

DOCKETED

Docket Number:	09-AFC-06C
Project Title:	Blythe Solar Power Project - Compliance
TN #:	201152
Document Title:	Testimony of K. Shawn Smallwood, Ph.D.
Description:	written testimony
Filer:	Michael R. Lozeau
Organization:	Lozeau Drury LLP
Submitter Role:	Intervenor Representative
Submission Date:	11/8/2013 3:50:02 PM
Docketed Date:	11/8/2013

STATE OF CALIFORNIA

**Energy Resources Conservation
and Development Commission**

In the Matter of:

NEXTERRA BLYTHE SOLAR ENERGY
CENTER, LLC'S REVISED PETITION TO
AMEND - CONVERSION TO PV BLYTHE
SOLAR POWER PROJECT

DOCKET NO. 09-AFC-6C

**TESTIMONY OF K. SHAWN SMALLWOOD, PH.D., ON BEHALF OF LABORERS'
INTERNATIONAL UNION OF NORTH AMERICA, LOCAL UNION NO. 1184**

November 8, 2013

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8 November 2013

RE: Written testimony on the proposed Blythe Solar Power Project

I have prepared the following written testimony on the Staff Assessment (CEC 2013a,b) and related documents (AECOM 2010a,b,c,d) prepared for the Blythe Solar Power Project, which I understand would be rated at a capacity of 485 MW on 4,139 acres of the Mojave Desert. My qualifications for preparing expert comments are the following. I earned a Ph.D. degree in Ecology from the University of California at Davis in 1990, where I subsequently worked for four years as a post-graduate researcher in the Department of Agronomy and Range Sciences. My research has been on animal density and distribution, habitat selection, habitat restoration, interactions between wildlife and human infrastructure and activities, conservation of rare and endangered species, and on the ecology of invading species. I have authored numerous papers on special-status species issues, including “Using the best scientific data for endangered species conservation,” published in *Environmental Management* (Smallwood et al. 1999), and “Suggested standards for science applied to conservation issues” published in the *Transactions of the Western Section of The Wildlife Society* (Smallwood et al. 2001). I served as Chair of the Conservation Affairs Committee for The Wildlife Society – Western Section. I am a member of The Wildlife Society and the Raptor Research Foundation, and I’ve been a part-time lecturer at California State University, Sacramento. I was also Associate Editor of wildlife biology’s premier scientific journal, *The Journal of Wildlife Management*, as well as of *Biological Conservation*, and I was on the Editorial Board of *Environmental Management*.

I have performed avian surveys in California for twenty-three years (Smallwood et al. 1996, Smallwood and Nakamoto 2009). Over these years, I studied the impacts of human activities and human infrastructure on birds and other animals, including on Swainson's hawks (Smallwood 1995), burrowing owls (Smallwood et al. 2007), and other species (Smallwood and Nakamoto 2009). I studied fossorial animals (i.e., animals that burrow into soil, where they live much of their lives), including pocket gophers (Smallwood and Geng 1997), ground squirrels, kangaroo rats, voles, harvester ants, and many other functionally similar groups. I performed focused studies of how wildlife interact with agricultural fields and associated cultural practices, especially with alfalfa production (Smallwood and Geng 1993, Erichsen et al. 1996, Smallwood et al. 1996, 2001).

I have worked in the Mojave Desert, including in the immediate area of the Blythe Solar Power project, since 1985. I performed mountain lion surveys in the Chuckwalla and Riverside Mountains, and in many other locations across the Mojave Desert. I also live-trapped small mammals and did surveys for American badger and burrowing owl at a proposed large solar project on the northern aspect of the Mojave Desert. I am familiar with the local ecology.

IMPACTS ASSESSMENT

The Blythe Solar Power project is obviously very large and will obviously cause extensive, irreversible damage to many special-status species and to the desert ecosystem. Placing PV arrays on >4,000 acres will destroy very large numbers of plants and animals, and will disturb sensitive desert soils. Too many of the conclusions in some of the technical documents (AECOM 2010a,b,c,d) contradicted the evidence of project impacts (e.g., claiming that impacts would be insignificant even though maps of survey results showed widespread occurrences of special-status species across the project site), or used fallacious arguments to claim that, for example, the project would not contribute significant cumulative impacts. I give lots of credit, therefore, to the CEC (2013a,b) for acknowledging many of the project impacts that were denied by the consultants. The first and most important step toward arriving at reasonable solutions to environmental problems is to understand the impacts.

In my comments that follow, my intent was to suggest improvements to the impacts assessment and the mitigation plan. I offered no comments on many of the CEC's conclusions with which I agreed.

It was apparent that the CEC (2013b) recognized some of the shortcomings in the AECOM reports. For example, where AECOM (2010a) concluded that the project would have a less than significant cumulative impact on desert tortoise, the CEC (2013b: 1-6) acknowledged that, *“Although the BSPP is not located near any Desert Wildlife Management Areas or critical habitat units and contains habitat of low-to-moderate quality, it nevertheless contributes incrementally to cumulative impacts to desert tortoise habitat and loss of population connectivity.”* Of course the CEC is correct about this, as a large proportion of the valley between three mountain ranges will be transformed into solar arrays.

CEC Staff also added avian species that were not in AECOM's species lists, but which were since found dead at nearby solar projects under construction or operation (see Table 3, CEC 2013b: 4.2-26). Given the lack of published (or unpublished) reports of impact monitoring at solar projects, the CEC's Staff was wise to review monthly compliance reports for surprising biological impacts at nearby solar projects. The impacts analysis and mitigation planning need to anticipate these types of surprises.

Burrowing owl

An impacts assessment was directed at burrowing owls, based on the CDFG (1995) guidelines. AECOM (2010d) performed burrowing owl surveys along foot transects while also searching for desert tortoise in early spring. Where active burrows were found, AECOM returned for Phase III surveys using binoculars and spotting scopes from parked vehicles from May 2 through May 21, 2010. These latter surveys were limited each day to 6 hours of daylight around sunrise and sunset.

According to Staff (CEC 2013b: 4.2-63), only 1 western burrowing owl and active burrow were detected in the Project Disturbance Area during 2009 surveys; and only 1 was detected in the buffer area. Staff (CEC 2013b: 4.2-79) concluded that *“...at least two burrowing owls have*

been confirmed within the BSPP area during 2009 surveys that have the potential to be impacted during construction and operation of the BSPP.” However, the foot surveys detected 92 burrows with sign of occupancy by burrowing owls (see Table 13 of AECOM 2010b). Foot surveys were highly unlikely to detect burrowing owl individuals, especially in the desert where burrowing owls tend to be more wary of humans. The foot surveys were suitable for detecting sign at burrows, although AECOM (2010d) did not reveal whether searchers deviated from transects to check off-transect burrows for sign. The Phase III surveys were done over a brief period late in the nesting season in desert environments, so I wonder whether these surveys were effective. In my experience, burrowing owl pairs often shift locations from early to later spring (Smallwood et al. 2013). Burrow locations early in spring do not always predict nesting locations.

Regardless of whether the surveys in May were adequate, the basis of the impact assessment and mitigation plan should be the number of burrows showing active sign, and not just the number of owls seen. This said, I must point out that nest locations usually include 2 to 3 burrows with abundant sign, as 1 or 2 burrows will be used as satellite burrows, into which the brood will sometimes switch into after chicks emerge. A careful examination of the data would likely have reduced the number of burrows serving as the basis of impact assessment from 92 to some smaller number, but certainly many more than the 6 burrows that were used to decide on the compensatory mitigation of protecting 39 acres. Assuming 1 satellite burrow for each primary burrow, a more reasonable basis for the mitigation would be 46 burrows and the conserved acreage would be 299 acres.

Collision risk

According to the CEC (2013b: 4.2-4), “...*staff is unable to quantify these [avian collisions] impacts or predict the extent of the potential impacts, as the impacts of large-scale renewable projects have not been studied in a scientifically robust manner.*” Later, the CEC (2013b: 4.2-88) concluded, “*The extent and severity of potential collision impacts on avian species under the modified BSPP is not quantifiable, yet are certain to occur. ... For the BSPP, staff has concluded that with the recent avian mortality and injury at other sites, presence of evaporation ponds, and possible polarized light pollution from the PV panels (discussed below), there is a likelihood of bird collisions and other yet unclear sources of anthropogenic sources of injury or mortality at the BSPP site.*” This is the type of conclusion that is consistent with the precautionary principle in risk assessment (National Research Council 1986, Shrader-Frechette and McCoy 1992, O’Brien 2000), where given high uncertainty about potential project impacts on sensitive resources it is prudent to err on the side of caution.

However, I disagree with CEC staff on their conclusion that these impacts cannot be quantified or predicted. Of course they can.† But of course the analyst must also acknowledge the high uncertainty in the predicted impacts. Nevertheless, it is important to decision-making to first identify the range of possible outcomes of a project, and to ideate on these outcomes creatively. In the case of bird collisions with industrial-scale solar PV, we already know that birds will collide with the solar panels or their support structures. For example, a Yuma clapper rail (*Rallus longirostris yumanensis*), which was a member of a species listed as Endangered under the Federal Endangered Species Act, was recently killed at an industrial solar farm near Joshua Tree National Park (<http://www.kcet.org/news/rewire/solar/photovoltaic-pv/endangered-bird->

[dead-at-desert-solar-facility.html](#)). We also know that Solar One killed many birds, based on the only published study of fatality monitoring at a solar project (McCrary et al. 1986), as far as I am aware. It remains unknown to what degree collision rates at solar PV projects might differ from those measured at Solar One (McCrary et al. 1986), which was a concentrating thermal power plant. But again, in the face of high uncertainty when assessing impacts to rare environmental resources, the accepted standard is to err on the side of caution (National Research Council 1986, Shrader-Frechette and McCoy 1992, O'Brien 2000), so one should not assume that due to less reflectivity in PV panels, the collision rates will necessarily be different. In fact, the collision rate could be higher, for all that is known now. Given these uncertainties, a reasonable approach would be to extrapolate the fatality rate estimates at Solar One, but adjusted for reasonable guesses as to what might be the percentage differences in the rates.

McCrary et al. (1986) searched for dead birds amongst the heliostat mirrors and around the power tower at Solar One, and they estimated a bird fatality rate caused by bird collisions with heliostat mirrors and the power tower, and by heat encountered when birds flew through the concentrated sunlight reflected toward the power tower. However, McCrary et al. (1986) appeared to have under-appreciated the magnitude of the impacts caused by Solar One, likely because McCrary et al. (1986) did not know as much as scientists know today about scavenger removal rates and searcher detection error.

