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June 16, 2010

DOCKET 09-AFC-6	
DATE	JUN 16 2010
RECD.	JUN 16 2010

California Energy Commission
Attn: Docket No. 09AFC6
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512

Re: 09-AFC-6 Blythe Solar Power Plant Project

Dear Docket Clerk:

Enclosed are an original and one copy of **REBUTTAL TESTIMONY OF SCOTT CASHEN ON BEHALF OF CALIFORNIA UNIONS FOR RELIABLE ENERGY FOR THE BLYTHE SOLAR POWER PROJECT**. Please process the document and provide us with a conformed copy in the envelope provided.

Thank you.

Sincerely,

/s/

Elizabeth Klebaner

EK:bh
Enclosures

2398-069a

STATE OF CALIFORNIA

California Energy Commission

In the Matter of: The Application for Certification for the Blythe Solar Power Project	Docket No. 09-AFC-6

REBUTTAL TESTIMONY OF SCOTT CASHEN ON BEHALF OF CALIFORNIA UNIONS FOR RELIABLE ENERGY FOR THE BLYTHE SOLAR POWER PROJECT

June 15, 2010

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Attorneys for CALIFORNIA UNIONS FOR RELIABLE ENERGY

I. Introduction

I have been working for the California Unions for Reliable Energy ("CURE") as a consultant on the Application for Certification ("AFC") for the Blythe Solar Power Project ("Project" or "BSPP") since the data adequacy phase. I have reviewed numerous documents and have conducted my own investigations and analyses regarding the Project's potential environmental impacts and alternatives.

I have a Master's of Science Degree in Wildlife and Fisheries Science from the Pennsylvania State University, University Park. The degree program included coursework in Landscape Ecology, Biometrics, Statistics, Conservation Biology, and Wetland Ecology. For my thesis, I conducted seven seasons of independent research on avian use of restored wetlands. The U.S. Fish and Wildlife Service subsequently used my technical report as a model for other habitat restoration monitoring projects in Pennsylvania.

My employment experience has included work in the fields of wildlife biology, forestry, and natural resource consulting. Much of my work over the past two and a half years has involved review of environmental documents associated with development of large-scale solar energy facilities. To date, I have served as an expert on 12 different solar projects, 9 of which are being sited in the Mojave or Sonoran Desert. I am currently concluding a two-year contract I hold with the State of California to conduct surveys for the Peninsular bighorn sheep near Anza-Borrego Desert State Park. I serve as a member of the scientific review team responsible for assessing the effectiveness of the US Forest Service's implementation of the Herger-Feinstein Quincy Library Group Act.

For the past two and a half years I have operated my own consulting business. I previously served as a Senior Biologist for TSS Consultants and ECORP Consulting. Other positions I have held have included conducting wildlife research for the National Park Service, the Point Reyes Bird Observatory, and the University of California. While in graduate school I served as an instructor of Wildlife Management and as a teaching assistant for a course on ornithology. A summary of my education and professional experience is attached to this testimony as provided with my opening testimony.

My testimony is based on the activities described above, the Applicant's opening testimony dated June 11, 2010, and the knowledge and experience I have acquired during more than 18 years of working in the field of natural resources management.

II. Mitigation for Potentially Significant Project Noise Impacts on Birds

The Applicant argues Staff has imposed excessive and unreasonable restrictions on Project noise from "steam blows."[1] According to the Applicant's testimony,

> The nearest undisturbed area (i.e., native habitat) that would potentially support nesting birds is located approximately 3,200 feet away from each steam blow source location. Given these variables, the expected noise level at the potential nesting areas would be approximately 59 dBA, well below the normally applied threshold of 65 dBA (65 dBA would occur approximately 1,600 feet from the source).[2]

Neither the Applicant's testimony nor the scientific literature supports the contention that 59 dBA can be used as a no-effect threshold. Research on the effects of noise on birds indicates large intra and inter-species variations. [3, 4, 5] Site-specific assessments are therefore necessary to demonstrate site and species-specific thresholds. Because the Applicant has not conducted these assessments, the Applicant has no basis to conclude noise levels of 59 dBA would not result in significant impacts to nesting birds. To the contrary, research on the effects of traffic noise on breeding birds concluded ambient noise up to a given level resulted in no reduction in the density of bird populations.[6] However, once an ambient noise threshold level was exceeded, densities decreased exponentially with increased noise.[7] Threshold levels were found to range from 36 to 58 decibels, depending on the species.[8]

Reijnen et al. (1997) concluded sound levels above 50 dBA could be considered potentially deleterious to breeding birds. The average distance (from the source of noise) at which an effect was observed in the Reijnen et al.

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[1] Applicant's Biological Resources Opening Testimony, p. 13.
[2] Id.
[3] National Park Service. 1994. Report to Congress: Report on effects of aircraft overflights on the National Park System.
[4] Larkin R. 1996. Effects of military noise on wildlife: A literature review. USA CERL Technical Report [internet; cited 28 Sep 2008]. Available from: http://nhsbig.inhs.uiuc.edu/bioacoustics/noise_and_wildlife.pdf.
[5] Manci KM, DN Gladwin, R Villella, MG Cavendish. 1988. Effects of aircraft noise and sonic booms on domestic animals and wildlife: a literature synthesis. National Ecology Research Center Report # NERC-88/29.
[6] Kaseloo PA. 2006. Synthesis of noise effects on wildlife populations. IN: Proceedings of the 2005 International Conference on Ecology and Transportation, Eds. Irwin CL, Garrett P, McDermott KP. Center for Transportation and the Environment, North Carolina State University, Raleigh, NC: pp. 33-35. Attached hereto as Attachment 1.
[7] Id.
[8] Id.

study was reported to be 1,000 m (3,280 feet).[9] This distance is comparable to that reported by the Applicant (i.e., 3,200 feet), although noise levels from the Applicant's proposed method for steam blows would exceed those reported as deleterious by Reijnen et al.

