grossly differed from other sources of heat injury, such as electrocution or fire. Electrocution injury requires the bridging of two contact points and is, therefore, seen almost exclusively in larger birds such as raptors. Contact points tend to be on the feet, carpi and/or head and burns are often found in these areas. Electrocution causes deep tissue damage as opposed to the surface damage of fire or solar flux. Other sequelae include amputation of limbs with burn marks on bone, blood vessel tears and pericardial hemorrhage. Burns from fires cause widespread charring and melting of feathers and soft tissues and histopathologic findings of soot inhalation or heat damage to the respiratory mucosa. None of these were characteristics of flux injury. In the flux cases small birds were over-represented, had burns generally limited to the feathers and internal injuries attributable to impact. Flux injury inconsistently resulted in charring, tended to affect feathers along the dorsal aspects of the wings and tail, and formed band-like patterns across the body (Divincenti, F. C., J. A. Moncrief, and B. A. Pruitt. 1969. Electrical injuries: a review of 65 cases. The Journal of Trauma 9: 497-507).

Proposed mechanisms of solar flux-related death follow one or a combination of the following pathways:

- impact trauma following direct heat damage to feathers and subsequent loss of flight ability
- starvation and/or thermoregulatory dysfunction following direct heat damage to feathers
- shock
- soft tissue damage following whole-body exposure to high heat
- ocular damage following exposure to bright light.

Necropsy findings from this study are most supportive of the first three mechanisms.

Loss of feather integrity has effects on a bird's ability to take off, land, sustain flight and maneuver. Tail feathers are needed for lift production and maneuverability, remiges are needed for thrust and lift and feathers along the propatagium and coverts confer smoothness to the avian airfoil. Shortening of primary flight feathers by as little as 1.6 cm with loss of secondary and tertiary remiges has been shown to eliminate take-off ability in house sparrows further demonstrating the importance of these feathers (Brown, R. E., and A. C. Cogley, 1996. Contributions of the propatagium to avian flight: Journal of Experimental Zoology 276: 112-124). Loss of relatively few flight feathers can, therefore, render a bird unable or poorly-able to fly. Birds encountering the flux field at Ivanpah may fall as far as 400 feet after feather singeing. Signs of impact trauma were often observed in birds with feather burns and are supportive of sudden loss of function (Beaufrere, H., 2009. A review of biomechanic and aerodynamic considerations of the avian thoracic limb. Journal of Avian Medicine and Surgery 23: 173-185).

Birds appear to be able to survive flux burns in the short term, as evidenced by the collection of several live birds with singed feathers. Additionally, Forensic Lab staff observed a falcon or falcon-like bird with a plume of smoke arising from the tail as it passed through the flux field. Immediately after encountering the flux, the bird exhibited a controlled loss of stability and altitude but was able to cross the perimeter fence before landing. The bird could not be further located following a brief search (personal observation, RAK and EOE). Birds that initially survive the flux exposure and are able to glide to the ground or a perch may be disabled to the point that they cannot efficiently acquire food, escape predators or thermoregulate. Observations of emaciation in association with feather burns in birds found alive is supportive of debilitation subsequent to flux exposure. More observational studies and follow-up are required to understand how many birds survive flux exposure and whether survival is always merely short-term. As demonstrated by the falcon, injured birds (particulary larger birds), may be ambulatory enough to glide or walk over the property line indicating a need to include adjacent land in carcass searches.

There was evidence of acute skin burns on the heads of some of the Grade 3 birds that were found dead. But interestingly, tissue burn effects could not be demonstrated in birds known to have survived short periods after being burned. Hyperthermia causing instantaneous death manifests as rapid burning of tissue, but when death occurs a day or later there will be signs of tissue loss, inflammation, proteinic exudate and/or cellular death leading to multisystemic organ failure. The beginnings of an inflammatory response to injury can be microscopically observed within one to a few hours after the insult and would have been expected in any of the four birds found alive. Signs of heat stroke or inhalation of hot air should have been observable a day or more after the incident. Rather, in these cases extensive feather burns on the body largely appeared to be limited to the tips of the feathers with the overlapping portions insulating the body as designed. This, in conjunction with what is likely only a few seconds or less spent in the flux, suggests that skin or internal organ damage from exposure to high temperatures in solar flux may not be a major cause of the observed mortality.

Ocular damage following light exposure was also considered but could not be demonstrated in the submitted birds. In the four birds that initially survived, there were no signs of retinal damage, inflammation or other ocular trauma. Given the small sample size, this does not preclude sight impairment as a possible sequela but clinical monitoring of survivors would be needed to draw more definitive conclusions.

Other/Undetermined:

Powerline electrocution was the cause of death for one bird (a juvenile Common Raven) at the Ivanpah facility. Electrocution at these solar facilities is a potential hazard but, thus far, appears to be an uncommon cause of death.

Smashed birds (13/233) were found at all three locations. Detailed carcass collection information was provided for 6; all were found on roads. Though poor carcass quality in all cases precluded definitive cause death determination, circumstances and carcass condition suggest vehicle trauma as the cause of deaths. The relatively low numbers of vehicle collisions may be attributed to slow on-site vehicle speeds and light traffic. Vehicle collisions, therefore, do not appear to be a major source of mortality and would be expected to decrease as construction ends.

There was a large number of birds (85/233) for which a cause of death could not be determined due to poor carcass condition. The arid, hot environment at these facilities leads to rapid carcass degradation which greatly hinders pathology examination. Results were especially poor for birds from the Genesis facility, where the cause of death(s) for 23/31 (74%) could not be determined. These results underscore the need for carcasses to be collected soon after death. More frequent, concerted carcass sweeps are advised.

Insect mortality and solar facilities as "mega-traps"

An ecological trap is a situation that results in an animal selecting a habitat that reduces its fitness relative to other available habitats (Robertson, B.A. and R.L. Hutto. 2006. A framework for understanding ecological traps and an evaluation of existing evidence. Ecology 87: 1075-1085; Robertson, B.A., J.S. Rehage, and Sih, A. 2013. Ecological novelty and the emergence of evolutionary traps. Trends in Ecology and Evolution 28: 552-560).

A wide variety of circumstances may create ecological traps, ranging from subtle (songbirds attracted to food resources in city parks, where they are vulnerable to unnaturally high populations of predators) to direct (birds are attracted to oil-filled ponds, believing it to be water, and become trapped). It appears that solar flux facilities may act as "**mega-traps,**" which we define as artificial features that attract and kill species of multiple trophic layers. The strong light emitted by these facilities attract insects, which in turn attract insect-eating birds, which are incapacitated by solar flux injury, thus attracting predators and creating an entire food chain vulnerable to injury and death.

OLE staff observed large numbers of insect carcasses throughout the Ivanpah site during their visit. In some places there were hundreds upon hundreds of butterflies (including monarchs, *Danaus plexippus*) and dragonfly carcasses. Some showed singeing, and many appeared to have just fallen from the sky. Careful observation with binoculars showed the insects were active in the bright area around the boiler at the top of the tower. It was deduced that the solar flux creates such a bright light that it is brighter than the surrounding daylight. Insects were attracted to the light and could be seen actively flying the height of the tower. Birds were also observed feeding on the insects. At times birds flew into the solar flux and ignited. Bird carcasses recovered from the site showed the typical singed feathers. The large populations of insects

may also attract indigenous bat species, which were seen roosting in structures at the base of the power tower.