McCrary et al. (1986) searched for dead birds during 40 visits to the 10 MW Solar One Project. Their search pattern was not fixed, so it was not as rigorous as modern searches at wind energy projects and other energy generation and transmission facilities. McCrary et al. (1986) placed 19 bird carcasses to estimate the proportion remaining over the average time span between their visits to the project site, though they provided few details about their scavenger removal trial. We know today that the results of removal trials can vary substantially for many reasons, including the species used, time since death, and the number of carcasses placed in one place at one time, and etc. (Smallwood 2007). McCrary et al. (1986) also performed no searcher detection trials, because they concluded that the ground was sufficiently exposed that all available bird carcasses would have been found. This conclusion would not be accepted today, based on modern fatality search protocols.

Because scientists have performed many more scavenger removal trials and searcher detection trials, as well as many more bird carcass searches since the study of McCrary et al. (1986), I recalculated the fatality rate estimate from that first study, but this time using national averages to represent scavenger removal rates and searcher detection rates (see Smallwood 2007, 2013). Based on the methods in Smallwood (2007), I have since reviewed more than 400 searcher detection trials and more than 400 scavenger removal trials across North America (Smallwood 2013a). From these reviews, I estimated the average proportion of carcasses remaining after 9 days since the last carcass search. I used 9 days for the average search interval, because that was the average search interval in the McCrary et al. (1986) study.

The estimator I used was derived from the Horvitz and Thompson (1952):

$$F_A = \frac{F_U}{R_C \times p},$$

where F_U was the unadjusted number of fatalities/MW/year (the found carcasses), and F_A was the fatality rate adjusted for the proportion of carcasses found amongst those that were available to be found, p , and by the average proportion of carcasses remaining since the last fatality search, R_C . The adjustments for p and R_C were estimated from searcher detection trials and scavenger removal trials. I assumed carcasses were deposited at a steady rate from heliostat mirrors and power towers, so I took the average proportion of carcasses remaining each sequential day between searches:

$$R_C = \frac{\sum_{i=1}^I R_i}{I},$$

where R_i was proportion of carcasses remaining by the i th day following the initiation of a scavenger removal trial. Thus, the expected proportion of carcasses remaining by the next fatality search should be R_C corresponding with the fatality search interval, I , which was 9 days in the McCrary et al. (1986) study. Note that McCrary et al. (1986) used R_i instead of R_C , which means their fatality rate estimate would have been inflated for this factor alone (their estimate was biased low, however, by assuming they experienced no searcher detection error).

McCrary et al. (1986) reported the mean and standard deviation (SD) of bird carcasses found per visit, but estimating rates for the purpose of extrapolation should include a standard error (SE), which can be approximated as:

$$SE = \frac{SD}{\sqrt{n}},$$

which, in the case of McCrary et al. (1986), with a SD = 1.8 and $n = 40$ visits, was 0.28 (the calculated mean was 1.75).

Using SE also facilitates carrying of the error terms through the calculation of the fatality rate estimate. For this purpose, I estimated standard error of the adjusted fatality rate, $SE[F_A]$, using the delta method (Goodman 1960):

$$SE[F_A] = \sqrt{\left(\frac{1}{p \times R_C} \times SE[F_U]\right)^2 + \left(\frac{F_U}{p} \times \frac{-1}{R_C^2} \times SE[R_C]\right)^2 + \left(\frac{F_U}{R_C} \times \frac{-1}{p^2} \times SE[p]\right)^2}.$$

Using data reported by McCrary et al. (1986), and adopting their assumptions, their estimated fatality rate was 1.75 fatalities/visit divided by 70% to 90% of placed trial carcasses remaining between visits, or $1.75 \div 0.90 = 1.94$ and $1.75 \div 0.70 = 2.5$. Assuming a point estimate of 80% of placed carcasses remaining, then the estimated bird carcasses per visit would be $1.75 \div 0.80 = 2.19$. Given that there were 40 visits in the year, then $2.19 \times 40 = 87.6$ bird fatalities per year, or on a per-MW basis, there were $87.6/10 \text{ MW} = 8.76$ bird fatalities per MW per year. Because McCrary et al. (1986) did not report the SE of their proportion of placed trials carcasses remaining, and because they assumed $p = 1$, I could not carry the error terms, so the estimate

from their study was 8.76 bird fatalities/MW/year with an 80% confidence interval (CI) of 6.96 to 10.55. The only real challenge remaining is to extrapolate this estimate to the 485 MW Blythe Solar Project consisting of PV panels instead of power towers and heliostat mirrors.

Assuming PV panels will result in only 10% of the fatalities compared to the rate observed at Solar One, then I would predict that Blythe Solar will kill 425 birds per year (80% CI: 338 to 512). Assuming PV panels will result in half the fatalities per MW as occurred at Solar One, and extrapolating this rate to the 485 MW Blythe Solar Project, I would predict 2,124 bird fatalities per year (80% CI: 1,688 to 2,558). However, these rates need to be adjusted for the proportion of fatalities not found by searchers.

The results of my adjustment trials yielded national averages of $R_C = 0.48$ (SE = 0.12) for birds over a mean search interval of 9 days and $p = 0.676$ (SE = 0.029) when ground visibility was characterized as high or very high. Using these values, my estimated fatality rate at McCrary et al.'s project site was 21.57 fatalities/MW/year (80% CI: 7.15 to 36.00). Relying on these adjustments and assuming PV panels will result in only 10% of the fatalities compared to the rate observed at Solar One, then I would predict that Blythe Solar will kill 1,046 birds per year (80% CI: 346 to 1,746). Assuming PV panels will result in half the fatalities per MW as occurred at Solar One, and extrapolating this rate to the 485 MW Blythe Solar Project, I would predict 5,231 bird fatalities per year (80% CI: 1,733 to 8,730). Clearly, the McCrary et al. (1986) fatality monitoring study resulted in a highly uncertain fatality rate estimate, which was revealed to be even more uncertain when considering national averages of the adjustment factors and when carrying the error terms through the calculations. The direct impact of the Blythe Solar Project can be said to be highly uncertain at this point, as also concluded by Staff. If the project goes forward, it would be very important to require sound fatality monitoring. It would be helpful to perform avian behavior surveys in advance of construction, as suggested by Staff (CEC 2013b), in order to characterize avian flight paths and the types of behaviors of endemic species that could contribute to collision risk (Smallwood et al. 2009, 2010).

Wildlife Movement and Habitat Fragmentation

After reviewing the maps of special-status species locations documented by the AECOM surveys, it looks to me as though Unit 3 would cause the fewest impacts to special-status plants. It also appears that ample room exists in the original project planning area to reconfigure the currently proposed project to minimize impacts to special-status species of wildlife. For example, the central portion of the planning area consistently hosted the fewest of each of the special-status species. Why not take advantage of the most effective way to minimize impacts by arranging the solar arrays to avoid areas most densely populated by special-status species? In particular, one obviously effective mitigation for the 2,000 individuals of critically-imperiled Abram's spurge located in the northwest area of Unit 4 of the Project is to rearrange that unit to avoid those plants entirely (CEC 2013b: 4.22-33, 4.2-99, 4.2-235, Figure 2). Unlike the weed management and compensatory habitat measures identified by staff, avoiding destruction of these individuals could be more effectively achieved with complete certainty by simply moving portions of the Project.

Cumulative Impacts

According to AECOM (2010a: xiii), “*The multiple solar projects proposed on BLM land between 2010 and roughly 2014, based on currently available data, would develop approximately 20,000 acres of desert lands along the Interstate 10 (I-10) corridor. ... Through the project-specific environmental review process, these various projects would individually be required to mitigate their own impacts through measures such as providing suitable habitat at an agency agreed-upon ratio for the affected species to compensate for the habitat loss. The BSPP will fully mitigate impacts to biological resources. Therefore, the cumulative contribution of the Proposed Project would be less than considerable.*” However, this argument erroneously portrays cumulative impacts analysis under CEQA as relevant and needed only when one or more nearby individual projects provided insufficient mitigation for one or more impacts. If this argument was true, then cumulative impacts assessments would merely be an exercise in evaluating the environmental reviews of other projects to ascertain whether their mitigation was sufficient. This exercise is not a scientifically valid cumulative impacts analysis.

According to the CEC (2013b:4.2-110), “*The BSPP would contribute to the cumulative loss of desert washes in the Palo Verde watershed. [CEC Staff earlier concluded that desert washes serve as wildlife movement corridors, which are essential to connectivity.] However, with implementation of mitigation measures the BSPP's contribution to cumulative impacts is less than cumulatively considerable.*” I concur with the first conclusion, although I’m more skeptical about whether desert washes are more important to wildlife movement than are the upland areas, because I have yet to see strong evidence to the truth of this conclusion. However, I disagree with the second conclusion because I do not agree that the mitigation measures have been completely formulated. According to what I read in the Staff Assessment, no land with appropriate habitat has been identified for protection as a form of compensatory mitigation, and payment into REAT would be payment into an entity set up to take environmental actions in the absence of certified public review, i.e., no EIR or EIS has been certified for the proposed actions.

MITIGATION

BIO-7 Preparation of a Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP)

The details of the mitigation plan are to be prepared in the BRMIMP, but there is no BRMIMP yet available for public review. I therefore cannot comment on the contents of the BRMIMP. According to the CEC (2013b: 4.2-133), the project owner, in consultation with the designated biologist, will prepare the BRMIMP, and the CPM will accept or reject it. Where the public review fits in is unclear to me; my best guess would be that the CEC assumes the public already had opportunities to review the various mitigation plans listed, and that the measures in these plans will be assembled seamlessly by the project owner. It looks to me as though the CEC expects the public to trust the project owner and designated biologist to accurately and comprehensively translate all of the measures in the various mitigation plans into the BRMIMP, as the public may not see the BRMIMP until after project approval.

BIO-12 Desert Tortoise Compensatory Mitigation

Purchasing habitat for permanent protection would be meaningful only if sufficient land with suitable habitat is available for purchase in the area of the project. The Staff Assessment does not include any information about whether suitable lands are available.

Implying that suitable land purchase opportunities may not exist, Staff also suggests the following option. *“In lieu of acquiring lands itself, the project owner may satisfy the requirements of this Condition by depositing funds into the Renewable Energy Action Team (REAT) Account established with the National Fish and Wildlife Foundation (NFWF), as provided below in section 3.i. of this Condition.”* However, I am unaware of the existence of any certified EIR or EIS for the Desert Renewable Energy Conservation Plan. Until an environmental review has been certified, I question whether it would be appropriate to compensate for biological impacts of the Blythe Solar Power project by paying into REAT.

BIO-15 Avian and Bat Protection Plans

I concur with Staff that surveys for live and dead birds and bats should be performed using scientifically rigorous methods. Given the high potential for collision impacts and the uncertainties of the magnitudes of these impacts, it is essential to incorporate scientific monitoring to learn about the impacts and how to minimize and reduce them going forward with solar energy generation. In the following paragraphs, I offer comments and suggestions on the Staff recommendations.