Many wildlife species are more susceptible to adverse effects from "startle" due to impulsive noises, rather than "annoyance" due to a change in overall noise levels. According to Staff, equipment for a quieter steam blow process, which would also reduce impacts from "startle" noise, is available and feasible mitigation to reduce Project impacts on wildlife.[10] I concur with Staff that a "low pressure" approach to steam blows should be implemented to avoid and minimize the adverse effects associated with Project steam blows.

Condition of Certification BIO-8 ("BIO-8") specifies that loud construction activities (i.e., steam blowing, both low and high pressure, and pile driving) shall be avoided from February 15 to April 15. According to the Revised Staff Assessment, these correspond with the height of the bird breeding season.[11] California Partners in Flight (2009) reports the avian breeding season in the Colorado Desert as extending from January 15 to July 15, with peak of egg initiation occurring on April 8.[12] The Revised Staff Assessment has proposed mitigation for only two of the six months during which Project noise is likely to impact nesting birds. However, due to inter-species variation in nesting chronology, Staff's proposed mitigation would be ineffective for some species. For example, the California Department of Fish and Game reports the peak breeding season for prairie falcons as occurring from April to early August (i.e., generally outside of the dates Staff has required mitigation for noise impacts).[13] Therefore, BIO-8 should be revised to require the Applicant to avoid loud construction activities from January 15th to August 15th.

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[9] Reijnen R, R Foppen, G Veenbaas. 1997. Disturbance by traffic of breeding birds: evaluation of the effect and planning and managing road corridors. Biodiversity and Conservation 6: 567-581.
[10] Revised Staff Assessment, p. C.7-8.
[11] Revised Staff Assessment, p. C.2-173.
[12] CalPIF (California Partners in Flight). 2009. Version 1.0. The Desert Bird Conservation Plan: a Strategy for Protecting and Managing Desert Habitats and Associated Birds in California. California.
Partners in Flight. http://www.prbo.org/calpif/plans.html.
[13] California Wildlife Habitat Relationships System. 2005. California Department of Fish and Game. California Interagency Wildlife Task Group. CWHR version 8.1 personal computer program. Sacramento (CA).

III. The Applicant's Proposed Changes to BIO-25 Should Be Rejected

In its opening testimony, the Applicant has proposed modifying Condition of Certification BIO-25 ("BIO-25") such that the success criterion for evaporation pond monitoring would no longer be 12 consecutive visits in which there was no mortality or entanglement. Instead, the Applicant proposes that the success criterion be 12 (non-consecutive) visits with no *"significant"* deaths or entanglement.[14] The Applicant's proposed changes should be rejected because they would increase the likelihood of significant, unmitigated Project impacts associated with the proposed evaporation ponds.

First, with the Applicant's proposed success criteria, if bird mortality occurred 11 months of the year (but not in the 12th) for years 0 through 12, the success criterion (i.e., 12 months of no significant bird or wildlife deaths) would be met and monthly monitoring would cease. This is clearly not the intent of the condition, which is to reduce bird and wildlife mortality for the life of the Project. Assuming the Project operates for 30 years, BIO-25 would cease to apply to the Project in year 13 even if significant bird mortality occurred on an annual basis. Second, the Applicant has failed to define what is considered "significant" deaths or entanglement. As a result, the Applicant's proposed success criterion is arbitrary and lacks any and all measurable performance standards.

IV. Potentially Significant Impacts to the Couch's Spadefoot Toad and Proposed Mitigation

In opening testimony, the Applicant provided information regarding baseline conditions for the Couch's spadefoot toad that is misleading, at best. Core to the Applicant's testimony is the argument that spadefoot toads were never detected during surveys, and thus Staff has no basis to conclude spadefoot toads would be impacted by the Project. The Applicant presents this argument four separate times in its testimony.[15] However, the Applicant neglected to report that the timing of its surveys almost certainly precluded *detection* of spadefoot toads. This is reflected in the Applicant's own testimony, which provides:

1. "[s]padefoots are mainly nocturnal with juveniles sometimes active in daylight;"[16]

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[14] Applicant's Biological Resources Opening Testimony, p. 39.
[15] Applicant's Biological Resources Opening Testimony. One instance on p. 7 and three instances on p. 40.
[16] AECOM Environment. Data Response Queries – CEC Email dated January 28, 2010. Applicant's Exhibit 18.

2. "[t]his species spends most of the year (dry period) within either self-made burrows or small mammal burrows (Stebbins 2003) and becomes active during spring and summer rains;"[17] and
3. "[m]ating occurs after heavy rainfall in April through September."[18]

The Applicant did not conduct surveys at night, during spring or summer rains, or after heavy rainfall between April and September.[19] In fact, according to the Applicant's own testimony, "this species [Couch's spadefoot toad] was not included as a target species for our surveys."[20]

A. Potential Breeding Ponds Are Present

The Applicant accuses Staff of misleading the reader regarding the presence of potential Couch's spadefoot toad breeding sites in the Project area."[21] In opening testimony, the Applicant provides the following justification for rejecting Staff's conclusion that potential Couch's spadefoot toad breeding ponds exist in the Project area:

> The 2010 survey results indicated that there were multiple potential ponding areas that may pond long enough to support breeding habitat for the Couch's spadefoot toad; however, there is no confirmation on the ponding potential and there is no evidence that toads are in the area. Therefore, it is speculation that they are potential breeding ponds.[22]

This reasoning is nonsensical. First, "ponding areas" within the range of the toad are—by definition—*potential* breeding ponds. Second, Staff's conclusions are not mere "speculation" because according to the Applicant's own testimony, "[b]oth the Blythe and Palen sites occur within the range of Couch's spadefoot and contain sufficient forage (termites and other insects) to support this species."[23]

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[17] Id.
[18] Id.
[19] Western Regional Climate Center [internet]. 2010. Period of Record Monthly Climate Summary, Blythe CAA Airport, California. Available at: http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca0927. Attached hereto as Attachment 2.
[20] Id.
[21] *See* Applicant's Biological Resources Opening Testimony, p. 7.
[22] Id.
[23] AECOM Environment. Data Response Queries – CEC Email dated January 28, 2010. Applicant's Exhibit 18.

