

MEMO

To: Alameda County Scientific Review Committee

From: Shawn Smallwood

Date: 26 July 2007

Re: Opinion of some SRC members that the period over which post-management mortality will be estimated remains undefined

During the SRC's conference call of 20 July 2007, Julie Yee stated her disagreement with my assumption the SRC will measure average annual mortality over the course of the project period defined by the Settlement Agreement, namely from the effective date of the Agreement (10 January 2007)¹ until November 2009. Other SRC members concurred with Julie that the monitoring period has not yet been defined. I found this opinion surprising, and as I stated during the call, I regard this issue as one of the most important the SRC faces. I was surprised by this opinion because I thought the SRC already decided this issue, months ago.

Julie cited the ambiguity of the Settlement Agreement as the basis of her opinion that the monitoring period can be some period less than the period defined by the Agreement, and Sandi Rivera affirmed that the Agreement gives the SRC the latitude to define the period during which mortality will be estimated for comparison to the baseline estimate. I agree the Settlement Agreement is vague on this point in its statement of the objective of the mortality reduction program. Term 3 of the Settlement Agreement reads, "The Wind Power Companies shall achieve a 50% reduction in raptor mortality within three (3) years of the effective date of this agreement." Term 2 of Exhibit G-1 for Settling Parties states the objective differently, "The Wind Power Companies shall achieve a 50% reduction in raptor mortality by November 1, 2009.

During the conference call, some SRC members expressed the opinion that "within 3 years" or "by November 2009" can be interpreted to mean any period within the 3 years or before November 2009, e.g., the last year of the program, the last 1.5-years, or some other period less than the 3-year avian mortality reduction program. Narrowly interpreted, the statement of objective in the Settlement Agreement and in Exhibit G-1 can be interpreted that way. However, the SRC was charged by the Board or Supervisors (BOS) with assessing the effectiveness of the Alameda County avian reduction **program**, which clearly started upon the effective date of the settlement agreement for most companies, and on 22 September 2005 for one non-settling company. Also, those specific phrases that can be narrowly interpreted come within a context of discussion that had already taken place. Prior to the Settlement Agreement, the SRC had already decided the monitoring period shall be 3 years (see below). After the Settlement Agreement, the SRC had maintained that the monitoring period shall be the time from the Settlement Agreement

¹ The Settlement Framework was signed by the Parties on 7 November 2006, but the Agreement was not adopted by the Alameda County Board of Supervisors until 10 January 2007. The 3-year period defined in the Agreement was effectively curtailed to a period of 2 years and 10 months due to the delay in BOS adoption between 7 November and 10 January.

until November 2009. These decisions followed deliberation over when the monitoring period should begin, and were based on technical considerations.

Deliberation over this issue began during the SRC's first meeting in September 2006, when Carl Thelander proposed setting annual mortality reduction targets, starting from a modest value and working toward 45% reduction after the third year of monitoring. Later the SRC rejected this proposal, and decided the post-management mortality estimate needed to be one value to be compared to the baseline value. The reason for this was the SRC's belief that annual estimates would lack the precision necessary to detect 10-15% changes in mortality from one year to the next. The SRC next considered but rejected the possibility that it might treat the first year (2005-06) of fatality monitoring performed by WEST, Inc. as the pre-management period, the mortality estimate from which would serve as the baseline. In this scenario, the following 2-year period would provide the data to be used to estimate average annual mortality post-management. On 1 December 2006, WEST, Inc. produced a power analysis in support of this scenario. However, the SRC rejected this scenario because the WEST, Inc. mortality estimates for 2005-06 were higher than reported by Smallwood and Thelander (2004), possibly due to management actions taken during that year. These management actions included leaving end-of-row lattice towers as flight diverters and shutting down turbines half the winter. The SRC felt that that year's data were unsuitable for use in a baseline estimate, and decided to instead use the Smallwood and Thelander (2004) estimates as the baseline. The SRC agreed that 3 years of post-management fatality monitoring was minimal because this was the period recommended by Smallwood and Thelander (2004) to minimize the effects of inter-annual variation in mortality and to arrive at a sufficiently precise estimate for the purpose of comparing the estimate to other estimates. The SRC also thought that the 2005-06 data collected by WEST, Inc. could be used as the first of the 3-year, post-management monitoring period that would lead to the post-management mortality estimates. This was deemed appropriate because management actions were scheduled by the BOS to begin by October 2005.