Monarch butterflies in North America – both east and west of the Rocky Mountains – have been documented to be in decline (see the North American Monarch Conservation Plan, available at: http://www.mlmp.org/Resources/pdf/5431_Monarch_en.pdf). Proposed causes include general habitat loss and specific loss of milkweed, upon which the butterflies feed and reproduce. Considering the numerous monarch butterfly carcasses seen at the Ivanpah facility, it appears that solar power towers could have a significant impact on monarch populations in the desert southwest. Analysis of the insect mortality at Ivanpah, and systematic observations of bird/insect interactions around the power tower, is clearly needed.

Bird species affected by solar flux include both insectivores (e.g. swallows, swifts, flycatchers, and warblers) and raptors that prey on insect-feeding birds. Based on observations of the tower in flux and the finding of large numbers of butterflies, dragonflies and other insects at the base of the tower and in adjacent buildings it is suspected that the bright light generated by solar flux attracts insects, which in turn attracts insectivores and predators of insectivores. Waterbirds and other birds that feed on vegetation were not found to have solar flux burns. Birds were observed perching and feeding on railings at the top of the tower, apparently in response to the insect aggregations there.

Further, dead bats found at the Ivanpah site could be attracted to the large numbers of insects in the area. Nineteen bats from the condenser area of the power tower facility have been submitted to NFWFL for further evaluation. These bats belong to the Vespertilionidae and Molossidae families, which contain species considered by the Bureau of Land Management to be sensitive species in California. Preliminary evaluation revealed no apparent singing of the hair, and analysis is ongoing.

Solar flux and heat associated with solar power tower facilities

Despite repeated requests, we have been unsuccessful in obtaining technical data relating to the temperature associated with solar flux at the Ivanpah facility. The following summarizes the information we have gathered from other sources.

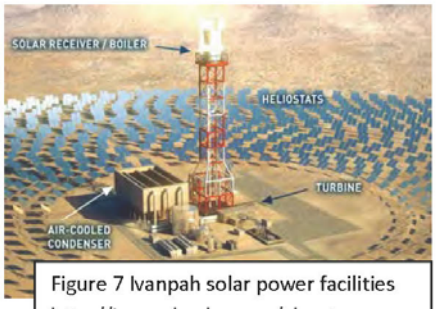

Figure 7 Ivanpah solar power facilities
http://ivanpahsolar.com/about

The Ivanpah solar energy generating facility consists of mirrors that reflect sunlight to a tower. In the tower sits a boiler that generates steam which then powers a turbine.

At the top of a 459 foot tall tower sits a boiler (solar receiver) that is heated by the sun rays reflected by 300,000 mirrors, called solar heliostats. When the concentrated sunlight strikes the boiler tubes, it heats the water to create superheated steam. The high temperature steam is then piped from the boiler to a turbine where electricity is generated (http://ivanpahsolar.com/about visited on 01/20/2014).

If all the solar heliostats are focused on the solar tower the beams multiply the strength of sunlight by 5000 times, and this generates temperatures at the solar tower in excess of 3600° Fahrenheit (> 1982° Celsius). Since steel melts at 2750° Fahrenheit (1510° Celsius), only a percentage of heliostats are focused on the solar receiver so that) the optimal temperature at the tower is approximately 900° Fahrenheit (~482° Celsius) ("How do they do it" Wag TV for Discovery Channel, Season 3, Episode 15, "Design Airplane Parachutes, Create Solar Power, Make Sunglasses" Aired August 25, 2009).

Figure 8: Seville solar power facility (http://inhabitat.com/sevilles-solar-power-tower)

A solar steam plant in Coalinga that also uses heliostat technology for extracting oil is on record stating that the steam generator is set to about 500° Celsius. (http://abclocal.go.com/kDSn/story?section=news%2Fbusiness&id=8377469 Viewed Jan 21, 2013)

Temperatures measured by the authors at the edge of the solar complex on the surface of a heliostat were approximately 200° Fahrenheit (~93° Celsius). Therefore, there is a gradient of temperature from the edge of the solar field to the tower that ranges from 200° to 900° Fahrenheit.

There is a phenomenon that occurs when the heliostats are focused on the tower and electricity is being generated. The phenomenon can be described as either a circle of clouds around the tower or, at times, a cloud formed on the side that is receiving the solar reflection. It appears as though the tower is creating clouds. Currently we propose two hypotheses of why this "cloud" is formed. The first hypothesis is simply the presumption that the high heat associated with towers is condensing the air, and forming the

Figure 9: Tower 1 (bright white) is shown under power. Tower 2 (black) is not operating.

clouds. The second hypothesis is that this phenomenon does not represent clouds at all rather it is a place in space where the heliostats that are not being used to generate heat are focused. Under this scenario, it is a place where the mirrors focus the excess energy not being used to generate electricity.

Ivanpah employees and OLE staff noticed that close to the periphery of the tower and within the reflected solar field area, streams of smoke rise when an object crosses the solar flux fields aimed at the tower. Ivanpah employees used the term "streamers" to characterize this occurrence.

When OLE staff visited the Ivanpah Solar plant, we observed many streamer events. It is claimed that these events represent the combustion of loose debris, or insects. Although some of the events are likely that, there were instances in which the amount of smoke produced by the ignition could only be explained by a larger flammable biomass such as a bird. Indeed OLE staff observed birds entering the solar flux and igniting, consequently becoming a streamer.

OLE staff observed an average of one streamer event every two minutes. It appeared that the streamer events occurred more frequently within the "cloud" area adjacent to the tower. Therefore we hypothesize that the "cloud" has a very high temperature that is igniting all material that traverses its field.
One possible explanation of this this phenomenon is that the "cloud" is a convergent location where heliostats are "parked" when not in use. Conversely it undermines the condensation hypothesis, given that birds flying through condensation clouds will not spontaneously ignite.

Temperatures required to burn feathers

Many of the carcasses recovered from the Ivanpah Solar plant after the plant became operational showed singing of feathers as shown in Figure 10.

Figure 10: Singed feathers from a Northern Rough-winged Swallow

In order to investigate at what temperature feathers burn/singe, we exposed feathers to different air temperatures. Each feather was exposed to a stream of helium and air for 30 seconds. The results indicate that at 400° Celsius (752° Fahrenheit) after 30 seconds the feather begins to degrade. But at 450° and

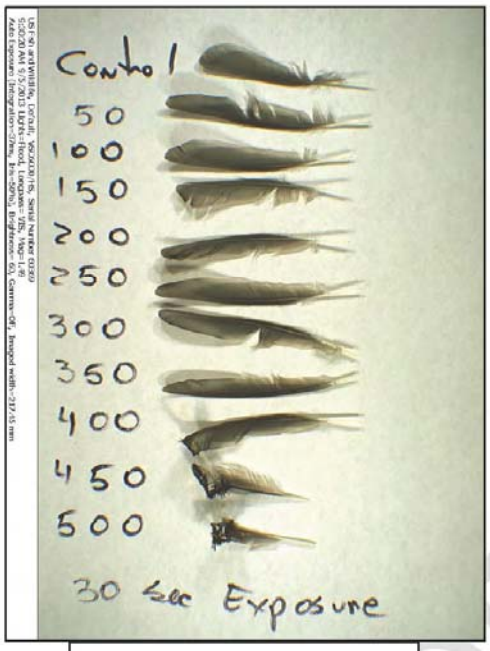

Figure 11: Results of exposing feathers to different temperatures (in degrees Celsius)

500° Celsius (842° and 932° Fahrenheit respectively) the feathers singed as soon as they made contact with the superheated air (Figure 11). Therefore, when singed birds are found, it can be inferred that the temperatures in the solar flux at the time a bird flew through it was at least 400° Celsius (752° Fahrenheit). This inference is consistent with the desired operating temperature of a power tower solar boiler (482° Celsius).