The bird and bat conservation strategy should be prepared for public review, not just agency review. To be frank, the expertise for use and behavior surveys, as well as for fatality monitoring, is in the private sector. I am unaware of any agency biologists actively engaged in scientific monitoring at renewable energy projects, so the review of the conservation strategy should not be left solely to biologists working for CDFW, USFWS, and BLM.

Fatality monitoring has proven to be very challenging due to many complex sources of uncertainty and bias (Smallwood 2007, 2013, Smallwood et al. 2010, 2013). Unless carefully planned and executed, the fatality monitoring will likely yield data of very limited scientific value. Given the high potential for large-magnitude impacts due to avian and bat collisions, and given the high uncertainties and large sources of bias associated with fatality monitoring, it is essential that monitoring studies be carefully designed.

Compared to the challenges of formulating scientifically defensible fatality monitoring, the complexities around use and behavior surveys are much greater (Smallwood et al. 2009, Smallwood et al. 2009, Smallwood and Neher 2010). Use surveys, as often used in wind energy projects, are of questionable value, as use rates have proven ineffective at predicting fatality rates. This inability to predict fatality rate from use rates means that use rates are unrelated to fatality rates at the level of analysis typically performed. This lack of relationship could be due to behaviors being far more important than relative abundance, or it could be due to inappropriate survey methods. In support of the latter possibility, few results of use surveys at wind energy projects have undergone any sort of scientific peer review.

Use surveys at wind energy projects have until very recently been limited to diurnal surveys, which do not work for nocturnal species or for diurnal species that also travel at night. Use surveys have not represented the relative abundance of owls or goatsuckers, nor have they represented nighttime migrants. The same shortfalls will limit the value in use surveys performed at solar projects.

Measure BIO-15 includes a provision to “*Implement an adaptive management and decision-making framework for reviewing, characterizing, and responding to mortality monitoring results.*” However, to qualify as adaptive management (*sensu* Holling 1978, Walters 1986), the essential steps of adaptive management must be in place, starting with agreement among stakeholders on the goals and objectives of the management plan, compilation of the available, relevant data, and establishment of working hypotheses and thresholds upon which to initiate alternative management prescriptions that were identified a priori. The monitoring is intended to support tests of the working hypotheses and to inform the stakeholders of whether thresholds were reached. I did not see any of these steps in the Staff Assessment, which indicates that adaptive management is not going to be implemented. There is no linking of monitoring thresholds to the phasing of the project’s construction, and no mitigation measures were identified to reduce impacts. There are no management actions or alternative management actions to minimize or reduce collisions.

Measure 3 under BIO-15 almost guarantees that bat acoustical monitoring will not be performed. I suggest replacing the word “may” with “will”, or otherwise delete the sentence about bat acoustical monitoring.

Measure 4(b) under BIO-15 should be deleted, as it will prove impractical and will interfere with the periodic fatality monitoring that is essential for obtaining the statistically robust data requested in 4(a).

Measure 4(c) over-emphasizes the statistical standard of the carcass persistence and detection trials. What is much more important is field implementation that truly represents the proportion of carcasses not detected by the searchers. Most of the trials performed to date have fallen short of this standard, and no statistical analysis can fix this shortfall. It is critical that frozen, fresh carcasses of appropriate species be placed periodically within the search areas during the course of routine fatality monitoring. All found carcasses, including those not placed, should be left in the field for the duration of the monitoring and recorded each time they are found. The status of all found carcasses should be tracked by the project analyst, who should receive all reports of fatality finds on a weekly basis.

Measure 4(d) and elsewhere under BIO-15, the Staff Assessment over-emphasizes the need to include in reporting and analysis only those fatalities whose cause of death can be clearly attributed to the facility. This standard is unrealistic, as most facility-caused fatalities will not yield clear evidence that the facility was responsible. The only exceptions might be eye-witness accounts of collisions, which will likely never happen, or bird feathers stuck to the PV panels or their support structures, which will be rare. All fatalities should be counted and used in fatality

rate estimates. Results should also include the caveat that some portion of the fatalities were likely not caused by the facility.

A superior approach to adding the caveat that some fatalities were likely unrelated to the facility would be to require background mortality surveys. These surveys would consist of surveys based on the same methods used in Blythe Solar Power, but sufficiently far off site to rule out carcass contamination contributed by the project. Periodic fatality searches performed offsite, including the integrated detection trials, would be useful for estimating the level of mortality that is not caused by the project. This background mortality can then be subtracted from the mortality estimate on the project site.

Measure 5 under BIO-15 reads, “*At the end of the three-year period, the CPM shall determine whether the survey program shall be continued for subsequent periods, based on results of onsite monitoring.*” However, a qualified TAC should make this determination, not the CPM. Also, the TAC should be responsible for changes in survey methodology. Adaptive management decisions should not be made by the CPM, but rather together by the TAC and stakeholders. An initial survey period of three-years also must be maintained as it is essential to procuring statistically significant data on which to base the need for further surveying (Smallwood and Thelander 2004, Smallwood 2013b).

Measure 6 under BIO-15 stipulated, “*An adaptive management program shall be developed to identify and implement reasonable and feasible measures that would reduce levels of avian or bat mortality or injury attributable to project operations and facilities.*” The same resolution was issued by Alameda County for the Scientific Review Committee overseeing the monitoring and fatality reduction program in the Altamont Pass Wind Resource Area. Whereas this resolution looks good, it is meaningless in the absence of reasonable and feasible measures (Smallwood 2008). The Staff Assessment should at least identify potential measures, if there are any. Otherwise, it is difficult for me – having been a member of the Alameda County Scientific Review Committee for five years – to believe that such measures exist or that adaptive management will really happen. Where is the evidence that any of the general types of wildlife hazing mentioned in the Staff Assessment have succeeded in reducing harm to wildlife in other solar projects, wind projects, or other human activities?

Measure 7 under BIO-15 lost me. I cannot understand the meaning of this section, or what it has to do with fatality monitoring or adaptive management. Are these mitigation measures proposed alternative prescriptions in adaptive management? If so, they include no performance standards and no thresholds for their implementation.

BIO 18 Burrowing Owls

The acquisition of 39 acres of burrowing owl habitat will be grossly short of the acreage needed to offset the impacts to 92 burrows with sign. The number one guiding principle in the 2012 CDFW Staff Guidelines on burrowing owl mitigation is to use the precautionary principal to ensure that sufficient mitigation is achieved. Thirty-nine acres would not be consistent with that principle.

Also, this is 2013 and not 2009, so the 2012 CDFW Staff Guidelines apply to the mitigation plan of this project. According to the 2012 guidelines, “*Occupancy of burrowing owl habitat is confirmed at a site when at least one burrowing owl, or its sign at or near a burrow entrance, is observed within the last three years.*” In the case of Blythe Solar Power, 92 burrows with sign were detected on site, so presence was confirmed in 92 burrows. If I read the 2012 guidelines correctly, at least an equivalent number of burrows should be replaced or protected offsite.

Summary Comments on Mitigation

1. The Staff Assessment recommends the formation of a technical advisory committee (TAC), but only if the CPM requests the assistance of a TAC. It also neglected to identify minimum qualifications of TAC members. The biological monitor needs the oversight of a qualified TAC. A qualified TAC would be composed of three PhD-level scientists with demonstrated expertise in impact monitoring. The TAC needs to be able to set its own meeting schedule and agenda, and it needs to be independent. The CPM should not have the authority to dissolve the TAC. The issues related to fatality and behavior monitoring are too complex to justify scientific oversight at a level that is less than what I suggest.
2. The BRMIMP should be prepared well in advance of a decision to approve the project, so that the public has the opportunity to effectively participate with this critical part of the mitigation plan. As currently proposed in the Staff Assessment, it appears that the public is supposed to trust that all of the thresholds and standards in a list of mitigation plans will be accurately and comprehensively integrated into the BRMIMP. However, I believe that this integration might prove complicated, and that some measures in the BRMIMP might have to be newly formulated to satisfy the CPM. If this happens, then the formulation of the mitigation plan would have been deferred to a time after the public had a chance to comment.
3. It would appear from the maps of special-status plant and animal species locations and from the map of the original project planning area that considerable opportunity exists for rearranging the solar arrays to minimize impacts.
4. I suggest that the project owner provides compensatory mitigation in the form of donations to local wildlife rehabilitators. The project will cause injuries to wildlife, so the owner should be responsible for contributing to the care and release to the wild of injured animals. Rehabilitation facilities typically operate on very small budgets, so struggle to maintain appropriate staff levels and facilities. More reliable funding is needed, and this funding should come from those causing the impacts.
5. The biological monitoring will not prove meaningful in an adaptive management context unless the project is developed in phases with the timing, planning, and mitigation of each phase linked to fatality thresholds of earlier phase(s). Building the project without regard to the fatality and behavior monitoring will mean that the phases subsequent to Phase 1 will derive no benefit from what was learned from the monitoring. The environmental impacts will therefore remain unchanged, when they could have been reduced in later phases.
6. Because very little is known of the types or magnitudes of impacts on wildlife caused by industrial solar projects, it would be irresponsible of permitting agencies to allow industrial

solar projects to go forward without scientific monitoring of project impacts. The CEC Staff Assessment is to be praised for insisting on scientific monitoring. It just needs some assistance from an expert, and more detail. The following are some suggestions.

Qualified biologists should be funded to search the ground on foot between solar panel arrays twice monthly for at least three years to determine whether collision fatalities are an issue. I suggest searching randomly or systematically selected arrays of solar panels, covering at least 33% of the project area. Frozen fresh carcasses of birds and bats should be placed at random locations within the fatality search intervals on a periodic basis, such as weekly. If collision fatalities are deemed to be an issue, then I suggest extending the fatality monitoring for another two years. Furthermore, I would suggest performing an analysis of the pattern of fatalities to identify spatial or other trends that can inform mitigation measures to reduce fatality rates. Basic methods for fatality monitoring at a solar energy project can be found in McCrary et al. (1986), and updated methodology can be found in Smallwood (2007, 2009, 2013), Smallwood and Karas (2009), and Smallwood et al. (2013).

Flight behavior surveys should be performed during one-hour sessions prior to construction to reveal flight paths and trends in behaviors. Most of the surveys should be performed during the early morning and late evening hours, but nocturnal surveys should also be done using a high-end thermal imaging camera. The nocturnal surveys should last two to three hours per session, due to set-up time and the risks of damaging the imaging equipment. The objectives of flight behavior surveys would be to: (1) establish whether specific portions of the project area should be avoided, and (2) explain fatality patterns so that mitigation measures can be formulated, if possible.



Shawn Smallwood, Ph.D.