Furthermore, the 3-year monitoring period in the Settlement Agreement was based on the Smallwood and Thelander (2004) recommendation, as well as Golden Gate Audubon Society's discussions with me during their settlement negotiation prior to the formation of the SRC. The very basis of the Settlement Agreement's monitoring period was the Smallwood and Thelander (2004) recommendation that fatality monitoring be performed at least 3 years.

The SRC's notes from its 23 October 2006 meeting stated, "*The objective of developing a data set is to evaluate the overall trends to reduce bird mortality at Altamont. The data would provide a baseline and be used for adaptive management. The data set would also provide a basis to evaluate management strategies recognizing that some specialized studies might have to be initiated to measure the effect of certain management strategies.*" The SRC further stated, "*The SRC's overall goal is to get precision on the trend of 45% reduction over 3 years for the four combined species (as specified in the Conditional Use Permits). The 15% referred to estimating the change in mortality. If interested in looking at long-term reduction, the precision on the 45% reduction will not be the same as the precision on individual annual reductions.*" This quote reflects the SRC's consideration of precision with annual mortality estimates versus an estimate based on a 3-year period.

The 28 November 2006 meeting notes included the statement, “*Will need several years of data because it is such a rare event. 45% should be the target,*” and “*Concern: If we don’t have any idea how we are doing until year 3, we have no room for correction. If point estimate doesn’t show a reduction, we will be concerned.*” The SRC further noted, “*What is year 1, pre-management data?*”

- *We are in a post-management phase.*
- *We could use 2004 CEC or Orloff data or 05-06 data.”*

Under “*Big Questions*”, the meeting notes state, “*What is the pre-management year? Is it 2005/06 data? 2004 Smallwood and Thelander? Orloff? 05-06 data? SRC assumes that we are already in a post-management state.*” The SRC was deliberating over the duration of the monitoring period with which to estimate the post-treatment mortality estimate to be compared to a baseline estimate, which the SRC agreed would be from Smallwood and Thelander (2004).

On the cover page of the SRC’s 7 February 2007 recommendations to the Alameda County Board of Supervisors, the SRC stated, “*...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.*” Under Common Elements of the recommendations, the SRC stated, “*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.*” The point of this last statement was that a three-year period would be devoted to estimating mortality with reasonable precision. Under Recommended Program, the SRC stated, “*At the end of year 3, the SRC will issue recommendations on additional studies in year 4 and beyond.*”

On 13 March 2007 I saw the last version of the Monitoring Team’s Scope of Work, which had been reviewed by the SRC. In the first paragraph, the Scope of Work states, “*The services offered are based on a monitoring program that will provide mortality data sufficient to meet the statistical requirements of detecting a 50% decline in mortality of four target raptor species (golden eagle, red-tailed hawk, American kestrel, and burrowing owl) with a precision level of $\pm 10\%$ for all species combined.*” Later it states, “*This level of effort will allow for some attrition in availability of turbines during the monitoring period while ensuring a minimal turbine sample size of 2200 turbines throughout the study.*” Later still, the Scope of Work states, “*The avian fatality data collected during the monitoring program will be analyzed to determine the level and nature of change in turbine-associated bird deaths during the survey period (ending November 2009) and whether there has been a 50% decline in combined raptor mortality.*” The Scope of Work also states, “*The proposed period of performance for this project will start 1 June 2007 and extend to 31 October 2009; 29 months following completion of the existing six-month contract between the County and the University to monitor the APWRA turbines.*” The impression I get from these statements is the Monitoring Team was aware of the SRC’s decision to estimate average annual mortality based on data collected from the entire period of the project, ending November 2009.

In the 19 March 2007 meeting notes, it was stated, “*Smallwood & Thelander (2004) estimated mortality based on 5 years of data and recommended that any future estimate consider at least 3 years of data. The winter-time shutdown study is an example of an alternative experimental study*

to evaluate reduction in mortality that controls for year-to-year variability. Introducing mitigation in one part of the APWRA and not in another so the differences between the two areas would not be influenced by year-to-year variability [sic]. ... The SRC thinks it's important for others to understand these issues as they relate to the baseline." These statements demonstrate the SRC was concerned about inter-annual variation in mortality, and felt this factor could confound the comparison of a post-management mortality estimate to a pre-management mortality estimate.

