

## MEMORANDUM

TO: Alameda County Board of Supervisors and Planning Director  
FROM: Altamont Pass Wind Resource Area Scientific Review Committee  
DATE: Feb 7, 2007  
RE: Analysis of Monitoring Program in Context of 1/1//2007 Settlement Agreement

The Scientific Review Committee (SRC) has reviewed the terms of the Settlement Agreement and amended conditional use permits approved by your Board on January 11, 2007. Analysis of the implications of the Settlement Agreement was facilitated by a public question/answer session conducted on February 5, 2007, between the SRC and the Settling Parties, in which specifics were clarified regarding implementation of the new conditions.

Based on this analysis, the SRC has determined that **the Settlement Agreement has NOT prompted a need for changes in the recommended approach to the monitoring program** put forth in the attached January 4, 2007, recommendations to the County. The SRC confirmed that, under the new Settlement Agreement goal of a 50% reduction in mortality, the needed sample size will remain 2500, as this will still achieve the same margin of error of plus-or-minus 10%. This sample size of 2500 turbines, put forth in the recommended program, will evaluate whether the conditions of the amended permits have been met with a level of accuracy that is credible to the scientific community.

The Board should also be aware that some of the provisions of the Settlement Agreement, specifically blade painting, may require independent study separate from this monitoring program. This will depend on the specific study design submitted by the wind companies. The SCR will attempt to maximize the Altamont-wide monitoring program to evaluate a variety of management actions that might be introduced at Altamont. However, to ensure that the benefit of management actions can be attributed to specific action in question, some additional independent studies may be required.

This memo is also intended to promote a common understanding of variability when measuring mortality reduction using data collected from survey samples and what it means with respect to the Settlement Agreement. In science, we rarely have perfect certainty, and results are typically reported with a margin of error or a bracketed confidence interval. Sampling variation is related to the random selection of turbines and the randomness of mortality events. While it is possible to reduce sampling variation by increasing the sampling effort, it is not practical and nearly impossible to set a level of sampling effort that would eliminate uncertainty completely. The SRC-recommended approach aims to achieve a scientifically acceptable 10% margin of error. In other words, the measured percent change in mortality is anticipated to be determined confidently within plus or minus 10 percentage points [i.e., possible results might be an estimate of 55% with a confidence interval of 45-65%, or a 42% estimate with a confidence interval of 32-52%]. If mitigation impacts are above or below the 50%

reduction goal beyond the 10% margin of error, then the data will provide strong statistical certainty about whether this goal was achieved. On the other hand, if the mitigation impacts occur within 10% of the 50% reduction, then this would lead to uncertainty about whether the goal was achieved.

Finally, the SRC has taken it under advisement that the Settlement Parties will look to the SRC to evaluate some aspects of the Settlement Agreement, such as the baseline mortality.

# **Altamont Pass Wind Resource Area Scientific Review Committee (SRC) Recommendations to County of Alameda Avian Monitoring Program**

Submitted to County of Alameda on January 4, 2007

## **Introduction**

In response to direction by the Alameda County Board of Supervisors, the Scientific Review Committee (SRC) has recommended a scientifically credible avian monitoring program that is responsive to the budget constraints identified by the Board of Supervisors.

The SRC recognizes the objective of this study is to evaluate whether the conditions set forth in the conditional use permits for wind turbines operating in Altamont Pass have been met. At its December 2006 meeting, the SRC reviewed a protocol developed by the avian monitoring consulting team responsive to SRC discussions held during its initial meeting in September 2006. To evaluate the recommended monitoring program, the SRC examined technical analyses, reviewed data collected and analyzed between winter 2005 and fall 2006, discussed the protocols with the avian monitoring consulting team, and held a technical workshop in which more than 20 stakeholders including representatives of the turbine operators, wildlife advocacy organizations, and landowners from Altamont Pass provided feedback on the proposed protocol.

Considering this input and discussion, the SRC has evaluated three approaches:

- 1) A monitoring program that meets the \$2 million budget as directed by the Board;
- 2) The SRC's "no constraints" optimal methodology; and
- 3) A recommended approach that seeks to be responsive to the Board of Supervisors budgetary concerns yet provides a scientifically credible monitoring program to evaluate the effectiveness of implementing the County Board of Supervisors requirements set forth in the conditional use permit<sup>1</sup>.

## **Common Elements**

All these approaches evaluate whether the conditions in the permits have been met, which is dependent on the wind companies implementing those conditions. The studies focus on a 45% reduction in the collective mortality of four target species: Golden Eagle, Red-Tailed Hawk, American Kestrel and Burrowing Owl while also monitoring all other birds. Although not stated directly in the conditional use permits, public input letters from the Attorney General's office, U.S. Fish & Wildlife Service and other interested parties recommended the 45% reduction in target raptor species. In addition, the November 2005 Study Plan developed by West, Inc., also used the 45% reduction measure. The SRC finds this target value acceptable even though it came from sources other than the conditional use permits.