The fact that a bird will catch on fire as it flies through the solar flux has been confirmed by a Chevron engineer who works at the Coalinga Chevron Steam plant, a joint venture of Chevron and BrightSource Solar. (http://abclocal.go.com/kDSn/story?section=news%2Fbusiness&id=8377469 Viewed Jan 21, 2013)

Conclusions and Recommendations

In summary, three main causes of avian mortality were identified at these facilities; impact trauma, predation and solar flux. Birds at all three types of solar plants were susceptible to impact trauma and predators. Solar flux injury was unique to the power tower facility. Solar facilities, in general, do not appear to attract particular species, rather an ecological variety of birds are vulnerable. That said, certain mortality and species trends were evident, such as waterbirds at Desert Sunlight, where open water sources were present.

Specific hazards were identified, including vertically-oriented mirrors or other smooth reflective panels; water-like reflective or polarizing panels; actively fluxing towers; open bodies of water; aggregations of insects that attracted insectivorous birds; and resident predators. Making towers, ponds and panels less attractive or accessible to birds may mitigate deaths. Specific actions include placing perch-guards on power tower railings near the flux field, properly netting or otherwise covering ponds, tilting heliostat mirrors during washing and suspending power tower operation at peak migration times.

Visual cues should be retrofitted to existing panels and incorporated into new panel design. These cues may include UV-reflective or solid, contrasting bands spaced no further than 28 cm from each other. This arrangement has been shown to significantly reduce the number of passerines hitting expanses of windows on commercial buildings. Spacing of 10 cm eliminates window strikes altogether. Further exploration of panel design and orientation should be undertaken with researchers experienced in the field (Daneil Klem Jr. of Muhlenberg College) to determine causes for the high rate of impact trauma, and designs optimized to reduce these mortalities.

Challenges to data collection included rapid degradation of carcass quality hindering cause of death and species determination; large facilities which are difficult to efficiently search for carcasses; vegetation and panels obscuring ground visibility; carcass loss due to scavenging; and inconsistent documentation of carcass history. Searcher efficiency has been shown to have varying influences on carcass recovery with anywhere from 30% to 90% detection of small birds achieved in studies done at wind plants (Erickson et al., 2005). Scavengers may also remove substantial numbers of carcasses. In studies done on agricultural fields, up to 90% of small bird carcasses were lost within 24 hours (Balcomb, 1986; Wobeser and Wobeser, 1992). OLE staff observed apparently resident ravens at the Ivanpah power tower. Ravens are efficient scavengers, and could remove large numbers of small bird carcasses from the tower vicinity. (Erickson, W. P., G. D. Johnson, and D. P. Young, Jr., 2005, A summary and comparison of bird mortality from anthropogenic causes with an emphasis on collisions: U S Forest Service General Technical Report PSW, v. 191, p. 1029-1042; Balcomb, R., 1986, Songbird carcasses disappear rapidly from agricultural fields: Auk, v. 103, p. 817-820; Wobeser, G., and A. G. Wobeser, 1992, Carcass disappearance and estimation of mortality in a simulated die-off of small birds: Journal of Wildlife Diseases, v. 28, p. 548-554.)

Given these variables it is difficult to know the true scope of avian mortality at these facilities. The numbers of dead birds are likely underrepresented, perhaps vastly so. Observational and statistical studies to account for carcass loss may help us to gain a better sense of how many birds are being killed. Complete histories would help us to identify factors (such as vertical placement of mirrors) leading to mortalities. Continued monitoring is also advised as these facilities transition from construction to full operation. Of especial concern is the Ivanpah facility which was not fully-functioning at the time of the latest carcass submissions. In fact, all but 7 of the carcasses with solar flux injury and reported dates of collection were found at or prior to the USFWS site visit (October 21-24, 2013) and, therefore, represent flux mortality from a facility operating at only 33% capacity. Investigation into bat and insect mortalities at the power tower site should also be pursued.

ACKNOWLEDGMENTS

We wish to acknowledge the invaluable assistance and insights of S.A. Michael Clark and S.A. Ed Nieves.

Appendix 1. List of all 71 species recovered from the three solar energy sites. In this table, remains of closely related taxa that could not be definitively identified (e.g. Cinnamon/Blue-winged Teal and Black-throated/Sage Sparrow) are assigned to the biogeographically more likely taxon. In all such cases, the possible taxa are ecologically similar. All of these species are MBTA-listed.

SPECIES		Zone	Residency	Sites	MNI
Cinnamon Teal	*Anas cyanoptera*	water	migrant	DS,IV	5
Pied-billed Grebe	*Podilymbus podiceps*	water	migrant	DS	1
Western Grebe	*Aechmorphorus occidentalis*	water	migrant	DS	9
Eared Grebe	*Podiceps nigricollis*	water	migrant	DS,GN	5
Brown Pelican	*Pelecanus occidentalis*	water	migrant	DS	2
Double-crested Cormorant	*Phalacrocorax auritus*	water	migrant	DS	2
Great Blue Heron	*Ardea herodias*	water	migrant	GN	1
Black-crowned Night-Heron	*Nycticorax nycticorax*	water	migrant	DS	1
Cooper's Hawk	*Accipiter cooperii*	air	migrant	IV	1
Red-shouldered Hawk	*Buteo lineatus*	terr	migrant	IV	1
American Kestrel	*Falco sparverius*	air	resident	GN,IV	2
Peregrine Falcon	*Falco peregrinus*	air	resident	IV	1
American Coot	*Fulica americana*	water	migrant	DS, IV	12
Yuma Clapper Rail	*Rallus longirostris yumanensis*	water	resident	DS	1
Sora	*Porzana carolina*	water	migrant	DS,IV	2
American Avocet	*Recurvirostra americana*	water	migrant	DS	1
Spotted Sandpiper	*Actitis maculatus*	water	migrant	IV	2
Ring-billed Gull	*Larus delawarensis*	water	migrant	GN	2
California Gull	*Larus californianus*	water	resident	GN	1
Greater Roadrunner	*Geococcyx californianus*	terr	resident	IV	5
Yellow-billed Cuckoo	*Coccyzus americanus*	terr	migrant	IV	1
Mourning Dove	*Zenaida macroura*	terr	resident	DS, IV	14
White-winged Dove	*Zenaida asiatica*	terr	resident	DS,GN	2
Barn Owl	*Tyto alba*	terr	resident	IV	1
Lesser nighthawk	*Chordeiles acutipennis*	air	resident	DS,GN,IV	7
Common Poorwill	*Phalaenoptilus nuttallii*	air	resident	DS,IV	2
White-throated Swift	*Aeronautes saxatalis*	air	resident	IV	1
Costa's Hummingbird	*Calypte costae*	air	resident	DS	1
Allen's/Rufous Hummingbird	*Selasphorus sp.*	air	migrant	IV	1
Northern Flicker	*Colaptes auratus*	terr	resident	IV	1
Ash-throated Flycatcher	*Myiarchus cinerascens*	air	resident	DS,IV	2
Say's Phoebe	*Sayornis saya*	air	resident	GN	2
Black Phoebe	*Sayornis nigricollis*	air	resident	DS	1
Loggerhead shrike	*Lanius ludovicianus*	terr	resident	DS,IV	5
Warbling Vireo	*Vireo gilvus*	terr	migrant	IV	1
Common Raven	*Corvus corax*	terr	resident	DS,IV	3
Horned Lark	*Eremophila alpestris*	terr	migrant	DS	1
Tree Swallow	*Tachycineta bicolor*	air	migrant	DS,GN,IV	5