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Declaration of Shawn Smallwood, Ph.D.

I, Shawn Smallwood, declare the following:

1. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.
2. I prepared the foregoing testimony for the Blythe Solar Power Project (09-AFC-6C) based on my independent analysis of the Staff Assessment and other documents available through the project docket, data from reliable documents and sources, and my professional experience and knowledge.
3. It is my professional opinion that the foregoing testimony is valid and accurate with respect to the issues addressed therein.
4. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief. Executed at Davis, California on November 8, 2013.



K. Shawn Smallwood

Kenneth Shawn Smallwood
Curriculum Vitae

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Born May 3, 1963 in
Sacramento, California.
Married, father of two.

Ecologist

Expertise

- Finding solutions to controversial problems related to wildlife interactions with human industry, infrastructure, and activities; and,
- Using systems analysis and experimental design principles to identify meaningful ecological patterns that can inform conclusions and management decisions.

Education

Ph.D. Ecology, University of California, Davis. September 1990.
M.S. Ecology, University of California, Davis. June 1987.
B.S. Anthropology, University of California, Davis. June 1985.
Corcoran High School, Corcoran, California. June 1981.

Experience

- 337 professional publications, including:
 - 61 peer reviewed publications
 - 24 in non-reviewed proceedings
 - 244 reports, declarations, and book reviews
 - 8 in mass media outlets
 - 75 public presentations of research results at meetings
 - Reviewed many professional papers and reports
 - Testified in 4 court cases.

Associate Editor, *Journal of Wildlife Management*, March 2004 to 30 June 2007.

Editorial Board Member, *Environmental Management*, 10/1999 to 8/2004.

Associate Editor, *Biological Conservation*, 9/1994 to 9/1995. Administered independent scientific reviews of submitted, professional papers in ecology and conservation biology, and made recommendations to the Editors.

Member, Alameda County Scientific Review Committee (SRC), 8/06 to 4/11. As part of a five member committee, I investigated the causes of bird and bat collisions in the Altamont Pass Wind Resource Area, and I recommended mitigation and monitoring measures. The SRC reviews the science underlying the Alameda county Avian Protection Program, and advises the County on how to reduce wildlife fatalities.

Research Ecologist, 2/06 to 12/07, under contract to East Bay Regional Parks District. Performed research of how fossorial mammals and raptors responded to grazing treatments and wind turbines at Vasco Caves Regional Preserve. I designed the study, trained the fatality monitors and behavior observers, mapped the burrows of fossorial mammals, analyzed the data, and took the lead on writing the report.

Consulting Ecologist, 7/04 to 12/07, California Energy Commission (CEC). In collaboration with Lawrence-Livermore National Lab, I performed independent research funded by the CEC on bird behavior in the Altamont Pass Wind Resources Area. I also provided consulting services as needed to the CEC. I produced several reports to the CEC and the CEC's Public Interest Energy Research program.

Consulting Ecologist, 11/99 to present, U.S. Navy. I provide endangered species surveys at multiple Navy facilities, hazardous waste site monitoring, and habitat restoration for the endangered Fresno kangaroo rat, California tiger salamander, California red-legged frog, California clapper rail, western burrowing owl, and other species. I have worked at Naval Air Station Lemoore; Naval Weapons Station, Seal Beach, Detachment Concord; Naval Security Group Activity, Skaggs Island; National Radio Transmitter Facility, Dixon.

Part-time Lecturer, 1/98 to 2005, California State University, Sacramento. I taught Contemporary Environmental Issues, Natural Resources Conservation (twice), Mammalogy, Behavioral Ecology, and Ornithology Lab.

Senior Ecologist, 1999 to 2005, BioResource Consultants. I planned and carried out research and monitoring projects, and analyzed complex data related to avian fatalities at wind turbines, avian electrocutions on electric distribution poles across California, and avian fatalities at transmission lines.

Systems Ecologist, 7/96 to present, Consulting in the Public Interest, www.cipi.com. I am part of a multi-disciplinary consortium of scientists facilitating large-scale, environmental planning projects and litigation. We provide risk assessments, assessments of management practices, and expert witness testimony.

Chairman, Conservation Affairs Committee, The Wildlife Society--Western Section, 1999-2001. I prepared position statements and led efforts directed toward conservation issues, including travel to Washington, D.C. to lobby Congress for more wildlife conservation funding.

Systems Ecologist, 1/95 until about 2000, Institute for Sustainable Development. I headed ISD's program on integrated resources management. I developed indicators of ecological integrity for large areas, using remotely sensed data, local community involvement and GIS.

Associate, 1997-1998, Department of Agronomy and Range Science, University of California, Davis. I worked with Shu Geng and Mingua Zhang on several projects related to wildlife interactions with agriculture and patterns of fertilizer and pesticide residues in groundwater across a large landscape.

Lead Scientist, 6/96 to 6/99, National Endangered Species Network. I headed NESN's efforts to inform academic scientists and environmental activists about emerging issues regarding the Endangered Species Act and other environmental laws pertaining to special status species. I also testified at public hearings on behalf of environmental groups and endangered species.

Ecologist, 1/97 to 6/98, Western Foundation of Vertebrate Zoology. I conducted field research to determine the impact of past mercury mining on the status of California red-legged frogs in Santa Clara County, California.

Senior Systems Ecologist, 7/94 to 12/95, EIP Associates, Sacramento, California. Provided consulting services in environmental planning. I also developed a quantitative assessment of land units for their conservation and restoration opportunities, using the ecological resource requirements of 29 special status species. I mapped vegetation and land use, and derived new spatial data from a GIS overlay of these variables with soil types, flood zones, roads, and other spatially referenced data. Using these derived data, I developed a set of indicators for prioritizing areas within Yolo County that will receive mitigation funds for habitat easements and restoration.

Post-Graduate Researcher, 10/90 to 6/94, with Dr. Shu Geng, Department of Agronomy and Range Science, *U.C. Davis*. Studied landscape and management effects on temporal and spatial patterns of abundance among pocket gophers and species of Falconiformes and Carnivora in the Sacramento Valley. I also developed and analyzed a data base of energy use in California agriculture, and I assisted with a landscape (GIS) study of groundwater contamination across Tulare County, California.

Co-teacher, 1/91 to 6/91 and 1/93 to 6/93, Graduate Group in Ecology, U.C. Davis. Co-taught conservation biology with Dr. Christine Schonewald.

Reader, 3/90 to 6/90, Department of Psychology, U.C. Davis. Assisted students of Psychobiology (taught by Dr. Richard Coss) with research and writing term papers.

Research Assistant, 11/88 to 9/90, with Dr. Walter E. Howard, Department of Wildlife and Fisheries Biology, U.C. Davis. Tested durable baits for pocket gopher control in forest plantations, and developed gopher sampling methods.

Fulbright Research Fellow, Indonesia, 7/88 to 11/88. Tested use of new sampling methods for monitoring the number of Sumatran tigers and six other species of endemic felids, and evaluated methods used by other researchers.

Research Assistant, 7/87 to 6/88, with Dr. Terrell P. Salmon, Wildlife Extension, Department of Wildlife and Fisheries Biology, U.C. Davis. Developed empirical models of mammal and bird invasions in North America, and a rating system for priority research and control of exotic species based on economic, environmental, and human health hazards in California.

Student Assistant, 3/85 to 6/87, with Dr. E. Lee Fitzhugh, Wildlife Extension, Department of Wildlife and Fisheries Biology, U.C. Davis. Developed and implemented a statewide mountain lion track count for long-term monitoring of numbers and distribution. I've continued the

statewide track count since 1985 (the last count was in 2008). I also developed quantitative methods to identify individual mountain lions by their tracks, and to differentiate mountain lion and dog tracks.

Projects

Research to reduce avian mortality due to wind turbines at Altamont Pass. I used GPS and GIS to map and study environmental impacts of 5,400 wind turbines. I related the number of raptor fatalities at wind turbines to the degree of aggregation of prey species around the turbines, as well as many other factors related to where the turbines are located, how they are designed and operated, and how raptors behave in the Altamont Pass Wind Resource Area. I also serve on the Alameda County Scientific Review Committee, charged with recommending scientific monitoring methods and mitigation measures for reducing avian mortality.

Research to reduce avian mortality on electric distribution poles. Since about 2000 I have performed research directed toward reducing bird electrocutions on electric distribution poles. I led fatality monitoring efforts at 10,000 poles multiple times in California, spanning Orange County to Glenn County, and I have produced two large reports.

Cook *et al.* v. Rockwell International *et al.*, No. 90-K-181 (D. Colorado). I provided expert testimony on the role of burrowing animals in affecting the fate of buried and surface-deposited radioactive and hazardous chemical wastes at the Rocky Flats Plant, Colorado. I provided expert reports based on four site visits and the most extensive document review of burrowing animals ever conducted. I conducted transect surveys for evidence of burrowing animals and other wildlife on and around waste facilities. I also discovered substantial intrusion of waste structures by burrowing animals. I testified in federal court in November 2005, and my clients were subsequently awarded a \$553,000,000 judgment by a jury.

Hanford Nuclear Reservation Litigation. I am providing expert testimony on the role of burrowing animals in affecting the fate of buried radioactive wastes at the Hanford Nuclear Reservation, Washington. I provided three expert reports based on three site visits and extensive document review. I predicted and verified a certain population density of pocket gophers on buried waste structures, as well as incidence of radionuclide contamination in body tissue. I conducted transect surveys for evidence of burrowing animals and other wildlife on and around waste facilities. I also discovered substantial intrusion of waste structures by burrowing animals.

Expert Testimony and Declarations on Residential and Commercial Development Proposals. I have testified before the California Coastal Commission, California Energy Commission, County Boards of Supervisors, and City Councils, and I have participated with press conferences and have been deposed by attorneys. I prepared expert witness reports and court declarations, which are summarized under Reports (below).

Expert Testimony on Proposed Gas-fired Power Plants. I provided comments letters, declarations, expert reports, and oral testimony on the impacts and appropriate mitigation of about eight natural gas-fired power plants in California.

Expert Testimony on Proposed Wind Farms. I provided comment letters and oral testimony to

administrative law courts in Klickitat and Skamania Counties, Washington, which convinced the court in Skamania County to require the replacement of a negative declaration with an EIS. I provided written testimony and deposition in support of litigation brought against the development of wind turbines in Cook County, Texas, which resulted in a settlement. I also provided written comments on the first EIR for the Buena Vista Wind Energy Project in Contra Costa County, California, prompting the withdrawal of that EIR and the preparation of an improved EIR which was later certified.