In science, the burden of proof rests on those making the claim.[24] According to the Applicant, "[q]uantitative data regarding length of potential water retention, depth of water (if any), size of the pond, and suitability for breeding were not documented" during the Applicant's surveys.[25] In this instance, the Applicant has not provided the information necessary to demonstrate that the "ponding areas" that it detected are *not* potential breeding habitat.

B. Significant Impacts and Proposed Mitigation

The Applicant's opening testimony provides that "[i]mpacts to the toad are not considered significant and should not require additional mitigation beyond the already defined avoidance and minimization measures and required compensatory mitigation."[26] However, mitigation is proposed because Staff has found that Project impacts to Couch's spadefoot toad *are* significant.[27, 28] As stated in my opening testimony, I agree with Staff's conclusion that the Project may result in potentially significant impacts to Couch's spadefoot toad.[29] Moreover, whereas "already defined avoidance and minimization measures and required compensatory mitigation" *may also* offset impacts to spadefoot toads, under those conditions the Applicant would be under no obligation to ensure that impacts to Couch's spadefoot toad will be avoided and minimized. As such, a condition that incorporates mitigation measures specific to the habitat requirements and future viability of the Couch's spadefoot toad are necessary and appropriate to mitigate the Project's potentially significant impacts to this species.

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[24] Wikipedia contributors. Pseudoscience [Internet]. Wikipedia, The Free Encyclopedia; 2010 Jun 14, 08:44 UTC [cited 2010 Jun 15]. Available from: http://en.wikipedia.org/wiki/Pseudoscience.
[25] Applicant's Biological Resources Opening Testimony, p. 40.
[26] Id.
[27] Revised Staff Assessment, p. C.2-70.
[28] The Revised Staff Assessment incorrectly refers to BIO-27 as the condition addressing mitigation for Project impacts to Couch's spadefoot toads. The correct condition is BIO-26.
[29] Testimony of Scott Cashen on Behalf of California Unions for Reliable Energy for the Blythe Solar Power Project, June 11, 2010, p. 9.

ATTACHMENT 1

Chapter 2

Avian Issues

Bioacoustic Profiles: Evaluating Potential Masking of Wildlife Vocal Communication by Highway Noise

Edward West (Phone: 916-737-3000, Email: ewest@jsanet.com), Senior Environmental Scientist, Jones & Stokes, 2600 V Street, Sacramento, CA 95818

Abstract

Highway noise can mask vocal communication and natural sounds important to wildlife for mate attraction, social cohesion, predator avoidance, prey detection, navigation, and other basic behaviors. This acoustic interference can potentially result in the reduced ability of individuals to acquire mates successfully, reproduce, raise young, and avoid predation. Because different species have evolved unique vocal repertoires, they are differentially susceptible to the masking effects of highway noise. No single noise-level criteria can be used to accurately define impact thresholds for all species. Here we show the utility of using bioacoustic profiles of bird vocal signals to identify and describe the range and variability of acoustic-masking thresholds. Variation in noise load, source amplitude, and signal frequency are modeled to illustrate the dynamic nature of each species' critical acoustic space.

Biographical Sketch: Dr. Edward West specializes in applied ecological research and management of rare, threatened, and endangered wildlife; ecosystem conservation; and mitigation planning. He is a senior environmental scientist with Jones & Stokes in Sacramento and a research associate in the John Muir Institute of the Environment at UC-Davis. His current research focuses on bioacoustics analysis of highway noise impacts on wildlife, particularly how noise impacts vocal communication and associated behaviors in birds. Dr. West is a member of the Bioacoustics Working Group at the UCD Road Ecology Center where he teaches courses in bioacoustics ecology.

Estimating Effects of Highway Noise on the Avian Auditory System

Robert J. Dooling (Phone: 301-405-5925, Email: dooling@psyc.umd.edu), Center for the Comparative and Evolutionary Biology of Hearing, University of Maryland, College Park, MD 20742

Abstract: Our own common experience suggests that the adverse effects of noise on birds can be considered with regard to four potentially overlapping categories. First, noise might be annoying to birds. This may cause them to abandon a particular site that is otherwise ideal in terms of food availability, breeding opportunities, etc. Second, noise which lasts for very long periods of time can be stressful. Such noise levels can raise the level of stress hormones, interfere with sleep and other activities, etc. Thirdly, very intense noise (acoustic overexposure) can cause permanent injury to the auditory system. Finally, noise can interfere with acoustic communication by masking important sounds or sound components. The first two categories of investigation are probably best addressed by field experiments. The second two categories of effects are probably best addressed by laboratory experiments where precise control can be obtained. The results of some of these experiments are described in this paper.

Experimental Design

A series of behavioral experiments in the laboratory examined the effect of intense noise on the peripheral auditory system of birds and the effect of less-intense masking noise on the ability of birds to detect and discriminate bird vocalizations. In all, these experiments involved four species of birds (budgerigars, canaries, Japanese quail, and zebra finches) with similar audiograms. All birds were trained by behavioral conditioning methods and were tested in the same behavioral apparatus using exactly the same procedures. Birds exposed to intense noise were also exposed under identical conditions to the same exact noises. These conditions minimized differences that might be due to different non-experimental conditions or methodologies. Thus, any differences that emerged are differences between species.

Acoustic Overexposure

In spite of very similar audiograms, budgerigars and quail respond quite differently to exposure to an intense pure tone. When exposed to a 2.86-kHz tone at 112 dB for 12 hours, budgerigars show an initial threshold shift (hearing loss) of about 40 dB, which is completely recovered by 1-2 days following the exposure. Quail, on the other hand, show an initial hearing loss of 70 dB and never fully recover their hearing, even after a year following this exposure. In another experiment, budgerigars, canaries, and zebra finches were all exposed to the same band noise (2-6 kHz) at a level of 120 dB for 24 hours. Again, species differences emerged. All three species showed an initial hearing loss of about 50 dB. Canaries and zebra finches recovered their hearing to within 10 dB of normal by about two weeks. Budgerigars never fully recovered their hearing and still showed a permanent hearing loss of over 20 dB several months following the exposure. These comparative results show that in spite of similar audiograms, different species of birds show considerable variation in their response to hearing damage from acoustic overexposure.