SPECIES		Zone	Residency	Sites	MNI
Cliff Swallow	*Petrochelidon pyrrhonota*	air	resident	GN	5
No. Rough-winged Swallow	*Stelgidopteryx serripennis*	air	migrant	IV	2
Verdin	*Auriparus flaviceps*	terr	resident	IV	3
Blue-gray Gnatcatcher	*Polioptila caerulea*	terr	resident	IV	1
Northern Mockingbird	*Mimus polyglottos*	terr	resident	IV	1
American Pipit	*Anthus rubescens*	terr	migrant	IV	4
Orange-crowned Warbler	*Oreothlypis celata*	terr	migrant	IV	1
Lucy's Warbler	*Oreothlypis luciae*	terr	resident	IV	1
Yellow-rumped Warbler	*Setophaga coronata*	air	migrant	IV	14
Black-throated Gray Warbler	*Setophaga nigrescens*	terr	migrant	IV	1
Hermit Warbler	*Setophaga occidentalis*	terr	migrant	GN	1
Townsend's warbler	*Setophaga townsendi*	terr	migrant	DS,IV	4
Yellow Warbler	*Setophaga petechia*	terr	migrant	IV	1
Black-and-white Warbler	*Mniotilta varia*	terr	migrant	IV	1
MacGillivray's Warbler	*Oporornis tolmei*	terr	migrant	IV	1
Wilson's Warbler	*Cardellina pusilla*	terr	migrant	DS,IV	4
Common Yellowthroat	*Geothlypis trichas*	terr	migrant	DS	1
Western Tanager	*Piranga ludoviciana*	terr	migrant	DS,IV	4
Black-headed Grosbeak	*Pheucticus melanocephalus*	terr	migrant	DS,GN	2
Lazuli Bunting	*Passerina caerulea*	terr	migrant	IV	1
Blue Grosbeak	*Passerina caerulea*	terr	resident	IV	1
Green-tailed Towhee	*Pipilo chlorurus*	terr	migrant	IV	1
Brewer's Sparrow	*Spizella breweri*	terr	resident	IV	3
Chipping Sparrow	*Spizella passerina*	terr	resident	GN,IV	4
Black-throated Sparrow	*Amphispiza bilineata*	terr	resident	DS,IV	4
Savannah Sparrow	*Passerculus sandwichensis*	terr	migrant	DS,IV	3
White-crowned Sparrow	*Zonotrichia leucophrys*	terr	migrant	IV	6
Pine Siskin	*Spinus pinus*	terr	migrant	IV	1
House Finch	*Carpodacus mexicanus*	terr	resident	IV	13
Great-tailed Grackle	*Quiscalus mexicanus*	terr	resident	DS,IV	5
Brown-headed Cowbird	*Molothrus ater*	terr	resident	DS,GN,IV	8
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*	terr	migrant	DS	1
Bullock's Oriole	*Icterus bullockii*	terr	resident	GN	2

Species recovered from one site: 47
two sites: 18
three sites: 5

Appendix 2. Species with solar flux burns

Common Name	Scientific name	
Yellow-rumped warbler	*Setophaga coronata*	12
House finch	*Carpodacus mexicanus*	10
Chipping sparrow	*Spizella passerina*	2
Unidentified warbler	*Parulidae*	2
Verdin	*Auriparus flaviceps*	2
Great-tailed grackle	*Quiscalus mexicanus*	2
Lucy's warbler	*Oreothlypis luciae*	1
Wilson's warbler	*Cardellina pusilla*	1
MacGillivray's warbler	*Oporornis tolmei*	1
Black-throated gray warbler	*Setophaga nigrescens*	1
Townsend's warbler	*Setophaga townsendi*	1
Orange-crowned warbler	*Oreothlypis celata*	1
Blue-gray gnatcatcher	*Polioptila caerulea*	1
Unidentified swallow	*Hirundinidae*	1
Northern rough-winged swallow	*Stelgidopteryx serripennis*	1
Warbling vireo	*Vireo gilvus*	1
Unidentified hummingbird	*Selasphorus sp.*	1
Unidentified passerine	Passeriformes	1
Unidentified finch	*Carpodacus sp.*	1
Lazuli bunting	*Passerina caerulea*	1
Unidentified sparrow	*Spizella species*	1
Unidentified blackbird	*Icteridae*	1
Peregrine falcon	*Falco peregrinus*	1

Letter 9
Law Offices of Stephan C. Volker
November 19, 2014

Response to Comment 9-1

The County acknowledges receipt of the "Backcountry Against Dumps" November 19, 2014 comment letter on the Draft EIR for the Iris Cluster Solar Farm Project and its general opposition to the project. This comment summarizes the overall characteristics of the projects as described in Chapter 3 of the EIR.

The proposed solar farm use is not "forbidden" by the Imperial County General Plan—as is claimed according to the commentator's interpretation of the General Plan. The proposed solar use is consistent with the County's General Plan and is a conditionally permitted use under the County's Land Use Ordinance. Please refer to responses to comment 9-2 for additional discussion of the projects' consistency with the County's General Plan and 9-3 for additional discussion of the project's impact to agricultural resources and local operations.

Response to Comment 9-2

This comment indicates that the project is inconsistent with the County's General Plan based on precedent established in the court case "Neighborhood Action Group v. County of Calaveras" (1984) 156 Cal. App.3d 1176, 1184. In that case, the County of Calaveras approved a conditional use permit (CUP) for a proposed project, but the County did not have a valid General Plan (i.e., the General Plan was determined not to be in compliance with State law). This, in turn, invalidated the County's issuance of a CUP for the project. The circumstances regarding the Neighborhood Action Group v. County of Calaveras case are not applicable to the project. Unlike the "Neighborhood" case, the County of Imperial's General Plan meets State requirements and is legally valid. As such, no defect exists as it relates to the County's authority to issue a CUP for the proposed solar generation projects, consistent with the underlying zoning designations within the project sites. Moreover, in a recent trial court case in the County of Imperial (Campoverde) a judge found that solar farms are consistent with the County's adopted General Plan.