Protocol-level endangered species searches and recovery efforts. I search for special-status species using Department of Fish and Game and US Fish and Wildlife Service protocols. I have searched for, or otherwise worked with, California red-legged frog, arroyo southwestern toad, California tiger salamander, blunt-nosed leopard lizard, western pond turtle, giant kangaroo rat, Fresno kangaroo rat, San Joaquin kit fox, Sumatran tiger, willow flycatcher, least Bell's vireo, western burrowing owl, Swainson's hawk, Valley elderberry longhorn beetle and many other special-status species. I also help with recovery of the Fresno kangaroo rat at Lemoore Naval Air Station.

Conservation of the endangered Fresno kangaroo rat. I am performing applied research to identify the factors responsible for the decline of this endangered species at Lemoore Naval Air Station, and am implementing habitat enhancements designed to reverse the trend and to expand the area occupied by this species.

Impact of West Nile Virus on yellow-billed magpies. Since 2005 I have worked under contract to the Sacramento-Yolo Mosquito and Vector Control District to gather post-West Nile Virus epidemic data to pre-epidemic data I had gathered on multiple bird species in the Sacramento Valley in the 1990s, but particularly on yellow-billed magpie and American crow, which are particularly susceptible to WNV.

Workshops on HCPs. Assisted Dr. Michael Morrison with organizing and conducting a 2-day workshop on Habitat Conservation Plans, sponsored by Southern California Edison, and another 1-day workshop sponsored by PG&E. These Workshops were attended by academics, attorneys, and consultants with HCP experience. We guest-edited a Proceedings published in Environmental Management.

Mapping of biological resources along Highways 101, 46 and 41. I used GPS and GIS to delineate vegetation complexes and locations of special-status species along 26 miles of highway in San Luis Obispo County, 14 miles of highway and roadway in Monterey County, and in a large area north of Fresno, including within reclaimed gravel mining pits.

GPS mapping and monitoring at restoration sites and at Caltrans mitigation sites. I am monitoring the success of elderberry shrubs at one location, the success of willows at another location, and the response of wildlife to the succession of vegetation at both these sites. I am also using GPS to monitor the response of fossorial animals to yellow star-thistle eradication and natural grassland restoration efforts at Bear Valley, Colusa County, and at the decommissioned Mather Air Force Base in Sacramento County.

Mercury effects on Red-legged Frog. I assisted Dr. Michael Morrison and US Fish and Wildlife

Service in assessing the possible impacts of historical mercury mining on the federally listed California red-legged frog in Santa Clara County. I also measured habitat variables in numerous streams.

Opposition to proposed No Surprises rule. I wrote a white paper and summary letter explaining scientific grounds for opposing the incidental take permit (ITP) rules providing ITP applicants and holders with general assurances they will be free of compliance with the Endangered Species Act once they adhere to the terms of a “properly functioning HCP.” I obtained 188 signatures of scientists and environmental professionals on the letter submitted to the US Fish and Wildlife Service and the National Marine Fisheries Service. The letter was also provided to all US Senators. It helped change the prevailing view of HCPs as beneficial to listed species.

Natomas Basin Habitat Conservation Plan alternative. I designed narrow channel marsh to increase the likelihood of survival and recovery in the wild of giant garter snake, Swainson’s hawk and Valley Elderberry Longhorn Beetle. The design included replication and interspersions of treatments for experimental testing of critical habitat elements. I provided a report to Northern Territories, Inc.

Assessment of Environmental Technology Transfer to China, and Assessment of Agricultural Production System. I twice traveled to China and interviewed scientists, industrialists, agriculturalists, and the Directors of the Chinese Environmental Protection Agency and the Department of Agriculture to assess the need and possible pathways for environmental clean-up technologies and trade opportunities between the US and China. I spent a total of five weeks in China, including in Shandong and Linxion Provinces and in Beijing.

Yolo County Habitat Conservation Plan. I conducted the landscape ecology study of Yolo County to identify the priority land units to receive mitigation so as to most improve the ecosystem functionality within the County from the perspective of 29 special-status species of wildlife and plants. I used a hierarchically structured indicators approach to apply principles of landscape and ecosystem ecology, conservation biology, and local values in rating land units. I derived GIS maps to help guide the conservation area design, and then I developed implementation strategies.

Mountain Lion Track Count. I developed and conducted the carnivore monitoring program throughout California since 1985. Species counted include mountain lion, bobcat, black bear, coyote, red and gray fox, raccoon, striped skunk, badger, and black-tailed deer. Vegetation and land use are also monitored. The transect was established on dusty, dirt roads within randomly selected quadrats. These roads are searched for tracks of the carnivores, which routinely use the roads for travel paths.

Sumatran Tiger and other Felids. I designed and conducted track counts for seven species of wild cats in Sumatra, including the Sumatran tiger, fishing cat, and golden cat. I spent four months on Sumatra and Java, and learned Bahasa Indonesia (the official Indonesian language). I was awarded a Fulbright Research Fellowship to complete the project.

Wildlife in Agriculture. Beginning as my post-graduate research, I have studied pocket gophers and other wildlife in 40 alfalfa fields throughout the Sacramento Valley, and I surveyed for wildlife

along a 200 mile road transect for six years. The data were analyzed using GIS and methods from landscape ecology, and the results were published and presented orally to farming groups in California and elsewhere. I also conducted the first study of wildlife in cover crops used on vineyards and orchards.

Agricultural Energy Use and Tulare County Groundwater Study. I developed and analyzed a data base of energy use in California agriculture, and collaborated on a landscape (GIS) study of groundwater contamination across Tulare County, California.

Pocket Gopher Damage in Forest Clearcuts. I tested various poison baits and baiting regimes for pocket gopher control in forest plantations, and I developed gopher sampling methods. I conducted the most extensive field study of pocket gophers ever, involving thousands of gophers in 68 research plots on 55 clearcuts among 6 National Forests in northern California.

Risk Assessment of Exotic Species in North America. I developed empirical models of mammal and bird species invasions in North America, as well as a rating system for assigning priority research and control to exotic species in California, based on economic, environmental, and human health hazards.

Representative Clients

Law offices and environmental groups	Government agencies
Law Offices of Stephan C. Volker	
Law Offices of Berger & Montague	US Department of Agriculture
Law Offices of Roy Haber	US Forest Service
Law Offices of Edward MacDonald	US Fish & Wildlife Service
Law Office of John Gabrielli	US Navy
Law Office of Bill Kopper	California Energy Commission
Law Office of Donald B. Mooney	California Office of the Attorney General
Law Office of Veneruso & Moncharsh	California Department of Fish & Game
Law Office of Steven Thompson	California Department of Transportation
California Wildlife Federation	California Department of Forestry
Defenders of Wildlife	California Department of Food & Agriculture
Sierra Club	Ventura County Counsel
National Endangered Species Network	County of Yolo
Spirit of the Sage Council	Tahoe Regional Planning Agency
The Humane Society	Sustainable Agriculture Research & Education Program
Hagens Berman LLP	Sacramento-Yolo Mosquito and Vector Control District
Environmental Protection Information Center (EPIC)	East Bay Regional Park District
Goldberg, Kamin & Garvin, Attorneys at Law	
Californians for Renewable Energy (CARE)	County of Alameda
Seatuck Environmental Association	
Friends of the Columbia Gorge, Inc.	Other organizations and Individuals
Save Our Scenic Area	Don & LaNelle Silverstien
Alliance to Protect Nantucket Sound	Seventh Day Adventist Church
Friends of the Swainson's Hawk	Escuela de la Raza Unida
Alameda Creek Alliance	Susan Pelican and Howard Beeman
Center for Biological Diversity	Residents Against Inconsistent Development, Inc.
Businesses	Bob Sarvey
FloDesign Wind Turbine	Mike Boyd
NEXtera Energy Resources, LLC	Hillcroft Neighborhood Fund
Pacific Gas & Electric Co.	Joint Labor Management Committee, Retail Food Industry
Southern California Edison Co.	Lisa Rocca
Georgia-Pacific Timber Co.	Kevin Jackson
Northern Territories Inc.	Dawn Stover and Jay Letto
National Renewable Energy Lab	Nancy Havassy
David Magney Environmental Consulting	Catherine Portman (for Brenda Cedarblade)
Wildlife History Foundation	
Emerald Farms	
Terry Preston, Wildlife Ecology Research Center	
G3 Energy and enXco	
Comstocks Business (magazine)	
Californians for Renewable Energy	
BioResource Consultants	

Representative special-status species experience

Common name	Species name	Status¹	Description
Field experience			
California red-legged frog	<i>Rana aurora draytonii</i>	FT, CSC	Protocol searches & detected at multiple sites
Foothill yellow-legged frog	<i>Rana boylei</i>	FSC, CSC	Research and search detections at multiple sites
Western spadefoot	<i>Spea hammondi</i>	FSC, CSC	Searches and search detections
California tiger salamander	<i>Ambystoma californiense</i>	FC, CSC	Protocol searches & detections at multiple sites
Coast range newt	<i>Taricha torosa torosa</i>	CSC	Searches and multiple detections
Blunt-nosed leopard lizard	<i>Gambelia sila</i>	FE, CE	Detected in San Luis Obispo County
California Horned Lizard	<i>Phrynosoma coronatum frontale</i>	FSC, CSC	Search and detected in San Luis Obispo Co.
Western pond turtle	<i>Clemmys marmorata</i>	FSC, CSC	Searches and detected at multiple sites
San Joaquin kit fox	<i>Vulpes macrotis mutica</i>	FE, CT	Protocol searches and detections
Sumatran tiger	<i>Panthera tigris</i>		Research in Sumatra
Mountain lion	<i>Puma concolor californicus</i>	CFP	Research and publications
Point Arena mountain beaver	<i>Aplodontia rufa nigra</i>	FE, CSC	Remote camera operation
Giant kangaroo rat	<i>Dipodomys ingens</i>	FE, CE	Detected in Cholame Valley
Fresno kangaroo rat	<i>Dipodomys nitratooides</i>	FE, CE	Research and conservation at Lemoore Naval Air Station – reports
Monterey dusky-footed woodrat	<i>Neotoma fuscipes luciana</i>	FSC, CSC	Non-target captures and mapping of dens
Salt marsh harvest mouse	<i>Reithrodontomys raviventris</i>	FE, CE	Habitat assessment, monitoring
Salinas harvest mouse	<i>Reithrodontomys megalotus distichlus</i>	G5T1S1	Captures in the Salinas area; habitat assessment
California clapper rail	<i>Rallus longirostris</i>	FE, CE	Surveys at Concord Naval Weapons Station
Golden eagle	<i>Aquila chrysaetos</i>	CSC	Research in Sacramento Valley
Swainson's hawk	<i>Buteo swainsoni</i>	CT	Research in Sacramento Valley
Northern harrier	<i>Circus cyaneus</i>	CSC	Research and publication
White-tailed kite	<i>Elanus leucurus</i>	CFP	Research and publication
Loggerhead shrike	<i>Lanius ludovicianus</i>	FSC, CSC	Research in Sacramento Valley
Least Bell's vireo	<i>Vireo bellii pusillus</i>	FE, CE	Detected in Monterey County
Willow flycatcher	<i>Empidonax traillii extimus</i>	FE, CE	Research at Sierra Nevada breeding sites
Burrowing owl	<i>Athene cucularia hypugia</i>	FSC, CSC	Research at multiple locations
Valley elderberry longhorn beetle	<i>Desmocerus californicus dimorphus</i>	FT	Research on mitigation site and publication

Analytical

Arroyo southwestern toad	<i>Bufo microscaphus californicus</i>	FE, CSC	Research and report.
Giant garter snake	<i>Thamnophis gigas</i>	FT, CE	Research and publication.
Northern goshawk	<i>Accipiter gentilis</i>	FSC, CSC	Research and publication.
Northern spotted owl	<i>Strix occidentalis</i>	FT	Research and reports. Publication in progress.