All these approaches are designed for 3 years with an adaptive management component in which the SRC will make recommendations with regards to uncertainties that need further study, such as additional management actions or actions that might be modified based on study outcomes.

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<sup>1</sup> Resolution No. R-2005-453, September 22, 2005

### **1) Monitoring Program with Cost Constraint**

Based on cost estimates provided by the consulting team, this monitoring program would include a sample size of fewer than 1000 turbines, visited every 30 days. A team of field staff, supplied by the avian monitoring team consultants, would select 1000 of the 2213 turbines that have been monitored through wind company sponsorship since the County approved the conditional use permits. The monitors would visit each turbine approximately once every 30 days and record the number of observed fatalities found within search plots around the turbines. This program has similarities to the recommended approach, but differs in the number of turbines and does not include the short-term intensive study on burrowing owls and American kestrels.

While 1000 turbines may sound like a large number, the expected number of fatalities in this sample size is too small to provide sufficient statistical power to detect change that is credible given widely accepted protocols in the scientific community. In other words, the County could conduct this study and not be able to determine if the actions taken by the companies resulted in a 45% reduction of raptor mortality in the Altamont Pass.

In addition, this program would not support any relative abundance surveys to assess whether birds continue to use the Altamont Pass at similar rates observed in the past. Relating mortality estimates to relative abundance estimates is standard practice in bird collision studies at wind farms. This program also would not support scavenger removal or searcher detection trials that estimate the number of carcasses missed during standard searches due to searcher error and scavengers removing carcasses. Understanding these detection factors is critical to adjust the mortality estimates by the number of bird carcasses *not* found. Because estimating these correction factors is standard practice, the SRC is concerned that results could be criticized without these study elements.

#### **Summary**

The SRC does not recommend that the County implement this program of study. An avian monitoring program that is responsive to the budgetary constraint of \$2 million would not provide a large enough sample size or reliable correction factors for the SRC to determine confidently whether the wind companies' actions to reduce avian mortality would meet the County's permit conditions.

### **2) Optimal Program with No Budgetary Constraints**

As part of its discussion and deliberation, the SRC also developed an optimal approach if science was the sole driver and cost was not a consideration. In this study, the sample size was increased to 3,000 turbines to improve the level of statistical confidence in mortality estimates and the search interval was reduced to 15 days to be consistent with the California Energy Commission's statewide guidelines. The optimal study would include relative abundance data to determine the number of birds "using" the area. Scavenger and searcher detection studies would also assist in data analysis to adjust the number of observed fatalities based on rates of other animals eating carcasses and human errors in finding them. The monitors would also conduct background mortality studies by searching for carcasses on ridgelines and other areas where no wind turbines are located in an effort to estimate the proportion of fatalities at wind turbines that may have been caused by natural factors and not wind turbines. (Background mortality has often been a concern of the wind farm companies.) The monitors would also conduct necropsy studies to improve determination of time and cause of death. The SRC would also recommend a survey of rancher rodent control activities.

To more accurately estimate small raptor (i.e., American kestrel and burrowing owl) and other small bird and bat mortality (which may be inaccurate even with a 15-day search interval), this approach also includes an intensive study on American kestrels and burrowing owls: every day for 1 month per season for a total of 4 months of the year. The SRC and others in the scientific community do not have sufficient information to accurately estimate the number being killed because scavengers remove the carcasses of American kestrels and burrowing owls between searches. Past studies have indicated that they may be scavenged at a much higher rate than larger raptors. This intensive study would more accurately determine the scavenger rate for these small birds. No other studies to date have addressed this issue. Finally, the SRC would recommend observational surveys to include small birds and recommend looking at all (67) plots in the sample once per week.

This optimal study would provide high precision to estimate the percent change in the individual four target species, other types of birds, and the pooled species. It would improve understanding of why birds collide with wind turbines and could improve the design and operations of wind farms in the future. The study would provide information about carcasses so scientists could identify and correct for other patterns of behavior that could result in additional bird deaths. Based on the 15-day search interval and more accurate correction factors, scientists would be able to more precisely estimate fatality rates for target species and small birds and bats. The study would provide a greater ability to correlate bird use with mortality. Finally, this study would produce reliable correction factors that enable comparisons with fatality rates from historical studies.

#### Summary

The only reason the SRC does not recommend this optimal approach is the issue of cost.