Masking of Vocalizations by Noise

Previous work has also shown that, in spite of similar audiograms, there can be considerable species differences in how well birds can hear against a background of noise. In recent work by Lohr and his colleagues (Lohr et al, 2003), two species of birds were trained by behavioral conditioning methods to detect and discriminate both their own species vocalizations and the vocalizations of the other species. Moreover, these experiments were conducted with two different kinds of noises having similar overall levels: one noise with a relatively flat spectrum over a broad range, and the other noise with a traffic-spectrum-shaped noise with the peak energy shifted to lower frequencies. Results show that both species required a better signal-to-noise ratio, by a few dB, to discriminate between two vocalizations than they did simply to detect whether a vocalization was presented or not. This fits well with our common-sense experiences listening to speech in noisy environments. The results comparing flat-spectrum noise to traffic-spectrum-shaped noises were also clear. Given the same overall level, birds could hear and discriminate vocalizations better in noise that resembled the spectrum of traffic noise than they could in a flat noise with energy evenly spread across frequencies. These results show that even with acoustically complex communication signals like vocalizations, it is the energy that is in the frequency region of the vocalizations that is most effective in masking the vocalizations. In their natural habitat, it is likely that birds, like humans listening to speech, can offset some of the masking effects of noise by turning their heads, raising their voices, and using various other strategies.

Conclusions

These results show that there are considerable species differences in how birds respond to noise. While generally birds are fairly resistant to auditory-system damage from intense-noise exposure, there are large species differences. A noise exposure that barely affects one species could cause serious anatomical damage and permanent hearing loss in another. When listening to vocalizations in a background of noise, it is the energy that falls within the spectral region of the vocalizations that is most effective in masking the vocalizations. Since many bird vocalizations contain most of their energy at frequencies above 1 kHz or so, traffic-like noise is less effective in masking bird vocalizations than is broadband noise if both are at the same overall level. These findings should have relevance for predicting the effects of noises on bird-communication systems and for the design of abatement strategies.

Biographical Sketch: Robert J. Dooling (Professor), received his Ph.D. in Physiological Psychology from St. Louis University in 1975. After postdoctoral studies at Rockefeller University in New York, he moved to the University of Maryland, College Park. Currently he is the co-director of the Center for the Comparative and Evolutionary Biology of Hearing at the University of Maryland. His Laboratory of Comparative Psychoacoustics is aimed at understanding how animals communicate with one another using sound and whether there are parallels with how humans communicate with one another using speech and language. Much of the work involves comparing the auditory systems of humans and different animals to gain insight into function. Other work seeks to understand vocal learning especially in birds such as songbirds and parrots, which, like humans, rely on hearing and learning to develop a normal vocal repertoire. There are currently ongoing projects on vocal learning and vocal development in budgerigars, the regeneration of auditory hair cells and recovery of hearing and the vocalizations following hearing damage, and the effect of masking noise on hearing and communication.

References

Dooling, R. J., A. N. Popper, and R. R. Fay. 2000. *Comparative Hearing: Birds and Reptiles.* Springer-Verlag, New York.

Lohr, B., T. F. Wright, and R. J. Dooling. 2003. Detection and discrimination of natural calls in masking noise by birds: Estimating the active space signal. *Anim. Beh.* 65: 763-777.

Ryals, B. M., R. J. Dooling, E. Westbrook, M. L. Dent, A. MacKenzie, and O. N. Larsen. 1999. Avian species differences in susceptibility to noise exposure. *Hear. Res.* 131(1-2): 71-88.

EVALUATING AND MINIMIZING THE EFFECTS OF IMPACT PILE DRIVING ON THE MARBLED MURRELET (*BRACHYRAMPHUS MARMORATUS*), A THREATENED SEABIRD

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Abstract

The purpose of this paper is to describe the methods used to evaluate the potential adverse effects of underwater sound from impact pile driving on the marbled murrelet (a seabird that is federally listed as threatened), and to introduce measures that have successfully minimized adverse effects. The U.S. Fish and Wildlife Service has evaluated the effects of pile driving on the marbled murrelet through several recent Endangered Species Act consultations. Over the past few years, there has been increased attention to the potential for impact pile driving to adversely affect fish species. When foraging, marbled murrelets dive in pursuit of prey and can be exposed to the same elevated sound pressure levels that adversely affect fish. Exposure to these sounds could result in mortality, injury, and/or modification of normal behaviors.

Marbled murrelets forage in the marine waters throughout Puget Sound. Recent transportation projects that have occurred in Puget Sound include replacement of the Hood Canal Floating Bridge and multiple Washington State Ferry terminal-maintenance and preservation projects. These projects typically use 36-inch and 24-inch hollow steel piles. Impact installation of these piles can produce sound pressure levels of 210 dB peak. Physical injury, including death, may occur in aquatic organisms at sound-pressure levels above 180 dB peak. Sound-pressure levels above 153 dBrms are expected to cause temporary behavioral changes that may negatively affect foraging efficiency.

These projects were evaluated by determining the area where sound pressure was expected to exceed the above levels and then estimating the potential for marbled murrelets to be exposed to those sound-pressure levels. When exposure was likely to occur, the U.S. Fish and Wildlife Service anticipated adverse effects in the form of harm (physical injury) and harassment (modification of normal behavior patterns). Minimization measures focused on reducing that potential exposure. Sound-attenuation devices (bubble curtains) were used to reduce the extent of the geographic area where adverse effects could occur. A hazing program was used to move murrelets out of the area where physical injury was expected.

We present the analysis used to evaluate adverse effects to marbled murrelets from pile driving, discuss the method used to estimate the extent of effects, and introduce measures to minimize adverse effects. Finally, we recommend future research needed to better understand and to reduce further these impacts.