Specifically with respect to the proposed projects, as indicated on EIR pages 4.10-11 through 4.10-12:

> Pursuant to Title 9, Division 5, Chapter 9 of the County's Zoning Ordnance, "Solar Energy Plants" are permitted uses in the A-2, A-2-R, and A-3 zones; subject to approval of a CUP. The Land Use Compatibility Matrix (see Table 4 of the General Plan Land Use Element) identifies land designated as "Agriculture" as compatible with lands zoned A-2, A-2-R, and A-3. In this content, the project facilities are a conditionally permitted use under the A-2, A-2-R, and A-3 zones and, therefore, are considered consistent with the General Plan and agricultural land use designation. Further, post-project restoration of the project sites would ensure future agricultural production and substantial conformance with the goals and objectives of the County's General Plan.

One of the Court's primary considerations in the "Neighborhood" case was whether the County of Calaveras had the authority to issue a CUP if it had failed to adopt a general plan containing elements, required by state law, which are relevant to the uses authorized by the permit. The County of Imperial's General Plan Land Use Element recognizes solar energy (an alternative form of energy) as being consistent with the County's overall goals and energy policies. As indicated on EIR Table 4.10-1, Project Consistency with Applicable Plan Policies (see EIR page 4.10-7), Development of Geothermal/Alternative Energy Resources. Goal 1 - the County of Imperial supports and encourages the full, orderly, and efficient development of geothermal/alternative energy resources while at the same time preserving and enhancing where possible agricultural, biological, human, and recreational resources. With the approval of all CUPs, Variances and discretionary permits, the proposed projects would be an allowable use within the existing land use and zoning designations for the sites. In addition, the project would promote Imperial County's renewable energy policies and would be consistent with the County's goal, as stated in its April

20, 2010 proclamation. According to the April 28, 2009 Joint Resolution of Imperial County Irrigation District and County of Imperial for the Creation of an Imperial Valley Renewable Energy Development Program, Imperial County is a major source of renewable energy for the State of California (see response to comment 9-16).

Response to Comment 9-3

This comment incorrectly states an interpretation of the General Plan that it "forbids" the proposed solar farm use on the proposed project sites. While the County's General Plan Land Use Agriculture category states that "agriculture shall be promoted as the principal and dominate use"; the Element does not restrict or otherwise forbid other uses. Moreover, agricultural uses continue to be the principal dominate use in the County. As provided in the Land Use Element, conversion of agricultural uses is allowed in cases "where a clear long term economic benefit to the County can be demonstrated through the planning and environmental review process." An economic, employment, and fiscal impact analysis has been prepared for the projects (Development Management Group, Inc., 2014) and is provided as EIR Technical Appendix M. The information in this analysis will be considered by the Planning Commission and Board of Supervisors as part of consideration of approval of the proposed projects, consistent with this particular provision of the General Plan.

CUPs for solar energy projects on agriculturally-zoned land are not expressly prohibited in the Imperial County General Plan. Although each conditional use permit application must be evaluated on a case-by-case basis, such conditional uses are not inherently inconsistent with the General Plan Agricultural Element or Land Use Element. The Agricultural Element and Land Use Element contain no express prohibition of non-agricultural uses on land designated within the Agricultural category. Rather, the Agricultural Element specifically allows non-agricultural development on land within the Agricultural Category. According to the Land Use Element, the "Agriculture" land use designation expressly allows non-agricultural uses on agricultural land and places an appropriate burden on those proposing a non-agricultural use to demonstrate that (1) it "does not conflict with agricultural operations and will not result in the premature elimination of such agricultural operations" and (2) it meets the requirement that "no use should be permitted which would have a significant adverse effect on agricultural production." (ICGP Land Use Elem. IV.C.1.) The Lead Agency has the authority to interpret the meaning of the General Plan and determine whether the proposed projects, together with the mitigation measures set forth in the EIR and the conditions of approval mandated by a CUP, are consistent with the General Plan.

Response to Comment 9-4

General Plan goals and policies for preserving agricultural land are not inflexible and, pursuant to the language in the General Plan, should be balanced with General Plan goals and objectives of economic growth and regional vision. The General Plan Agricultural Element specifically cautions against its Goals and Policies being interpreted as doctrine:

> Imperial County's Goals and Objectives are intended to serve as long-term principles and policy statements representing ideals which have been determined by the citizens as being desirable and deserving of community time and resources to achieve. The Goals and Objectives, therefore, are important guidelines for agricultural land use decision making. It is recognized, however, that other social, economic, environmental, and legal considerations are involved in land use decisions and that these [Agricultural Element] Goals and Objectives, and those of other General Plan Elements, should be used as guidelines but not doctrines. (ICGP Ag. Elem. III.A Preface [emphasis added].)

In addition to the considerations set forth in the Agricultural Element regarding non-agricultural use of land within the Agricultural category, preserving Agricultural land for agricultural use must be balanced against the Economic Growth and Regional Vision goals and objectives of the General Plan Land Use Element. In particular, Goal 2 states: "Diversify employment and economic opportunities in the County while preserving agricultural activity." Goal 3, Objective 3.2 states: "Preserve agricultural and natural resources while promoting diverse economic growth through sound land use planning." These goals and

objectives call for a balanced approach between preserving agricultural land and promoting economic growth.

Furthermore and as provided on page 4.2-17 of the Draft EIR, existing nuisance issues such as noise, dust, and odors from existing agricultural uses would not impact the projects given the general lack of associated sensitive uses (e.g. residences). Likewise, with mitigation measures proposed in other resource sections (e.g. air quality, noise, etc.) project-related activities would not adversely affect adjacent agricultural operations. Additionally, the projects would not develop infrastructure that would attract or encourage new development of adjacent farmlands. Further, the provisions of the Imperial County Right-to-Farm Ordinance (No. 1031) and the State nuisance law (California Code Sub-Section 3482) would continue to be enforced. Based on these considerations, the projects are not expected to adversely impact adjacent landowners' abilities to economically and conveniently farm adjacent agricultural land and the impact is considered less than significant.

Response to Comment 9-5

The comment states that the projects would terminate and prevent agricultural uses on the project sites for the projects' operational life of up to 40 years. This project-related impact is disclosed in Impact 4.2.1 of the Draft EIR (see pages 4.2-12 through 4.2-15) and was determined to be significant in the absence of mitigation. With the implementation of Mitigation Measures 4.2-1a and 4.2-1b, this impact would be reduced to a less than significant level. The comment does not question the adequacy of Mitigation Measures 4.2-1a and 4.2-1b in minimizing this impact.

Response to Comment 9-6

The County recognizes that the proposed solar uses are not compatible with the existing Williamson Act lands located within the project sites. Therefore, cancellation of William Act contracted lands is a required discretionary action associated with approval of the projects. EIR Section "Required Project Approvals" (see EIR page 3-26) states:

> Williamson Act Contract Cancellation. There are three active Williamson Act Contracts within the FSF and ISF project sites. Agricultural Preserve 160 includes the two parcels associated with Contract 2003-02 (Assessor's Parcel Numbers [APNs]: 059-050-003 and 059-120-001); and one parcel associated with Contract 2004-01 (APN: 059-050-002) within the ISF project site. One parcel associated with Contract 2003-001 (APN: 059-050-001) is also part of Agricultural Preserve 160 and is located within the FSF project site. Petitions for cancellation of these contracts were filed with the County in 2014.