On 31 March 2007, the SRC produced a document titled, "S20_Alameda County Scientific Review Committee Replies to the Parties' Responses to its Queries and to Comments from the California Office of the Attorney General." In the section addressing comparability of mortality estimates, the SRC repeatedly referred to the post-Agreement mortality estimate as the 2007-09 estimate, implying the time period of the estimate spanned 2007 through 2009.

In the 17 April 2007 memo to Chris Bazar regarding "SRC Statement in Support of the Monitoring Program Scope and Budget," the SRC stated the following:

- *"It is absolutely critical that the monitoring program continue without interruption, because lack of completeness and continuity in the data would compromise the program's precision in determining the percent reduction in mortality.*
- *Without the monitoring program recommended by the SRC, it will be impossible to determine if the 50% reduction required by the settlement agreement and stipulated in the conditional use permits is being reached."*

These statements indicate the SRC intended for the ongoing monitoring to contribute to an overall average annual mortality estimate, and that an interruption would jeopardize the ability of the monitoring program to generate a sufficiently precise estimate.

In my opinion, the SRC has long intended to estimate average annual mortality based on data gathered over a 3-year period. Saying otherwise now is a deviation from what has already been agreed among SRC members, and from what has been understood by the Parties and the Monitoring Team. Just as the beginning of the post-management phase had been defined as the month following the BOS Resolution of 22 September 2005, the beginning of the post-management phase since the Settlement Agreement was defined by the Parties and in the CUPs as the day after 10 January 2007, and not the day after some management actions are finally taken. It is the **program** the SRC is evaluating, not just specific management actions. The post-management phase is ongoing, despite the fact nothing of substance has been done to reduce mortality since the Agreement. It is the SRC's responsibility to evaluate the effectiveness of the program, even if the program is devoid of management actions.

Using a shorter time period also risks obtaining an unusually high or low mortality estimate simply due to inter-annual variation in relative abundance and mortality. After using the Delta Method to carry standard errors from estimates of searcher detection and scavenger removal rates through to their use in calculating mortality estimates, I recently found that the lower- and upper-bound estimates of the 80% confidence interval were far from the point estimate. For two

of the SRC's target raptor species, the lower-bound estimates were less than 0, which of course is absurd, but not different from mortality estimates reported at other wind farms or even this one (see Orloff and Flannery's 1992 report). The important point here is that even though they were based on multiple years of fatality data, the precision of the mortality estimates the SRC regards as baseline is very low. The precision of mortality estimates derived from a one-year period, or 1.5 years, or 0.5 years, would be excessively low for our purpose.² (In support of this conclusion see the attached report.) It would be highly unlikely that a 50% mortality reduction would be detected from a short-duration, post-management monitoring period because the standard error of the estimate would be too great. And due to the possibility of large inter-annual variability in mortality, a significant difference between the baseline estimate and another mortality estimate derived from a one-year period would be unsatisfactory (see attached report).

It has been a long-standing assumption that the SRC was responsible for assessing the effectiveness of the Alameda County avian mortality reduction program, and not just individual mitigation measures. As the foregoing shows, this assumption has been implicit in our previous discussions. I strongly recommend that the SRC use fatality monitoring data generated from start to finish of the avian mortality reduction program to measure mortality as a means of assessing the effectiveness of the program; that is, whether the program reduced raptor mortality by 50%. The program's start and end dates were specified in the 22 September 2005 BOS resolution (at least for non-settling companies) and in the Settlement Agreement. The program must be tested for effectiveness, even more so than specific mitigation measures, because the California Department of Fish and Game will need to decide whether it is worthwhile to attempt the development of an NCCP, and whether it should advise the County to prepare an EIR. Also, the BOS and the public will need to know whether the program was effective, and hence the degrees to which mitigation measures or lack thereof contributed to the program's effectiveness. It would be inappropriate for the SRC to decide to redefine the program as starting after the Companies actually implement mitigation measures, and it would be contrary to the best available scientific information (see attached report).

² The SRC has been shown mortality estimates from one year of data, including from Diablo Winds and the 2005-06 year of APWRA-wide monitoring by WEST, Inc. These estimates were presented as point estimates without error terms. I have used these point estimates also, for the sake of argument over specific issues, but in my report on Diablo winds, which was prepared in response to the WEST, Inc. report on the same project, I wrote, "... *the first annual report of Diablo Winds fatalities is preliminary because the time period was short and the sample size of fatalities small. Several years of monitoring will be needed to make more robust comparisons of mortality before and after the project.*"