Biographical Sketch: Emily Teachout is a fish and wildlife biologist with the U.S. Fish and Wildlife Service in Lacey, Washington, and is a member of her office's Transportation Planning Branch. As a transportation liaison, Emily reviews transportation projects through the National Environmental Policy Act, Endangered Species Act, Fish and Wildlife Coordination Act, and other regulations. Emily provides technical expertise on the conservation of bull trout, marbled murrelets, Northern spotted owls, bald eagles, and other sensitive species. As her office's lead on evaluating potential impacts of underwater sound on aquatic species, Emily develops risk assessments, effect analyses, and policy guidance on pile installation related to ferry operations and bridge projects.

Synthesis of Noise Effects on Wildlife Populations

Paul A. Kaseloo (Phone: 804-524-6991, Email: pkaseloo@vsu.edu), Department of Biology, Virginia State University, Petersburg VA 23806

Abstract: This report contains a partial summary of a literature review dealing with the effect of noise on wildlife emphasizing the effects on birds. Beginning with studies in the Netherlands and, later, in the United States, a series of studies have indicated that road noise has a negative effect on bird populations (particularly during breeding) in a variety of species. These effects can be significant with 'effect distances' (i.e., those within which the density of birds is reduced) of two to three thousand meters from the road. In these reports, the effect distances increase with the density of traffic on the road being greatest near large, multilane highways with high densities. A similar effect has been reported for both grassland and woodland species. It is important to note that 1) not all species have shown this effect and 2) some species show the opposite response, increasing in numbers near roads or utilizing rights-of-way. It is important to determine the cause of this effect and to utilize additional or alternative methods beyond population densities as the sole measure of effect distance, because the latter is susceptible to variation due to changes in overall population density. Recommendations for further study are given, including alternative measures of disturbance in birds.

Introduction

This presentation summarizes part of a larger report that reviewed literature dealing with the effect of noise on wildlife on a wide variety of species (Kaseloo and Tyson 2004). Here, the responses reported for bird species are summarized, because they have been reported to show the most dramatic negative response to road noise of any group and this response appears proportionate to the level of traffic on the road. According to a recent estimate, 20% of the land area of the United States may be ecologically affected by public roads (Forman 2000). This estimate is based, in part, on findings of the effect of road noise on the density of bird populations. In these studies "effect distance" is defined as the distance from the road to the point at which reduced density was no longer recorded.

Effect of Road Noise on Bird Species

In an early study (a re-analysis of previous work), avoidance of roads was found for at least two species (lapwing and black-tailed godwit) of grassland birds (van der Zande et al. 1980). A subsequent study of grassland birds found seven of 12 species had reduced breeding densities near roads and that the effect distance increased from 20-1,700 m at 5,000 vehicles/day to 65-3,530 m at 50,000 vehicles/day (Reijnen et al. 1996). A longer-term (five-year) study near Boston found that, at least for two species of grassland birds studied (bobolinks and meadowlarks), the effect distances increased from no effect at 3,000-8,000 vehicles/day to 1,200 m at traffic densities of 30,000 vehicles/day or more (Forman et al. 2002).

In a study of woodland species, 26 of 43 (60%) were found to show a decrease in population densities with effect distances that also increased with the amount of traffic. The effect distances ranged from 50-1,500 m at 10,000 vehicles/day and increased to 70-2,800 m at 60,000 vehicles/day (Reijnen et al. 1995b). A further, multi-year study found that 17 of 23 species showed a reduction in breeding bird density in at least one year of the study (average 40,000-52,000 vehicles/day) (Reijnen and Foppen 1995a). This effect was reduced in years of high overall population density. The authors concluded that high overall population densities led to an underestimation of the quality of the habitat as the numbers of birds were forced into poorer-quality areas under these conditions (Reijnen and Foppen 1995a; see also Reijnen et al. 1997, figure 1).

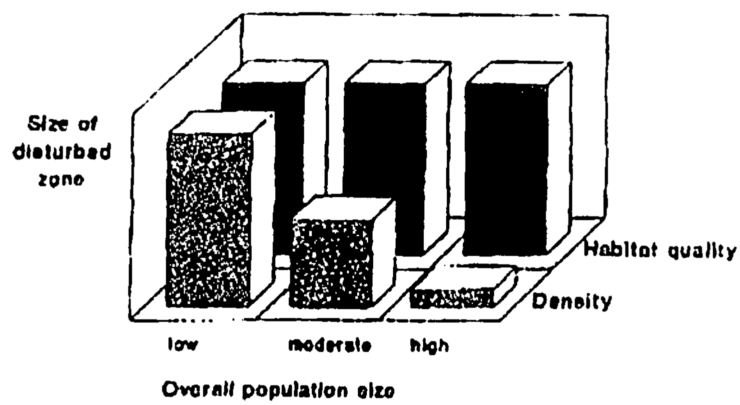

Figure 1. Schematic representation of the effect of disturbance by traffic on habitat quality (solid) and density (hatched) of breeding birds in relation to overall population size. (Reprinted with the kind permission of Springer Science and Business Media from Reijnen et al. 1997.)

Based on these results, sound levels above 50 dB(A) could be considered potentially deleterious, and the effect distance was estimated to be an average of 1,000 m (Reijnen et al. 1997). The existing model of the effect on birds assumes that noise is the presumptive major causative factor (see figure 2) because of the distances involved in the effect. However, it is important to consider that no multi-species study has found all species to be sensitive. In several studies that cover a wide range of habitat types it has been shown that while some species become less common near the road, others show the opposite effect, and the importance of these (ecotonal) species may also need to be considered in evaluating the impact of roads (Michael et al. 1976; Clark and Karr 1979; Ferris 1979; Adams and Geis 1981). It should be noted that noise was not the focus of these studies, but the fact that population densities vary dramatically between species merits consideration. Other species have been shown to breed in exceptionally noisy environments such as near roads and airports (e.g., Awbrey et al. 1995). Finally, a number of studies have found that rights-of-way can provide breeding habitat for some species and that management of this area can be important, particularly in areas where disturbance (e.g., from agricultural activity) farther from the road may preclude the use of alternative areas (Oetting and Cassel 1971; Voorhees and Cassel 1980; Laursen 1981; Warner and Joselyn 1986; Warner 1992). Again, it should be noted that noise was not the focus of these studies, but the close proximity of significant numbers of breeding birds of various types (pheasants, ducks, passerines) to the road (interstate highways) indicates that noise from the road is not an absolute barrier to breeding, particularly if alternative areas are not readily available.