In addition to the on-site contracts, page 4.2-16 of the EIR acknowledges the presence of other properties surrounding the project sites under active Williamson Act Contracts (see Figure 4.2-1) and the potential creation of disincentives for adjacent properties to keep renewing their existing contracts. However, given that final land uses following the projects useful lifecycle would consist of agricultural uses, no new growth pressures are anticipated as a direct consequence of the projects.

Additionally, the Imperial County Board of Supervisors recently voted in 2010 to not renew existing Williamson Act Contracts within the County due to the State's decision to discontinue funding for the program. This essentially means that all Williamson Act contracts in Imperial County will terminate on or before December 31, 2018. Although there remains a possibility that the State' will reinstate funding for Williamson Act subventions, the fact the Board of Supervisors has already voted to discontinue funding for the program brings into question the continuation of the Williamson Act program within Imperial County. Although, landowners do have the option to protest the non-renewal, this option only allows them to keep their Williamson Act value until there is less than six years remaining in the non-renewal phase-out. Beyond four years, current tax incentives would no longer apply. Based on these circumstances, if the property owners had protested, which they did not, each of the active Williamson Act contracts could theoretically be in non-renewal status prior to project approval.

Response to Comment 9-7

Please refer to responses to comments 9-4 and 9-6.

Response to Comment 9-8

The County appreciates the additional information provided by the comment as it relates to the projects' potential to increase temperatures and decrease humidity levels on surrounding farmland. After further investigation of Exhibit III, it appears that the commenter is overstating the results of the study. As provided, although the field data showed a decline in air temperatures as a function of distance from the solar farm, the study notes that the solar array was completely cooled at night (most days) based on 18 months of data. As a result, the formation of a heat island was determined unlikely. Further, the study indicated that access roads in-between the solar arrays, as proposed as part of the projects, allowed for substantial cooling. In this context, micro-climatic changes as a result of the projects are considered less than significant.

Response to Comment 9-9

Local public and private airport operations are considered in Impacts 4.8-5 and 4.8-6 of the EIR (see pages 4.8-18 to 4.8-19). As provided, the Calexico International Airport is located approximately 2.5 miles east of the ISF project site and the Frontier Agricultural Services and Johnson Brothers private airstrip is located approximately 0.50 mile southeast of ISF. On August 13, 2014 the Imperial County Airport Land Use Commission reviewed the project and determined that the project is consistent with the Airport Land Use Compatibility Plan (ALUCP). The potential for compatibility impacts between the private airstrip and projects included consideration of the projects' potential to produce light and glare impacts and the introduction of structures on the project sites that could interfere with the aerial application operations. Given that aerial application operations would be discontinued over the project sites and lessened in the project vicinity due to other nearby solar farms, the impact is considered less than significant. This comment does not raise any issue as to the adequacy of the EIR analysis.

Response to Comment 9-10

Pursuant to CEQA, an economic impact is not an impact on the physical environment that must be addressed in an EIR (see CEQA Guidelines Section 15131). The County considers the fiscal and economic impacts as part of approval of the projects. Conditions of Approval, in terms of financing of services, etc. are also placed on each of these projects based on the findings of the particular fiscal/economic study. Previous solar projects approved by the County have been shown to provide a fiscal benefit to the County.

An economic, employment, and fiscal analysis has been prepared for the projects (Appendix M) and this information will be considered as part of the Planning Commission and Board of Supervisor consideration for approval of the projects. The analysis provided in EIR Appendix M indicates that the proposed project would have an overall economic, employment and fiscal benefit as compared to the existing agricultural use of the project sites.

Response to Comment 9-11

Please refer to responses to comments 9-3, 9-4, and 9-5.

Response to Comment 9-12

Please refer to responses to comments 9-2 and 9-3.

Response to Comment 9-13

Please refer to responses to comments 9-2 and 9-3.

Response to Comment 9-14

As provided in response to comment 9-4, the EIR provides consideration for the projects' potential to impact adjacent agricultural lands and operations. Based on the analysis provided under Impact 4.2-4 (page 4.2-17), the projects would not directly affect the movement of agricultural equipment on local roadways nor would they disrupt access to existing agriculture-serving roads. Additionally, County setback requirements combined with existing roadways along the borders of each project site would provide physical separation between the solar arrays and adjacent agricultural operations. Based on these circumstances, the comment provides no basis as to why agricultural usage on adjacent properties would become infeasible with the projects. With respect to crop dusters, the potential restriction about over spraying would be no different than being surrounded by organic farms which would prohibit the use of pesticides.

Response to Comment 9-15

As provided on page 3-21 of the EIR, the projects would include the installation of a grounding system to permit dissipation of ground fault currents. With the implementation of standard engineering practices as part of the grounding installation, this impact is considered less than significant.

Response to Comment 9-16

Please refer to response to comment 9-14.

Response to Comment 9-17

Pursuant to Government Code §51200 et seq., Williamson Acts, cancellation of lands within Williamson Act contracts is allowed. The Act contains specific provisions for the cancellation of the contracts which the County will implement as part of the approvals of the projects. Although the commenter argues that the County cannot lawfully cancel the three existing Williamson Act contracts based on a perceived inconsistency with the County's General Plan and public benefit, substantial evidence shows that this is not the case. Cancellation of the contracts would be consistent with the Act and County's General Plan and in the public interest because of the following:

- All Williamson Act Contracts in the County will expire because the County Board of Supervisors in 2010 directed County staff to file notices of Non-Renewal for all active Williamson Act Contracts in the County. This policy direction by the County Board of Supervisors in essence determined that the cancellation of Williamson Act Contracts may not have an effect of removing land from agricultural production.
- The proposed project sites represent approximately 0.25% of the total amount of land devoted to agriculture in Imperial County.
- Because solar energy projects are largely passive facilities that do not generate dust, noise, or other impacts that would impact adjacent agricultural uses, they do not threaten the preservation of such adjacent agricultural uses.

Therefore, the cancellation of these contracts would result in a less than significant impact.

Response to Comment 9-18

The County disagrees with the comment's assertion that the projects' are not adequately described in the Draft EIR. As stated in Chapter 3 of the EIR, the proposed projects involve four separate CUP applications associated with four project sites. A single solar energy facility is not proposed. In fact, four separate solar generating facilities are contemplated, each governed by its own CUP application; however, they would share the same transmission line. The County has prepared this EIR in order to comprehensively address the potential environmental impacts associated with the development of the project sites under these four CUP applications. Each site could potentially be developed with differing technologies based on market conditions at the time of construction. For this reason, the EIR evaluates both expansive photovoltaic (PV) and concentrated photovoltaic (CPV) technologies within a fixed-tilt or tracker mount system. Representative examples of these technologies are considered and analyzed in Section 4.1 of the EIR (see EIR Figures 4.1-3 through 4.1-18).