¹ FE = Federal Endangered, FT = Federal threatened, FC = Federal candidate for listing, FSC = Federal species of concern, CE = California Endangered, CT = California threatened, CFP = California Fully Protected, CSC = California Species of Concern, G5T1S1 = CNDDDB rating of imperiled throughout California range.

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Comments on Environmental Documents

I was retained or commissioned to comment on environmental planning and review documents, including:

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- City of Elk Grove Sphere of Influence EIR (2011; 28 pp);
- Comment on Sutter Landing Park Solar Photovoltaic Project MND (2011; 9 pp);
- Statement of Shawn Smallwood, Ph.D. Regarding Proposed Rabik/Gudath Project, 22611 Coleman Valley Road, Bodega Bay (CPN 10-0002) (2011; 4 pp);
- Declaration of K. Shawn Smallwood on Biological Impacts of the Ivanpah Solar Electric Generating System (ISEGS) (2011; 9 pp);
- Comments on Draft Eagle Conservation Plan Guidance (2011; 13 pp);
- Comments on Draft EIR/EA for Niles Canyon Safety Improvement Project (2011; 16 pp);
- Declaration of K. Shawn Smallwood, Ph.D., on Biological Impacts of the Route 84 Safety Improvement Project (2011; 7 pp);
- Rebuttal Testimony of Witness #22, K. Shawn Smallwood, Ph.D, on Behalf of Intervenors Friends of The Columbia Gorge and Save Our Scenic Area (2010; 6 pp);

- Prefiled Direct Testimony of Witness #22, K. Shawn Smallwood, Ph.D, on Behalf of Intervenors Friends of the Columbia Gorge and Save Our Scenic Area. Comments on Whistling Ridge Wind Energy Power Project DEIS, Skamania County, Washington (2010; 41 pp);
- Evaluation of Klickitat County's Decisions on the Windy Flats West Wind Energy Project (2010; 17 pp);
- St. John's Church Project Draft Environmental Impact Report (2010; 14 pp.);
- Initial Study/Mitigated Negative Declaration for Results Radio Zone File #2009-001 (2010; 20 pp);
- Rio del Oro Specific Plan Project Final Environmental Impact Report (2010;12 pp);
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- Tehachapi Renewable Transmission Project EIR/EIS (2009; 142 pp);
- Delta Shores Project EIR, south Sacramento (2009; 11 pp + addendum 2 pp);
- Declaration of Shawn Smallwood in Support of Care's Petition to Modify D.07-09-040 (2008; 3 pp);
- The Public Utility Commission's Implementation Analysis December 16 Workshop for the Governor's Executive Order S-14-08 to implement a 33% Renewable Portfolio Standard by 2020 (2008; 9 pp);
- The Public Utility Commission's Implementation Analysis Draft Work Plan for the Governor's Executive Order S-14-08 to implement a 33% Renewable Portfolio Standard by 2020 (2008; 11 pp);
- Draft 1A Summary Report to California Independent System Operator for Planning Reserve Margins (PRM) Study (2008; 7 pp.);
- SEPA Determination of Non-significance regarding zoning adjustments for Skamania County, Washington. Declaration to Friends of the Columbia Gorge, Inc. and Save Our Scenic Area (Sep 2008; 16 pp);
- California Energy Commission's Preliminary Staff Assessment of the Colusa Generating Station (2007; 24 pp);
- Rio del Oro Specific Plan Project Recirculated Draft Environmental Impact Report (2008: 66 pp);
- Replies to Response to Comments Re: Regional University Specific Plan Environmental Impact Report (2008; 20 pp);
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- Clark Precast, LLC's "Sugarland" project, Negative Declaration (2008: 15 pp.);
- Cape Wind Project Draft Environmental Impact Statement (2008; 157 pp.);

- Yuba Highlands Specific Plan (or Area Plan) Environmental Impact Report (2006; 37 pp.);
- Replies to responses to comments on Mitigated Negative Declaration of the proposed Mining Permit (MIN 04-01) and Modification of Use Permit 96-02 at North Table Mountain (2006; 5 pp);
- Mitigated Negative Declaration of the proposed Mining Permit (MIN 04-01) and Modification of Use Permit 96-02 at North Table Mountain (2006; 15 pp);
- Windy Point Wind Farm Environmental Review and EIS (2006; 14 pp and 36 Powerpoint slides in reply to responses to comments);
- Shiloh I Wind Power Project EIR (2005; 18 pp);
- Buena Vista Wind Energy Project Notice of Preparation of EIR (2004; 15 pp);
- Negative Declaration of the proposed Callahan Estates Subdivision (2004; 11 pp);
- Negative Declaration of the proposed Winters Highlands Subdivision (2004; 9 pp);
- Negative Declaration of the proposed Winters Highlands Subdivision (2004; 13 pp);
- Negative Declaration of the proposed Creekside Highlands Project, Tract 7270 (2004; 21 pp);
- On the petition California Fish and Game Commission to list the Burrowing Owl as threatened or endangered (2003; 10 pp);
- Conditional Use Permit renewals from Alameda County for wind turbine operations in the Altamont Pass Wind Resource Area (2003; 41 pp);
- UC Davis Long Range Development Plan of 2003, particularly with regard to the Neighborhood Master Plan (2003; 23 pp);
- Anderson Marketplace Draft Environmental Impact Report (2003: 18 pp + 3 plates of photos);
- Negative Declaration of the proposed expansion of Temple B'nai Tikyah (2003: 6 pp);
- Antonio Mountain Ranch Specific Plan Public Draft EIR (2002: 23 pp);
- Response to testimony of experts at the East Altamont Energy Center evidentiary hearing on biological resources (2002: 9 pp);
- Revised Draft Environmental Impact Report, The Promenade (2002: 7 pp);
- Recirculated Initial Study for Calpine's proposed Pajaro Valley Energy Center (2002: 3 pp);
- UC Merced -- Declaration of Dr. Shawn Smallwood in support of petitioner's application for temporary restraining order and preliminary injunction (2002: 5 pp);
- Replies to response to comments in Final Environmental Impact Report, Atwood Ranch Unit III Subdivision (2003: 22 pp);
- Draft Environmental Impact Report, Atwood Ranch Unit III Subdivision (2002: 19 pp + 8 photos on 4 plates);
- California Energy Commission Staff Report on GWF Tracy Peaker Project (2002: 17 pp + 3 photos; follow-up report of 3 pp);
- Initial Study and Negative Declaration, Silver Bend Apartments, Placer County (2002: 13 pp);
- UC Merced Long-range Development Plan DEIR and UC Merced Community Plan DEIR (2001: 26 pp);
- Initial Study, Colusa County Power Plant (2001: 6 pp);
- Comments on Proposed Dog Park at Catlin Park, Folsom, California (2001: 5 pp + 4 photos);
- Pacific Lumber Co. (Headwaters) Habitat Conservation Plan and Environmental Impact

- Report (1998: 28 pp);
- Final Environmental Impact Report/Statement for Issuance of Take authorization for listed species within the MSCP planning area in San Diego County, California (Fed. Reg. 62 (60): 14938, San Diego Multi-Species Conservation Program) (1997: 10 pp);
- Permit (PRT-823773) Amendment for the Natomas Basin Habitat Conservation Plan, Sacramento, CA (Fed. Reg. 63 (101): 29020-29021) (1998);
- Draft Recovery Plan for the Giant Garter Snake (*Thamnophis gigas*). (Fed. Reg. 64(176): 49497-49498) (1999: 8 pp);
- Review of the Draft Recovery Plan for the Arroyo Southwestern Toad (*Bufo microscaphus californicus*) (1998);
- Ballona West Bluffs Project Environmental Impact Report (1999: oral presentation);
- California Board of Forestry's proposed amended Forest Practices Rules (1999);
- Negative Declaration for the Sunset Sky ranch Airport Use Permit (1999);
- Calpine and Bechtel Corporations' Biological Resources Implementation and Monitoring Program (BRMIMP) for the Metcalf Energy Center (2000: 10 pp);
- California Energy Commission's Final Staff Assessment of the proposed Metcalf Energy Center (2000);
- US Fish and Wildlife Service Section 7 consultation with the California Energy Commission regarding Calpine and Bechtel Corporations' Metcalf Energy Center (2000: 4 pp);
- California Energy Commission's Preliminary Staff Assessment of the proposed Metcalf Energy Center (2000: 11 pp);
- Site-specific management plans for the Natomas Basin Conservancy's mitigation lands, prepared by Wildlands, Inc. (2000: 7 pp);
- Affidavit of K. Shawn Smallwood in Spirit of the Sage Council, et al. (Plaintiffs) vs. Bruce Babbitt, Secretary, U.S. Department of the Interior, et al. (Defendants), Injuries caused by the No Surprises policy and final rule which codifies that policy (1999: 9 pp).

I also issued formal comments on the following documents:

- Draft Program Level EIR for Covell Village (2005; 19 pp);
- Bureau of Land Management Wind Energy Programmatic EIS Scoping document (2003: 7 pp.);
- NEPA Environmental Analysis for Biosafety Level 4 National Biocontainment Laboratory (NBL) at UC Davis (2003: 7 pp);
- Notice of Preparation of UC Merced Community and Area Plan EIR, on behalf of The Wildlife Society—Western Section (2001: 8 pp.);
- Preliminary Draft Yolo County Habitat Conservation Plan (2001; 2 letters totaling 35 pp.);
- Merced County General Plan Revision, notice of Negative Declaration (2001: 2 pp.);
- Notice of Preparation of Campus Parkway EIR/EIS (2001: 7 pp.);
- Draft Recovery Plan for the bighorn sheep in the Peninsular Range (*Ovis candensis*) (2000);
- Draft Recovery Plan for the California Red-legged Frog (*Rana aurora draytonii*), on behalf of The Wildlife Society—Western Section (2000: 10 pp.);
- Sierra Nevada Forest Plan Amendment Draft Environmental Impact Statement, on behalf of The Wildlife Society—Western Section (2000: 7 pp.);
- State Water Project Supplemental Water Purchase Program, Draft Program EIR (1997);

- Davis General Plan Update EIR (2000);
- Turn of the Century EIR (1999: 10 pp);
- Proposed termination of Critical Habitat Designation under the Endangered Species Act (Fed. Reg. 64(113): 31871-31874) (1999);
- NOA Draft Addendum to the Final Handbook for Habitat Conservation Planning and Incidental Take Permitting Process, termed the HCP 5-Point Policy Plan (Fed. Reg. 64(45): 11485 - 11490) (1999; 2 pp + attachments);
- Covell Center Project EIR and EIR Supplement (1997).