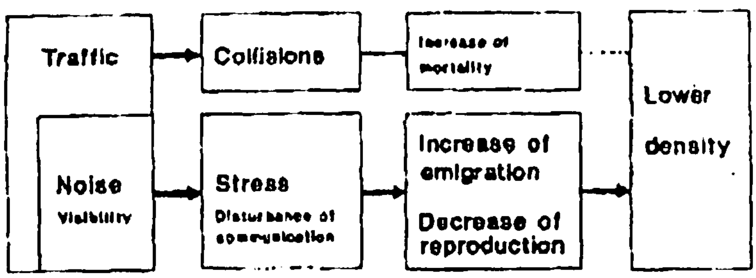

Figure 2. Probable relationship between traffic and density of breeding birds. (Reprinted with the kind permission of Springer Science and Business Media from Reijnen et al. 1997.)

The fact that the reduction in density of some species is proportional to traffic density supports the idea that noise is having a significant effect on these species. However, the effect is not universal and needs to be considered in terms of the surrounding habitat as well as species in question.

Recommendations for Future Study

Because the effect attributed to road noise can be extremely significant and has been shown to occur in a number of studies and across a wide variety of species, this effect must be investigated further. One central question that has yet to be resolved is whether noise in isolation is sufficient to cause this effect. To this point it has been assumed that noise is the cause because of the large effect distances and because other potential sources (e.g., visual disturbance, pollution, etc.) are unlikely to have an influence at such distances (Forman et al. 2002). If noise can be established as the cause of this effect, then mitigation efforts that are able to reduce noise alone can be expected to produce the desired response (i.e., may make habitat more attractive to species that had been avoiding these areas). In addition, the time for such a response to occur needs to be evaluated (i.e., over what time frame does a study need to be conducted to see a response). Because birds can be territorial it may take some time for them to reoccupy an area, even if acoustic conditions are more favorable.

The proximate effects of traffic noise on avian physiology have not been quantified. Since density alone can be a misleading indicator as to habitat quality (see also van Horne 1983), additional measures need to be employed to evaluate the stress the bird is experiencing. Such factors could include physiological measures of stress such as hormone levels or behavioral or activity measures that would indicate a bird is experiencing less or more favorable conditions. In breeding birds, the fecundity or fledging success might be useful indicators as well. Finally, areas of noise mitigation exist, and, although many of these may be near heavily populated regions, careful examination of these areas may reveal test sites that can be used for comparison to other (non-mitigated) areas so long as sufficient similarities (e.g., community composition, patch size, etc.) for comparison remain. These areas may present an opportunity for study without the need to construct or modify existing roads for such comparisons, although creation of controlled sites with high and low noise levels may ultimately prove necessary.

An accurate assessment of the impact of road noise will only be possible once the nature of the effect of road noise on birds is determined so that predictions as to the magnitude of the disturbance can be made.

Acknowledgments: The report summarized here was supported through the Federal Highway Administration through a cooperative agreement (DTFH61-03-H-00123).

Biographical Sketch: Dr. Paul Kaseloo is currently an assistant professor in the Biology Department at Virginia State University. He has a Ph.D. in zoology and physiology from the University of Wyoming, where his research involved the energy costs of diving and digestion in ducks. His broader research interests include the physiological ecology of vertebrates. He authored a review of the effects of noise on wildlife through the Federal Highway Administration Minority Institutions of Higher Education Competitive Assistance Program.

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ATTACHMENT 2

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NOTE:
To print data frame (right side), click on right frame before printing.

1971 - 2000

- Daily Temp. & Precip.
- Daily Tabular data (~23 KB)
- Monthly Tabular data (~1 KB)
- NCDC 1971-2000 Normals (~3 KB)

1961 - 1990

- Daily Temp. & Precip.
- Daily Tabular data (~23 KB)
- Monthly Tabular data (~1 KB)
- NCDC 1961-1990 Normals (~3 KB)

Period of Record

- Station Metadata
- Station Metadata Graphics

General Climate Summary Tables

- Temperature
- Precipitation
- Heating Degree Days
- Cooling Degree Days
- Growing Degree Days

Temperature

- Daily Extremes and Averages

- Spring 'Freeze' Probabilities
- Fall 'Freeze' Probabilities
- 'Freeze Free' Probabilities
- Monthly Temperature Listings
  - Average
  - Average Maximum
  - Average Minimum

Precipitation

- Monthly Average
- Daily Extreme and Average
- Daily Average
- Precipitation Probability by Duration.
- Precipitation Probability by Quantity.
- Monthly Precipitation Listings
  - Monthly Totals

Snowfall

- Daily Extreme and Average
- Daily Average
- Monthly Snowfall Listings
  - Monthly Totals

Snowdepth

- Daily Extreme and Average
- Daily Average

Heating Degree Days

- Daily Average

Cooling Degree Days

- Daily Average

Period of Record Data Tables

- Daily Summary Stats (~55 KB)
- Monthly Tabular data (~2 KB)

Western Regional Climate Center,
wrcc@dri.edu

BLYTHE CAA AIRPORT, CALIFORNIA

Monthly Total Precipitation (inches)

(040927)

File last updated on Apr 5, 2010
*** Note *** Provisional Data *** After Year/Month 200912
a = 1 day missing, b = 2 days missing, c = 3 days, ..etc..,
z = 26 or more days missing, A = Accumulations present
Long-term means based on columns; thus, the monthly row may not
sum (or average) to the long-term annual value.
MAXIMUM ALLOWABLE NUMBER OF MISSING DAYS : 5
Individual Months not used for annual or monthly statistics if more than 5 days are missing.
Individual Years not used for annual statistics if any month in that year has more than 5 days missing.