In relation to the proposed Operations and Maintenance (O&M) buildings, page 3.9 of the EIR provides a description of these project facilities. An O&M building is contemplated for each of the project sites; however, there may be cases where the O&M building on one site can be shared with an adjacent solar project (see EIR page 3-9). As described, the footprint of the O&M buildings at each location would not exceed an area of approximately 5,000 square feet. The parking area would comprise an area of less than 0.25 acres. The O&M buildings would consist of a steel framed structure with metal siding and roof panels and painted to match the surrounding landscape (e.g., desert sand). The O&M buildings would include a small office, storage space, an electrical/array control room, restroom, and a compact water treatment facility. Subsequent to project approval, construction level engineering plans will be submitted by the applicant to the County Planning & Development Services Department, which in turn will be provided to the Fire Prevention Bureau for review and approval as part of the development review/building permit process.

The project objective of providing up to 360 MW of power reflects the County's mission to help California meet its statutory and regulatory goal of increasing renewable power generation, including greenhouse gas reduction goals of Assembly Bill (AB) 32 (California Global Warming Solutions Act of 2006), the County's goals of becoming a major source of renewable energy for California, and the Applicant's goal to assist the County with these initiatives.

According to the April 28, 2009 Joint Resolution of Imperial County Irrigation District and County of Imperial for the Creation of an Imperial Valley Renewable Energy Development Program, Imperial County is a major source of renewable energy for the State of California. One of the purposes of the Imperial Valley Renewable Energy Development Program is to "[m]aximize development of all renewable energy resources." In addition to the project objective cited by the commenter, an objective of the projects is "to help California meet its statutory and regulatory goal of increasing renewable power generation, including greenhouse gas reduction goals of Assembly Bill (AB) 32 (California Global Warming Solutions Act of 2006)." Pursuant to SB 2X, California utilities have been mandated to obtain 33% of their energy from renewable sources (wind, solar, geothermal, biofuels, etc.) by 2020. Additional objectives of the projects are to "[i]nterconnect with electrical transmission infrastructure either planned or being constructed by other nearby projects, interconnect to the ISO controlled transmission network, and maximize opportunities for the sharing or use of existing utility transmission corridor(s)" and to "[e]ncourage economic investment and diversify the economic base for Imperial County."

Response to Comment 9-19

Table 3-1 on EIR page 3-1 contained a typographical error. Table 3-1 has been corrected as follows:

Table 3-1. Project Study Areas APNs, Acreages, and Zoning

	APN	Acreage	Zoning
Ferrell Solar Farm	052-180-042	204.0	A2R
	~~059-150-001~~ 059-050-001	160.27~~163.1~~	A2R
Subtotal		*364.27~~367.1~~*	
Rockwood Solar Farm	052-180-040	67.9	A2R, A2
	052-180-048	170.7	A2R
	052-180-064	157.7	A2R, A2
Subtotal		*396.2*	
Iris Solar Farm	059-050-002	184.58~~188.1~~	A2R
	059-050-003	160.0~~165.5~~	A2R, A2
	059-120-001	157.3~~167.2~~	A2R
Subtotal		*501.88~~520.8~~*	
Lyons Solar Farm	052-180-053	57.2	A3
	052-180-058	81.2	A2R
Subtotal		*138.4*	
Total Project Study Areas		**1,400.75~~1,422.4~~**	

Response to Comment 9-20

Page 3-22 of the EIR has been revised as follows to indicate that project construction is proposed to start in early to mid-2015:

> Construction activities are proposed to start in mid-~~2014~~2015 and last for up to 12 months;

This minor text change does not change any of the analysis or determinations provided in the Draft EIR.

Response to Comment 9-21

The alternatives analysis as provided in Chapter 8 of the EIR contains a reasonable range of alternatives consistent with the requirements of CEQA. Furthermore, the EIR does not reject any of the alternatives analyzed and each of these alternatives would remain under consideration by the County decision makers. For each of these alternatives, the EIR states, "However, this alternative would make it more difficult to achieve the overall objective of providing a total of up to 360 megawatts of renewable solar energy, as there would be less area available for the placement of PV or CPV structures." However, this statement is not a categorical rejection of the alternatives.

In relation to the comment's request for the analysis on a non-solar alternative, the County would assert that such an alternative is commensurate with the No Project/No Development Alternative, which is already analyzed as Alternative 1. As provided on page 8-2 of the Draft EIR, Alternative 1 would generally maintain existing agricultural use on the project sites. If another economically viable electrical generating facility could be constructed (in place of solar), the project applicant could have proposed such an alternative. However, an EIR need not consider alternatives that are infeasible (CEQA Guidelines 15126.6(a)) or which would change the fundamental nature of the proposed project. (*Al Larson Boat Shop, Inc. v. Board of Harbor Comm.* (1993) 18 Cal.App.4th 729, 745.) The alternatives presented in an EIR must be potentially feasible, defined as "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social and technological factors." (Pub. Res. Code Section 21061.1).

This comment also alleges that the EIR fails to examine the benefits of a Renewable Distributed Generation alternative (Alternative 6). The commenter is directed to page 8-23 of the EIR. As provided, Alternative 6 would result in reduced impacts to agricultural and hydrology/water quality when compared

to the proposed project. However, due to a lack of an effective electricity distribution system for large numbers of small electricity producers that would be required under Alternative 6, it was not considered environmentally superior to Alternative 3: Reduced Acreage Alternative (Avoid Williamson Act Land).

Response to Comment 9-22

The County notes the comment's disagreement with the EIR's determination of the environmentally superior alternative (Alternative 3: Reduced Acreage Alternative (Avoid Williamson Act Land). However, the comment's focus is solely placed on the roof-top solar facilities and not the interconnecting utility infrastructure, which could result in impacts that are similar to or greater than that of the proposed project. For example, the distributed nature of the alternative would require utility connections that could result in similar impacts to burrowing owl and local water crossings due to the increased distance between connections. Additionally, at approximately 10 kW per system, since the applicant does not own the buildings needed for installation, implementation would take many, many years (compared to the proposed project's three year construction schedule) to reach the up to 360 MW capacity. Based on these circumstances, the Distributed Generation Alternative would make it more difficult to achieve the overall objective of providing a total of 360 megawatts of renewable solar energy, as there would be less area available for the placement of PV structures, and full implementation would not be achievable within the state-mandated timeframes.

Response to Comment 9-23

Please refer to responses to comments 9-2, 9-3, and 9-4.

Response to Comment 9-24

The comment speculates on the potential impacts to important farmlands as a result of another 40-year CUP following the expiration of the CUP subject to the EIR. The EIR analyzes the environmental effects on the 40-year CUP followed by post-project restoration of the project sites. The application of another CUP would be subject to additional CEQA review at the time an application is filed with the County. Any consideration of potential impacts to important farmlands would be based on future project details, which remain remote and speculative at this time.

Response to Comment 9-25

Please refer to responses to comments 9-3, 9-4, 9-8, 9-9, 9-10, and 9-14.

