EDM International, Inc.

E | D | M

4001 Automation Way
Fort Collins, Colorado 80525-3479 USA
970/204-4001 ♦ Fax: 970/204-4007
Email: info@edmlink.com ♦ www.edmlink.com

California Energy Commission
Dockets Office, MS-4
Re: Docket No. 06-OII-1
1516 Ninth Street
Sacramento, CA 95814-5512

Re: EDM Comments re: Docket No. 06-OII-1
Developing Statewide Avian Guidelines

Dear Commissioners:

These comments are submitted on behalf of EDM International (electronically and by mail). EDM is a consulting firm that provides an array of utility-related consulting services, including impact studies for proposed wind resource areas. We are currently studying a proposed wind turbine site in Plumas County, California. I attended the CEC staff workshop by phone on August 28-29, and had several comments relating to study design and suggested guidelines for assessing windpower impacts on bird and bat species.

In his presentation, Dick Anderson recommended "per use" counts as the most effective way to present standardized bird habitat use in pre-construction WRA studies. Although it would seem that this index provides a standard by which studies can be easily compared, an examination of various studies indicates that the duration of individual surveys, survey effort, and area surveyed varies between studies, making generalizations between studies (i.e. meta-analysis) difficult. Although I agree that these types of counts are useful and should be performed in all pre-construction studies, if the CEC intends these as a standard survey methodology and a benchmark for meta-analysis, then survey duration, number and frequency of surveys, survey area, and the exact methods used for surveys should be standardized.

A survey methodology that can be performed in conjunction with per use counts and offers a number of advantages over per use counts is described in Morrison's Avian Risk and Fatality Protocol (Available: http://www.nrel.gov/docs/fy99osti/24997.pdf). This protocol is designed for pre-construction studies where the locations of proposed turbine sites is known, and involves marking the perimeter of the proposed rotor swept areas on the ground then visualizing where these RSAs would be in airspace given the height of the wind turbine nacelle. Birds are observed for a standard survey period and their trajectory in relation to the RSA is noted and recorded as a categorical variable based on the zone that they pass through. This framework allows quantitative comparison between individual turbines, control and treatment sites, multiple proposed WRAs, seasons, years, and so on using analysis of variance (ANOVA) techniques. It also allows one to calculate risk indices for various species, explore the effects of changes in micrositing, and compare passage rates before and after windfarm development. Adoption of this survey and analysis procedure would not require much additional effort than that required to perform standard per use counts, and would provide valuable information to compare bird use within and between sites.

Another comment has to do with point count survey duration. As Anderson noted in his presentation, different survey durations are more or less compatible with observing different types of birds. Small birds (particularly resident species) are prone to being counted multiple times during longer surveys, resulting in an overestimate of their actual abundance. In addition, the behavior of smaller bird species (small territories, singing and other territorial displays, low flight heights) makes small bird data from short-duration point counts amenable to analysis using distance sampling, a method which can be used to provide estimates of true density and/or abundance by adjusting for the variability in ease of detection between species. This analysis requires that enough observations are accumulated to estimate detectability, but once this threshold is exceeded, provides a far more rigorous and robust measure of density/abundance than the per use counts described above. These metrics could, for example, be used in a BACI experimental design to test if there has been significant changes in estimated songbird density/abundance (due to "poofing" or habitat avoidance) after a WRA has been developed.

Larger birds can be tracked more easily to avoid counting them twice, and for these less frequently observed species, longer point counts are often needed to gather the sample size needed for statistical analyses. In addition, point counts on bird species that often fly at higher altitudes cannot be analyzed using distance sampling because the perpendicular distance at which they are sighted does not have much of a relationship with their detectability. For these species, alternative metapopulation-based analysis methods may be used to estimate their density/abundance (see Royle, J.A. 2004. Generalized estimators of avian abundance from count survey data. Animal Biodiversity and Conservation 27(1): 375-386).

The considerations mentioned above make it advantageous to perform two types of avian point counts so that all birds present on a site are adequately represented. For the study we are performing in the Plumas National Forest, we used 30 minute point counts at proposed turbine sites, simultaneously recording both per use data as well as data for the Morrison protocol described above. These data will also be used to estimate absolute abundance using the methods described in Royle 2004. Thus there are three measures of bird use that will be generated from a single set of point counts. In a similar way, five minute point counts were performed at designated points along established transects in songbird habitat at the proposed turbine site, and from these data absolute density will be estimated using distance sampling to supplement the relative density derived from per use counts. By performing surveys from which multiple estimators of bird activity, risk, density, and/or abundance can be calculated, researchers will generate more robust results that are more useful for rigorously evaluating a site, making comparisons between sites, and increasing our level of understanding of avian interactions with wind turbines.

Statistical analyses should be an important part of the state guidelines as well. Data from studies that include both a treatment site (a proposed turbine site) and a reference site (an ecologically similar site where no developments are planned) can be compared in a Before After Control Impact (BACI) analysis framework. This type of experimental design enables one to compare pre and post construction data, performing statistical tests for changes in bird density/abundance. BACI analyses of bird point count data have been developed that use commonly available software (see Mcdonald, T.L., W.P. Erickson, and L.L. McDonald. 2000. Analysis of count data from Before-After-Control-Impact studies. Journal of Agricultural, Biological, and Environmental Statistics 5(3): 262-279). These methods might also be used on bat acoustic detector data to compare activity levels of different species or phonic groups.

Comparing estimated pre and post construction densities and abundances to mortalities detected by carcass searches could be particularly informative. The table below shows a simplified range of observed density and mortality outcomes and how they might be interpreted.

Density	**Mortality**	**Conclusion**
Lower	Low	Avoidance?
Lower	High	Local or regional impact?
No change	Low	Little or no impact?
No change	High	Compensatory mortality?
Higher	Low	Attraction, but avoidance?
Higher	High	Ecological trap?

Performing such comparisons for a variety of different species or species groups could provide valuable insight into the mortality risk of different species and species groups, and comparing these across WRAs could produce valuable generalizations, particularly if combined with analysis of data using the Morrison protocol (see above).

I look forward to reading the draft guidelines. Thank you for your consideration.

Jon Belak