Position Statements I prepared the following position statements for the Western Section of The Wildlife Society, and one for nearly 200 scientists:

- Recommended that the California Department of Fish and Game prioritize the extermination of the introduced southern water snake in northern California. The Wildlife Society--Western Section (2001);
- Recommended that The Wildlife Society—Western Section appoint or recommend members of the independent scientific review panel for the UC Merced environmental review process (2001);
- Opposed the siting of the University of California’s 10th campus on a sensitive vernal pool/grassland complex east of Merced. The Wildlife Society--Western Section (2000);
- Opposed the legalization of ferret ownership in California. The Wildlife Society--Western Section (2000);
- Opposed the Proposed “No Surprises,” “Safe Harbor,” and “Candidate Conservation Agreement” rules, including permit-shield protection provisions (Fed. Reg. Vol. 62, No. 103, pp. 29091-29098 and No. 113, pp. 32189-32194). This statement was signed by 188 scientists and went to the responsible federal agencies, as well as to the U.S. Senate and House of Representatives.

Printed Mass Media

Smallwood, K.S., D. Mooney, and M. McGuinness. 2003. We must stop the UCD biolab now. Op-Ed to the Davis Enterprise.

Smallwood, K.S. 2002. Spring Lake threatens Davis. Op-Ed to the Davis Enterprise.

Smallwood, K.S. Summer, 2001. Mitigation of habitation. The Flatlander, Davis, California.

Entrikan, R.K. and K.S. Smallwood. 2000. Measure O: Flawed law would lock in new taxes. Op-Ed to the Davis Enterprise.

Smallwood, K.S. 2000. Davis delegation lobbies Congress for Wildlife conservation. Op-Ed to the Davis Enterprise.

Smallwood, K.S. 1998. Davis Visions. The Flatlander, Davis, California.

Smallwood, K.S. 1997. Last grab for Yolo’s land and water. The Flatlander, Davis, California.

Smallwood, K.S. 1997. The Yolo County HCP. Op-Ed to the Davis Enterprise.

Radio/Television

KXJZ Capital Public Radio -- Insight (Host Jeffrey Callison). Mountain lion attacks (with guest Professor Richard Coss). 23 April 2009;

KXJZ Capital Public Radio -- Insight (Host Jeffrey Callison). Wind farm Rio Vista Renewable Power. 4 September 2008;

KQED QUEST Episode #111. Bird collisions with wind turbines. 2007;

KDVS Speaking in Tongues (host Ron Glick), Yolo County HCP: 1 hour. December 27, 2001;

KDVS Speaking in Tongues (host Ron Glick), Yolo County HCP: 1 hour. May 3, 2001;

KDVS Speaking in Tongues (host Ron Glick), Yolo County HCP: 1 hour. February 8, 2001;

KDVS Speaking in Tongues (host Ron Glick & Shawn Smallwood), California Energy Crisis: 1 hour. Jan. 25, 2001;

KDVS Speaking in Tongues (host Ron Glick), Headwaters Forest HCP: 1 hour. 1998;

Davis Cable Channel (host Gerald Heffernon), Burrowing owls in Davis: half hour. June, 2000;

Davis Cable Channel (hosted by Davis League of Women Voters), Measure O debate: 1 hour. October, 2000;

KXTV 10, In Your Interest, The Endangered Species Act: half hour. 1997.

Posters at Professional Meetings

Smallwood, K. S. and C. G. Thelander. 2005. Lessons learned from five years of avian mortality research in the Altamont Pass WRA. AWEA conference, Denver, May 2005.

Neher, L., L. Wilder, J. Woo, L. Spiegel, D. Yen-Nakafugi, and K.S. Smallwood. 2005. Bird's eye view on California wind. AWEA conference, Denver, May 2005.

Smallwood, K. S., C. G. Thelander and L. Spiegel. 2003. Toward a predictive model of avian fatalities in the Altamont Pass Wind Resource Area. Windpower 2003 Conference and Convention, Austin, Texas.

Smallwood, K.S. and Eva Butler. 2002. Pocket Gopher Response to Yellow Star-thistle Eradication as part of Grassland Restoration at Decommissioned Mather Air Force Base, Sacramento County, California. White Mountain Research Station Open House, Barcroft Station.

Smallwood, K.S. and Michael L. Morrison. 2002. Fresno kangaroo rat (*Dipodomys nitratoides*) Conservation Research at Resources Management Area 5, Lemoore Naval Air Station. White Mountain Research Station Open House, Barcroft Station.

Smallwood, K.S. and E.L. Fitzhugh. 1989. Differentiating mountain lion and dog tracks. Third Mountain Lion Workshop, Prescott, AZ.

Smith, T. R. and K. S. Smallwood. 2000. Effects of study area size, location, season, and allometry on reported *Sorex* shrew densities. Annual Meeting of the Western Section of The Wildlife Society.

Presentations at Professional Meetings and Seminars

Comparing Wind Turbine Impacts across North America. California Energy Commission Staff Workshop: Reducing the Impacts of Energy Infrastructure on Wildlife, 20 July 2011.

Siting Repowered Wind Turbines to Minimize Raptor Collisions. California Energy Commission Staff Workshop: Reducing the Impacts of Energy Infrastructure on Wildlife, 20 July 2011.

Siting Repowered Wind Turbines to Minimize Raptor Collisions. Alameda County Scientific Review Committee meeting, 17 February 2011

Comparing Wind Turbine Impacts across North America. Conference on Wind energy and Wildlife impacts, Trondheim, Norway, 3 May 2011.

Update on Wildlife Impacts in the Altamont Pass Wind Resource Area. Raptor Symposium, The Wildlife Society—Western Section, Riverside, California, February 2011.

Siting Repowered Wind Turbines to Minimize Raptor Collisions. Raptor Symposium, The Wildlife Society—Western Section, Riverside, California, February 2011.

Wildlife mortality caused by wind turbine collisions. Ecological Society of America, Pittsburgh, Pennsylvania, 6 August 2010.

Map-based repowering and reorganization of a wind farm to minimize burrowing owl fatalities. California burrowing Owl Consortium Meeting, Livermore, California, 6 February 2010.

Environmental barriers to wind power. Getting Real About Renewables: Economic and Environmental Barriers to Biofuels and Wind Energy. A symposium sponsored by the Environmental & Energy Law & Policy Journal, University of Houston Law Center, Houston, 23 February 2007.

Lessons learned about bird collisions with wind turbines in the Altamont Pass and other US wind farms. Meeting with Japan Ministry of the Environment and Japan Ministry of the Economy, Wild Bird Society of Japan, and other NGOs Tokyo, Japan, 9 November 2006.

- Lessons learned about bird collisions with wind turbines in the Altamont Pass and other US wind farms. Symposium on bird collisions with wind turbines. Wild Bird Society of Japan, Tokyo, Japan, 4 November 2006.
- Responses of Fresno kangaroo rats to habitat improvements in an adaptive management framework. California Society for Ecological Restoration (SERCAL) 13th Annual Conference, UC Santa Barbara, 27 October 2006.
- Fatality associations as the basis for predictive models of fatalities in the Altamont Pass Wind Resource Area. EEI/APLIC/PIER Workshop, 2006 Biologist Task Force and Avian Interaction with Electric Facilities Meeting, Pleasanton, California, 28 April 2006.
- Burrowing owl burrows and wind turbine collisions in the Altamont Pass Wind Resource Area. The Wildlife Society—Western Section Annual Meeting, Sacramento, California, February 8, 2006.
- Mitigation at wind farms. Workshop: Understanding and resolving bird and bat impacts. American Wind Energy Association and Audubon Society. Los Angeles, CA. January 10 and 11, 2006.
- Incorporating data from the California Wildlife Habitat Relationships (CWHR) system into an impact assessment tool for birds near wind farms. Shawn Smallwood, Kevin Hunting, Marcus Yee, Linda Spiegel, Monica Parisi. Workshop: Understanding and resolving bird and bat impacts. American Wind Energy Association and Audubon Society. Los Angeles, CA. January 10 and 11, 2006.
- Toward indicating threats to birds by California's new wind farms. California Energy Commission, Sacramento, May 26, 2005.
- Avian collisions in the Altamont Pass. California Energy Commission, Sacramento, May 26, 2005.
- Ecological solutions for avian collisions with wind turbines in the Altamont Pass Wind Resource Area. EPRI Environmental Sector Council, Monterey, California, February 17, 2005.
- Ecological solutions for avian collisions with wind turbines in the Altamont Pass Wind Resource Area. The Wildlife Society—Western Section Annual Meeting, Sacramento, California, January 19, 2005.
- Associations between avian fatalities and attributes of electric distribution poles in California. The Wildlife Society—Western Section Annual Meeting, Sacramento, California, January 19, 2005.
- Minimizing avian mortality in the Altamont Pass Wind Resources Area. UC Davis Wind Energy Collaborative Forum, Palm Springs, California, December 14, 2004.
- Selecting electric distribution poles for priority retrofitting to reduce raptor mortality. Raptor Research Foundation Meeting, Bakersfield, California, November 10, 2004.
- Responses of Fresno kangaroo rats to habitat improvements in an adaptive management framework. Annual Meeting of the Society for Ecological Restoration, South Lake Tahoe, California,

October 16, 2004.

Lessons learned from five years of avian mortality research at the Altamont Pass Wind Resources Area in California. The Wildlife Society Annual Meeting, Calgary, Canada, September 2004.

The ecology and impacts of power generation at Altamont Pass. Sacramento Petroleum Association, Sacramento, California, August 18, 2004.

Burrowing owl mortality in the Altamont Pass Wind Resource Area. California Burrowing Owl Consortium meeting, Hayward, California, February 7, 2004.

Burrowing owl mortality in the Altamont Pass Wind Resource Area. California Burrowing Owl Symposium, Sacramento, November 2, 2003.