Response to Comment 9-26

The projects' cumulative effects to agricultural resources, including important farmlands, are considered on pages 6-6 through 6-8 of the Draft EIR. As provided, the incremental impact of the loss of 1,4001~~,422~~ acres of farmland would be mitigated via full restoration of the project study areas to comparable agricultural production post-project, purchase of an agricultural easement at a 2:1 ratio, or payment into the County's agricultural mitigation fund, which the County uses at its discretion to mitigate for farmland loss consistent with its General Plan policies. The comment's statement regarding impacts to agriculture-serving business is unsupported by substantial evidence and beyond the scope of CEQA (see response to comment 9-10).

Response to Comment 9-27

Please refer to response to comment 9-9.

Response to Comment 9-28

Please refer to responses to comments 9-6 and 9-17.

Response to Comment 9-29

The County disagrees with the comment's ascertain that the focused surveys for western burrowing owl were inadequate. As provided on page 4.4-8 of the EIR, 15 adult burrowing owls and one juvenile burrowing owl were observed using eight occupied burrows and six active burrows within the project area. An additional 37 adults and seven juveniles using 22 occupied burrows and 10 active burrows were observed off-site within the IID right-of-way. The locations of these sightings are provided in Figure 4.4-1. In accordance with the CDFW Staff Report on Burrowing Owl Mitigation (2012), impacts to the foraging habitat within 100 meters (approximately 300 feet; 6.5 acres) of each active burrow was considered significant thereby requiring mitigation. Direct and indirect impacts to burrowing owl as a result of project-related construction and operation are described on pages 4.4-13 through 4.4-14. Mitigation Measures 4.4-1a, 4.4-1b, 4.4-1c, and 4.4-1d are proposed to minimize the identified impacts consistent with CDFW's general guidance. The comment provides no supporting basis as to how the impact is not adequately analyzed in the EIR or why the proposed mitigation is insufficient. Please also refer to responses to comments 4-1 through 4-10.

Response to Comment 9-30

The comment provides no supporting rationale for the 160 foot buffer requirements contained in Mitigation Measure 4.4-1a(1). In practice, burrowing owls are well adapted to urban and disturbed environments and, as a result, the proposed distance is considered sufficient during the non-breeding season. As provided in Mitigation Measure 4.4-1a, for construction activities occurring during the breeding season, measures 2 through 5 would be required along with Mitigation Measure 4.4-1b. These measures, when combined with Mitigation Measures 4.4-1c and 4.4-1d, would be effective in minimizing direct and indirect impacts to burrowing owl to a less than significant level. Please also refer to responses to comments 4-1 through 4-10.

Response to Comment 9-31

The comment ascertains that the EIR fails to analysis operational effects, including glare and glint, is inaccurate. Impact 4.4-1 (page 4.4-15) of the EIR provides an analysis of the project's potential to result in electrocution of avian species, including migratory birds. Mitigation Measure 4.4-1f proposes the development and implementation of an Avian Bat Protection Plan (ABPP) following the USFWS's guidelines. As provided, the ABPP will outline conservation measures for construction and O&M activities that might reduce potential impacts to bird populations and shall be developed by the project applicant in conjunction with and input from the USFWS. In addition to addressing issues related to electrocution from distribution lines, the ABPP will also address potential effects from the PV panels. With the implementation of an ABPP, project-related impacts to migratory birds would be less than significant.

Response to Comment 9-32

Please refer to response to comment 9-15.

Response to Comment 9-33

The EIR provides an analysis of the projects' contribution to greenhouse gas emissions based on best available information. As provided in Appendix D (Air Quality and Global Climate Change), solar projects are an integral part of the State's emission reduction strategy as presented in the State's Scoping Plans. The 2008 Scoping Plan specifically addresses critical complementary measures directed at emission sources that are included in the cap-and-trade program that are designed to achieve cost-effective emissions reductions while accelerating the necessary transition to the low-carbon economy. One of these measures was the Renewables Portfolio Standard (Scoping Action E-3 – RPS), which was to promote multiple objectives, including diversifying the electricity supply by accelerating the transformation of the Electricity sector, including investment in the transmission infrastructure and system changes to allow integration of large quantities of intermittent wind and solar generation. Therefore, this project

complies with an approved GHG emission reduction plan and is presumed to have less than significant GHG impacts and no further quantification is warranted.

Response to Comment 9-34

Please refer to responses to comments 9-2 and 9-3.

STATE OF CALIFORNIA—CALIFORNIA STATE TRANSPORTATION AGENCY EDMUND G. BROWN Jr., Governor

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11-IMP-98
PM 24.09
Iris Cluster Solar Farm DEIR
SCH # 2014041091

Armando Villa
Imperial County
Planning and Development Services
801 Main Street
El Centro, CA 92243

Dear Mr. Villa:

The California Department of Transportation (Caltrans) received a copy of the Draft Environmental Impact Report (DEIR) for the proposed Iris Cluster Solar Farm project located near State Route 98 (SR-98). Caltrans has the following comments:

Visual aspects of the project including glint and glare should be documented not to have any potential safety impacts to motorists driving on SR-98. 10-1

It is understood by our agency that the project will only access SR-98 from existing county roads or a permitted highway access location. 10-2

If you have any questions on the comments Caltrans has provided, please contact Marisa Hampton of the Development Review Branch at (619) 688-6954. 10-3

Sincerely,

JACOB M. ARMSTRONG, Chief
Development Review Branch

""Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Letter 10
California Department of Transportation (Caltrans)
October 14, 2014

Response to Comment 10-1

EIR Section 4.1 Aesthetics/Visual Resources provides an evaluation of potential glint and glare impacts of the proposed project to motorists traveling on roadways that are adjacent to the project site, including SR-98. A reflectivity analysis was completed that addressed potential fixed tilt, one axis trackers, and two axis tracker systems that could be installed at the project sites.

The analysis determined that the single axis trackers had no risk of glare to roadway traffic; however, the fix tilt structures showed a potential risk of glint to south roadway positions, and double axis trackers showed a potential risk of glint to the east and west roadway positions. The Reflectivity Analysis recommendations included the installation of fence slats along southern roadways where fixed tilt trackers may be located, and fence slats along east and west roadways where double axis trackers may be located to reduce potential glare or glint impacts to roadway travelers.

The following mitigation measures are required for the FSF, RSF, ISF, and LSF and would reduce the impact to a level less than significant:

4.1-4 **Installation of Fence Slats.** Based on final engineering and design, neutral colored security fence slats shall be installed in the following areas:

- ***Fixed Tilt*** – Fence slats shall be installed for all portions of the project study areas with fixed-tilt trackers installed that face a roadway to the south.
- ***Double Axis Trackers*** – Fence stats shall be installed for all portions of the project study areas with double axis trackers installed that face a roadway to the east and/or west.

It should be noted that the County is requesting the applicant to conduct additional glint and glare analysis at the time site plans are submitted to the Planning Department for review and approval as these plans would have the precise location and layout, configuration, material types, etc of the PV or CPV systems. This analysis may indicate that slats may be required only in specific locations (depending on the array types, etc.) or that none would be required with a determination of no glint or glare risk to motorists.

Response to Comment 10-2

Comment noted. Access is proposed only from existing County roadways and permitted highway locations.

Response to Comment 10-3

Comment noted.

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