YEAR(S)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
1948	0.00 z	0.00 z	0.00 z	0.00 z	0.00 z	0.00 z	0.05	0.90	0.49	1.33	0.00	0.24	3.01
1949	2.48	0.00	0.01	0.02	0.00	0.00	0.00	0.18	0.00	0.23	0.00	0.07	2.99
1950	0.00	0.05	0.00	0.00	0.00	0.00	0.24 c	0.00 f	0.02	0.00	0.00	0.00	0.31
1951	0.54	0.00	0.00	0.73	0.07 j	0.00	0.19	5.92	0.00	0.41	0.69	0.13	8.61
1952	0.40	0.18	0.59	0.65	0.00	0.91	0.02 f	0.05	0.10	0.00	0.25 i	1.42	4.30
1953	0.00	0.10	0.10	0.00	0.00	0.00	0.07	0.06	0.00	0.00	0.00	0.26	0.59
1954	0.70	0.00	0.76	0.01	0.00	0.00	0.14	0.46	0.20	0.16	0.00	0.00	2.43
1955	1.05	0.00	0.00	0.02	0.00	0.00	0.04	1.14	0.00	0.00	0.01	0.00	2.26
1956	0.00 b	0.07	0.00	0.00	0.00	0.00	1.03	0.00	0.01	0.00	0.00 e	0.00	1.11
1957	0.97	0.03	0.00	0.13	0.00	0.00	0.32	0.11 d	0.00	1.53	0.05	0.13	3.27
1958	0.12	1.35	0.60	0.25	0.02	0.00	0.02	0.57	0.01	0.09	0.03	0.00	3.06
1959	0.07	0.36	0.00	0.00	0.00	0.01	0.07	1.30	0.07	0.38	0.00	1.95	4.21
1960	0.42	0.17	0.21	0.03	0.00	0.00	0.12	0.09	1.03	0.02	0.25	0.00	2.34
1961	0.13	0.00	0.00	0.00	0.00	0.00	0.04	0.50	0.00	0.00	0.12	0.75	1.54
1962	0.79	0.26	0.09	0.00	0.00 a	0.00	0.02	0.48	0.00	0.00	0.00	0.57	2.21

1963	0.55	0.23	0.20	0.00	0.00	0.00	0.00	1.05	1.03	1.17	0.41	0.00	4.64
1964	0.00	0.22	0.33	0.08	0.00	0.00	0.08	0.00	0.00	0.00	0.30	0.12	1.13
1965	0.14	0.09	0.23	3.00	0.01	0.00	0.00	0.35	0.00	0.00	0.81	1.44	6.07
1966	1.08	0.02	0.15	0.03	0.00	0.00	0.61	0.13	0.18	1.09	0.02	0.19	3.50
1967	0.26	0.00	0.22	0.00	0.00	0.00	0.00	1.16	1.04	0.00	0.70	0.87	4.25
1968	0.00	0.12	0.25	0.06	0.00	0.00	0.38	0.05	0.00	0.32	0.03	0.11	1.32
1969	1.00	0.01	0.03	0.00	0.00	0.00	1.05	0.17	0.60	0.17	0.47	0.05	3.55
1970	0.11	0.66	1.11	0.01	0.00	0.00	0.00	0.73	0.00	0.00	0.00	0.03	2.65
1971	0.00	0.00	0.00	0.05	0.00	0.00	0.01	1.07	0.97	0.06	0.00	0.08	2.24
1972	0.00	0.00	0.00	0.00	0.00	0.10	0.21	0.30	0.01	1.89	0.38	0.03	2.92
1973	0.07	0.96	1.12	0.00	0.00	0.00	0.00	0.38	0.00	0.00	0.05	0.00	2.58
1974	0.71	0.00	0.19	0.00	0.00	0.00	0.12	0.11	0.00	0.89	0.00	0.70	2.72
1975	0.05	0.11	0.07	0.32	0.00	0.00	0.76	0.00	0.56	0.00	0.01	0.04	1.92
1976	0.00	1.78	0.00	0.91	0.00	0.00	0.14	0.00	2.14	0.05	0.02	0.18	5.22
1977	0.16	0.01	0.12	0.01	0.09	0.01	0.17	1.10	0.70	0.06	0.00	0.40	2.83
1978	1.73	1.07	0.22	0.10	0.04	0.00	0.06	0.99	0.00	1.42	0.43	0.89	6.95
1979	1.44	0.06	0.81	0.00	0.12	0.00	0.36	2.09	0.52	0.06	0.00	0.18	5.64
1980	0.84	1.57	0.65	0.24	0.00	0.00	0.10	0.72	0.18	0.03	0.00	0.02	4.35
1981	0.05	0.19	1.01	0.00	0.07	0.04	0.00	1.77	0.03	0.00z	0.00z	0.00	3.16
1982	0.13	0.26	0.87	0.00	0.12	0.00	0.49	1.25	0.51	0.00	0.28	1.26	5.17
1983	0.13	0.37	1.75	0.00	0.00	0.00	0.00	2.07	0.88	0.00	0.03	0.73	5.96
1984	0.06	0.00	0.00	0.00	0.02	0.00	2.44	0.11	0.00	0.00	0.10	3.33	6.06
1985	0.27	0.29	0.03	0.06	0.00	0.00	0.00	0.00	1.61	0.90	1.84	0.07	5.07
1986	0.07	0.40	0.19	0.02	0.00	0.00	0.11	0.05	0.90	0.50	0.69	0.75	3.68
1987	0.00	0.03	0.00	0.05	0.00	0.03	1.40	0.00	0.01	0.42	0.71	0.68	3.33
1988	0.42	0.61	0.02	0.98	0.00	0.00	0.00	0.83	0.00	0.07	0.00	0.00	2.93
1989	1.08	0.00	0.06	0.00	0.00	0.00	0.32	0.15	0.01	0.00	0.00	0.00	1.62
1990	0.14	0.01	0.21	0.00	0.02	0.00	0.22	1.47	0.13	0.06	0.00	0.00z	2.26
1991	0.00z	0.76	0.00z	0.00z	0.00	0.00	0.01	0.28	1.52	0.14	0.04	0.31	3.06
1992	0.78	1.59	2.15	0.28	0.03	0.00	0.00	1.93	0.00	0.20	0.00	2.20	9.16
1993	2.33	2.19	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.87	0.01	5.62
1994	0.01	0.29	0.68	0.02	0.12	0.00	0.69	0.14	0.00	0.00	0.06	1.23	3.24