Raptor Mortality at the Altamont Pass Wind Resource Area. National Wind Coordinating Committee, Washington, D.C., November 17, 2003.

Raptor Behavior at the Altamont Pass Wind Resource Area. Annual Meeting of the Raptor Research Foundation, Anchorage, Alaska, September, 2003.

Raptor Mortality at the Altamont Pass Wind Resource Area. Annual Meeting of the Raptor Research Foundation, Anchorage, Alaska, September, 2003.

California mountain lions. Ecological & Environmental Issues Seminar, Department of Biology, California State University, Sacramento, November, 2000.

Intra- and inter-turbine string comparison of fatalities to animal burrow densities at Altamont Pass. National Wind Coordinating Committee, Carmel, California, May, 2000.

Using a Geographic Positioning System (GPS) to map wildlife and habitat. Annual Meeting of the Western Section of The Wildlife Society, Riverside, CA, January, 2000.

Suggested standards for science applied to conservation issues. Annual Meeting of the Western Section of The Wildlife Society, Riverside, CA, January, 2000.

The indicators framework applied to ecological restoration in Yolo County, California. Society for Ecological Restoration, September 25, 1999.

Ecological restoration in the context of animal social units and their habitat areas. Society for Ecological Restoration, September 24, 1999.

Relating Indicators of Ecological Health and Integrity to Assess Risks to Sustainable Agriculture and Native Biota. International Conference on Ecosystem Health, August 16, 1999.

A crosswalk from the Endangered Species Act to the HCP Handbook and real HCPs. Southern California Edison, Co. and California Energy Commission, March 4-5, 1999.

- Mountain lion track counts in California: Implications for Management. Ecological & Environmental Issues Seminar, Department of Biological Sciences, California State University, Sacramento, November 4, 1998.
- “No Surprises” -- Lack of science in the HCP process. California Native Plant Society Annual Conservation Conference, The Presidio, San Francisco, September 7, 1997.
- In Your Interest. A half hour weekly show aired on Channel 10 Television, Sacramento. In this episode, I served on a panel of experts discussing problems with the implementation of the Endangered Species Act. Aired August 31, 1997.
- Spatial scaling of pocket gopher (*Geomys*) density. Southwestern Association of Naturalists 44th Meeting, Fayetteville, Arkansas, April 10, 1997.
- Estimating prairie dog and pocket gopher burrow volume. Southwestern Association of Naturalists 44th Meeting, Fayetteville, Arkansas, April 10, 1997.
- Ten years of mountain lion track survey. Fifth Mountain Lion Workshop, San Diego, February 27, 1996.
- Study and interpretive design effects on mountain lion density estimates. Fifth Mountain Lion Workshop, San Diego, February 27, 1996.
- Small animal control. Session moderator and speaker at the California Farm Conference, Sacramento, California, Feb. 28, 1995.
- Small animal control. Ecological Farming Conference, Asylomar, California, Jan. 28, 1995.
- Habitat associations of the Swainson's Hawk in the Sacramento Valley's agricultural landscape. 1994 Raptor Research Foundation Meeting, Flagstaff, Arizona.
- Alfalfa as wildlife habitat. Seed Industry Conference, Woodland, California, May 4, 1994.
- Habitats and vertebrate pests: impacts and management. Managing Farmland to Bring Back Game Birds and Wildlife to the Central Valley. Yolo County Resource Conservation District, U.C. Davis, February 19, 1994.
- Management of gophers and alfalfa as wildlife habitat. Orland Alfalfa Production Meeting and Sacramento Valley Alfalfa Production Meeting, February 1 and 2, 1994.
- Patterns of wildlife movement in a farming landscape. Wildlife and Fisheries Biology Seminar Series: Recent Advances in Wildlife, Fish, and Conservation Biology, U.C. Davis, Dec. 6, 1993.
- Alfalfa as wildlife habitat. California Alfalfa Symposium, Fresno, California, Dec. 9, 1993.
- Management of pocket gophers in Sacramento Valley alfalfa. California Alfalfa Symposium, Fresno, California, Dec. 8, 1993.

Association analysis of raptors in a farming landscape. Plenary speaker at Raptor Research Foundation Meeting, Charlotte, North Carolina, Nov. 6, 1993.

Landscape strategies for biological control and IPM. Plenary speaker, International Conference on Integrated Resource Management and Sustainable Agriculture, Beijing, China, Sept. 11, 1993.

Landscape Ecology Study of Pocket Gophers in Alfalfa. Alfalfa Field Day, U.C. Davis, July 1993.

Patterns of wildlife movement in a farming landscape. Spatial Data Analysis Colloquium, U.C. Davis, August 6, 1993.

Sound stewardship of wildlife. Veterinary Medicine Seminar: Ethics of Animal Use, U.C. Davis. May 1993.

Landscape ecology study of pocket gophers in alfalfa. Five County Grower's Meeting, Tracy, California. February 1993.

Turbulence and the community organizers: The role of invading species in ordering a turbulent system, and the factors for invasion success. Ecology Graduate Student Association Colloquium, U.C. Davis. May 1990.

Evaluation of exotic vertebrate pests. Fourteenth Vertebrate Pest Conference, Sacramento, California. March 1990.

Analytical methods for predicting success of mammal introductions to North America. The Western Section of the Wildlife Society, Hilo, Hawaii. February 1988.

A state-wide mountain lion track survey. Sacramento County Dept Parks and Recreation. April 1986.

The mountain lion in California. Davis Chapter of the Audubon Society. October 1985.

Ecology Graduate Student Seminars, U.C. Davis, 1985-1990: Social behavior of the mountain lion; Mountain lion control; Political status of the mountain lion in California.

Other forms of Participation at Professional Meetings

- Workshop co-presenter at Birds & Wind Energy Specialist Group (BAWESG) Information sharing week, Bird specialist studies for proposed wind energy facilities in South Africa, Endangered Wildlife Trust, Darling, South Africa, 3-7 October 2011.
- Scientific Committee, Conference on Wind energy and Wildlife impacts, Trondheim, Norway, 2-5 May 2011.
- Chair of Animal Damage Management Session, The Wildlife Society, Annual Meeting, Reno, Nevada, September 26, 2001.

- Chair of Technical Session: Human communities and ecosystem health: Comparing perspectives and making connection. Managing for Ecosystem Health, International Congress on Ecosystem Health, Sacramento, CA August 15-20, 1999.
- Student Awards Committee, Annual Meeting of the Western Section of The Wildlife Society, Riverside, CA, January, 2000.
- Student Mentor, Annual Meeting of the Western Section of The Wildlife Society, Riverside, CA, January, 2000.

Reviews of Journal Papers (Scientific journals for whom I've provided peer review)

Journal	Journal
American Naturalist	Journal of Animal Ecology
Journal of Wildlife Management	Western North American Naturalist
Auk	Journal of Raptor Research
Biological Conservation	National Renewable Energy Lab reports
Canadian Journal of Zoology	Oikos
Ecosystem Health	The Prairie Naturalist
Environmental Conservation	Restoration Ecology
Environmental Management	Southwestern Naturalist
Functional Ecology	The Wildlife Society--Western Section Trans.
Journal of Zoology (London)	Proc. Int. Congress on Managing for Ecosystem Health
Journal of Applied Ecology	Transactions in GIS
Ecology	Tropical Ecology
Biological Control	The Condor

Committees

- Scientific Review Committee, Alameda County, Altamont Pass Wind Resource Area
- Ph.D. Thesis Committee, Steve Anderson, University of California, Davis
- MS Thesis Committee, Marcus Yee, California State University, Sacramento

Other Professional Activities or Products

Testified in Federal Court in Denver during 2005 over the fate of radio-nuclides in the soil at Rocky Flats Plant after exposure to burrowing animals. My clients won a judgment of \$553,000,000. I have also testified in many other cases of litigation under CEQA, NEPA, the Warren-Alquist Act, and other environmental laws. My clients won most of the cases for which I testified.

Testified in Skamania County Hearing in 2009 on the potential impacts of zoning the County for development of wind farms and hazardous waste facilities.

Testified in deposition in 2007 in the case of O'Dell et al. vs. FPL Energy in Houston, Texas.

Testified in Klickitat County Hearing in 2006 on the potential impacts of the Windy Point Wind Farm.

Memberships in Professional Societies

The Wildlife Society

Raptor Research Foundation

American Museum of Natural History

Honors and Awards

Certificate of Appreciation, The Wildlife Society—Western Section, 2000, 2001

Fulbright Research Fellowship to Indonesia, 1987.

Northern California Athletic Association Most Valuable Cross Country Runner, 1984.

J.G. Boswell Full Academic Scholarship, 1981 (Paid expenses for undergraduate education).

American Legion Award, Corcoran High School, 1981, and John Muir Junior High, 1977.

CIF Section Champion, Cross Country in 1978 and Track & Field 2 mile run in 1981.

National Junior Record, 20 kilometer run, 1982.

National Age Group Record, 1500 meter run, 1978

Community Activities

District 64 Little League Umpire, 2003-2007

Dixon Little League Umpire, 2006-07

Davis Little League Chief Umpire and Board member, 2004-2005

Davis Little League Safety Officer, 2004-2005

Davis Little League Certified Umpire, 2002-2004

Davis Little League Scorekeeper, 2002

Davis Visioning Group member

Petitioner for Writ of Mandate under the California Environmental Quality Act against City of Woodland decision to approve the Spring Lake Specific Plan, 2002

Served on campaign committees for City Council candidates

DECLARATION OF SERVICE

I, Michael R. Lozeau, declare that on November 8, 2013, I served and filed copies of the TESTIMONY OF K. SHAWN SMALLWOOD, PH.D., ON BEHALF OF LABORERS' INTERNATIONAL UNION OF NORTH AMERICA, LOCAL UNION NO. 1184 dated November 8, 2013. The most recent Proof of Service List, which I copied from the web page for this project at: <http://www.energy.ca.gov>, is attached to this Declaration.

(Check one)

For service to all other parties and filing with the Docket Unit at the Energy Commission:

I successfully uploaded the document to the Energy Commission's e-filing system and I personally delivered the document or deposited it in the US mail with first class postage to those persons for whom a physical mailing address but no e-mail address is shown on the attached Proof of Service List. [The e-filing system will serve the other parties and Committee via e-mail when the document is approved for filing.] or

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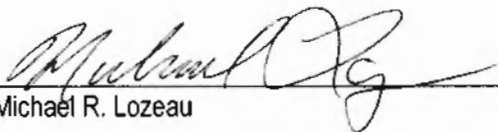
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Sacramento, CA 95814-5512

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I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct, and that I am over the age of 18 years.

Dated: November 8, 2013



Michael R. Lozeau



Proof of Service List

Docket: 09-AFC-06C

Project Title: Blythe Solar Power Project - Compliance

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