### 3) Recommended Program

The recommended approach is like the other studies in that its objective is to evaluate whether the conditions set forth in the permits have been met with a level of accuracy credible to the scientific community. This program will detect a 45% reduction collectively in the four target species with a  $\pm 10\%$  margin of error. To reach this level of validity, the sample size will start with 2500 turbines to ensure 2000 turbines will be available over the course of the study. Turbines are regularly taken out of operation for various reasons so the 2500 turbines assure an adequate sample size despite expected attrition. This sample size is largely comparable to the 2213 turbines monitored since permit approval in 2005. The study will also consider the percent reduction for individual species although at a reduced level of precision. At the end of year 3, the SRC will issue recommendations on additional studies in year 4 and beyond.

After considering 15- and 30-day search intervals, the SRC recommends a 30-day search interval for the Altamont-wide study only under the condition that an intensive study with 2-day intervals for one month each per season is conducted on two key species, referred to as the Sample Design for American Kestrels and Burrowing Owls. Combining the 30-day search interval with the intensive short-term sample design addresses both spatial and temporal patterns of mortality. This program allows the SRC to understand the frequency and timing of birds being scavenged that can be applied to the Altamont-wide study. The SRC recommends the short-term sample design to resolve unanswered scientific questions, to provide accurate data on these two key species in the permits, to improve correction factors in other studies, and to be responsive to the CEC statewide guidelines that will recommend 15-day search intervals.

Except for winter-time shutdown of wind turbines, management actions, as required under the current conditional use permits, will likely not be able to achieve a 45% reduction in red-tailed hawk fatalities. Red-tailed hawk fatalities confound scientists and seem immune to most management actions. In addition, this recommended approach will not confirm a 45% reduction in Golden Eagle fatalities since it will measure the reduction of the pooled species together. It will, however, allow the SRC to look at the trend in fatalities of the individual species, including Golden Eagles.

#### Summary

This approach would provide sufficient scientific information to determine if the conditions of the permit have been met while reducing monitoring costs compared to the optimal approach. This approach would also assist in examining effects of the winter shut down, a strategy previously recommended by the Board.

#### **Cost Considerations on Recommended Approach**

Field work is the primary driver of the monitoring costs: searching for bird carcasses is time consuming and costly. Conducting searches is arduous work that also requires expertise to ensure quality data collection. The SRC is concerned that reducing the contracting team to one firm will not solve budgetary concerns.

The SRC has worked with the County to identify cost cutting measures by eliminating redundancy among the consulting staff within the scope of work, reconfiguring the team to have one primary contact to interface with the SRC and be responsible for all deliverables, and forming a management board so the senior consultants can provide strategy on milestones and review critical documents.

To save costs and be responsive to the Board of Supervisors, the County Planning Director and stakeholder concerns, the SRC has recommended the following:

- Changing the consulting team structure and reducing administrative overhead of the consulting team
- Doing two studies (a short-term intensive combined with a long-term with 30-day interval) rather than one long-term study with 15-day interval.
- Limiting the relative abundance study to raptors.
- Eliminating the collection of behavior data as part of the long-term monitoring in the Altamont-wide study and instead focusing behavior data collection in response to specific management actions and research questions.

### Comparison of Programs

	<b>\$2 Million Program</b>	<b>Optimal Program</b>	<b>Recommended Program</b>	<b>Program Implemented by Companies 2005-2006</b>
<b>Sample Size<sup>2</sup></b>	<1000 turbines	>3000 turbines	2500 turbines	2213 turbines
<b>Search Frequency<sup>3</sup></b>	30 days	15 days	30 days	30 days
<b>Bird Behavior Data<sup>4</sup></b>	No	No	No	Yes
<b>Bird Relative Abundance Surveys</b>	No	Yes	Yes	Yes
<b>Scavenger Studies<sup>5</sup></b>	No	Yes	Yes	Yes
<b>Kestrels &amp; Burrowing Owls Study</b>	No	Yes Search daily for 1 month per season (4Xs/yr)	Yes Search every other day for 1 month per season (4Xs/yr)	No
<b>Other Elements</b>	None	Background Mortality Necropsy Studies	None	None
<b>Survey Rancher Rodent Control</b>	No	Yes	Yes	No
<b>What Study Measures</b>	Cannot assess 45% change with scientific credibility	45% change in individual species and pooled species	45% change in pooled species (4 target species together)	45% change in pooled species, but highly uncertain due to insufficient information about American kestrels and burrowing owls

<sup>2</sup> Sample Size: # of turbines searched at Altamont Pass as part of the monitoring program.

<sup>3</sup> Search Frequency: time between visits to individual turbine to search for dead birds in the search area.

<sup>4</sup> Behavior Data: how birds behave in presence of wind turbines. (i.e., flight height, distance to turbine)

<sup>5</sup> Scavenger Studies: Special studies that correct the number of observed fatalities to account for the number of birds being eaten by animals in the area and human error to be able to find carcasses.