1995	2.29	0.00 z	0.49	0.09	0.00 z	0.00	0.05	1.37	0.08	0.00	0.00	0.00	4.37
1996	0.10	0.27	0.09	0.00	0.22	0.00	0.00	0.00	0.85	0.01	0.04	0.01	1.59
1997	0.47	0.00	0.00	0.06	0.00	0.00	0.61	0.03	2.05	0.01	0.03	1.06	4.32
1998	0.28	3.03	1.29	0.01	0.01	0.00	0.05	0.47	0.52	0.04	0.16	0.21	6.07
1999	0.00	0.34	0.00	1.00	0.04	0.00	1.20	0.00	0.74	0.00	0.00	0.00	3.32
2000	0.00	0.08	0.38	0.00	0.00	0.01	0.00	1.03	0.00	0.00	0.00 b	0.00	1.50
2001	0.81	0.67	1.55	0.01	0.00	0.00	0.00	0.00 c	0.00	0.00	0.11	0.03	3.18
2002	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.75	0.04	0.03	0.00	0.86
2003	0.11	1.08	0.28	0.08	0.00	0.00	0.06	0.00	0.07	0.00	0.33	0.00	2.01
2004	0.02	0.57	0.81	0.06	0.00	0.00	0.00	0.02	0.12	1.02	0.31	0.57	3.50
2005	1.55	2.83	0.21	0.00	0.00	0.00	0.00	1.35	0.00	0.85	0.00	0.00	6.79
2006	0.00	0.00	0.25	0.00	0.00	0.20	0.15	1.46	1.44	0.04	0.00	0.00	3.54
2007	0.16	0.07	0.53	0.00	0.00	0.00	0.00	0.00	0.06	0.00	1.11	0.00	1.93
2008	0.77	0.02	0.00	0.00	0.18	0.00	0.27	0.15	0.06	0.00	0.24	0.65	2.34
2009	0.02	0.43	0.00	0.00	0.03	0.01	0.07	0.02	0.03	0.00	0.00	0.85	1.46
2010	2.12 a	0.72 p	0.00 z	0.00 z	0.00 z	0.00 z	0.00 z	0.00 z	0.00 z	0.00 z	0.00 z	0.00 z	2.12
					Period of Record Statistics								
MEAN	0.49	0.43	0.35	0.16	0.02	0.02	0.24	0.62	0.36	0.26	0.20	0.41	3.42
S.D.	0.65	0.68	0.48	0.44	0.05	0.12	0.43	0.92	0.54	0.46	0.34	0.64	1.80
SKEW	1.60	2.23	1.82	4.82	2.81	7.01	3.02	3.38	1.64	1.94	2.55	2.35	0.84
MAX	2.48	3.03	2.15	3.00	0.22	0.91	2.44	5.92	2.14	1.89	1.84	3.33	9.16
MIN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.59
NO YRS	61	60	60	60	59	61	61	61	62	61	60	61	54

Declaration of Scott Cashen
Blythe Solar Power Project

Docket 09-AFC-6

I, Scott Cashen, declare as follows:

1) I am an independent biological resources consultant. I have been operating my own consulting business for the past three years. Prior to starting my own business I was the Senior Biologist for TSS Consultants.

2) I hold a Master's degree in Wildlife and Fisheries Science. My relevant professional qualifications and experience are set forth in the attached testimony and are incorporated herein by reference.

3) I prepared the testimony attached hereto and incorporated herein by reference, relating to the biological resource impacts of the Blythe Solar Power Project.

5) It is my professional opinion that the attached testimony and maps contained therein are true and accurate with respect to the issues that they address.

6) I am personally familiar with the facts and conclusions described within the attached testimony and maps, and if called as a witness, I 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.

Dated: 6/15/10

At: Walnut Creek, CA

Signed: [signature]

DECLARATION OF SERVICE
Blythe Solar Power Plant Project

Docket No. 09-AFC-6

I, Bonnie Heeley, declare that on June 16, 2010, I served and filed copies of the attached **REBUTTAL TESTIMONY OF SCOTT CASHEN ON BEHALF OF CALIFORNIA UNIONS FOR RELIABLE ENERGY FOR THE BLYTHE SOLAR POWER PROJECT** dated June 15, 2010. The original document, filed with the Docket Office, is accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at: http://www.energy.ca.gov/sitingcases/solar_millennium_blythe/index.html.

The document has been sent to both the other parties in this proceeding (as shown on the Proof of Service list) and to the Commission's Docket Office via email and U.S. mail as addressed below:

CALIFORNIA ENERGY COMMISSION
Attn: Docket No. 09-AFC-6
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512
docket@energy.state.ca.us

I declare under penalty of perjury that the foregoing is true and correct. Executed at South San Francisco, California on June 16, 2010.

/s/
Bonnie Heeley

CALIFORNIA ENERGY COMMISSION Attn: Docket No. 09AFC6 1516 Ninth Street, MS4 Sacramento, CA 95814-5512 docket@energy.state.ca.us	Alice Harron Senior Director-Project Dvlpmnt 1625 Shattuck Ave., #270 Berkeley, CA 94709-1161 harron@solarmillennium.com	Elizabeth Ingram, Associate Dvlpr Solar Millennium, LLC 1625 Shattuck Avenue Berkeley, CA 94709 ingram@solarmillennium.com
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Ram Ambatipudi Chevron Energy Solutions 150 E. Colorado Blvd., Ste. 360 Pasadena, CA 91105 rambatipudi@chevron.com		