

SUMMARY OF ALAMEDA COUNTY SRC RECOMMENDATIONS AND CONCERNS AND SUBSEQUENT ACTIONS

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For 24 months preceding a nearly yearlong hiatus, the Alameda County Scientific Review Committee (SRC) issued recommendations regarding the operation of wind turbines in the Altamont Pass Wind Resource Area (APWRA) and the associated fatality monitoring program. These recommendations were in response to the Alameda County Board of Supervisors Resolution Number R-2005-453 September 22, 2005, “The SRC shall be responsible for developing scientifically-supported strategies to reduce injury and mortality to avian wildlife associated with wind turbine operations in the Alameda County portion of the APWRA, including existing and future repowering projects, through the implementation of those strategies, especially those set forth under Condition 7 below (the Avian Wildlife Protection Program & Schedule, or AWPPS).” Also, “The SRC should utilize an approach under which there is a continual cycle of assessment, design, implementation, monitoring, evaluation, adjustment and re-assessment of strategies, except where experimentation on this basis is deemed by the SRC to be in conflict with the overall program of strategies and schedule set forth under Condition 7 below. The SRC shall provide its recommendations to the Planning Director for the implementation of specific strategies to reduce avian mortality, and the conduct of research and monitoring activities.” Also, the Settlement Agreement of 11 January 2007 appeared to reinforce the SRC’s role of making recommendations.

Since convening, the SRC had to hastily address a series of complex issues, often issuing recommendations without having time to later return to them to assess their effectiveness. Therefore, I prepared the following summary of the SRC’s recommendations in order to catalogue and organize them and to facilitate a subsequent assessment of the effectiveness of the recommendations. Table 1 briefly summarizes the most important recommendations, in my opinion, and Table 2 presents more detail. Table 2 also includes most of the recommendations the SRC has made, though I suspect others were made but were not recorded in writing. This summary is entirely my own and was prepared on my own volition. Previous drafts of this review were not assigned an SRC document number and not posted on the SRC website.

I organized the recommendations/concerns in the following order: The Program goal, permit compliance issues, mitigation measures, measuring mortality reduction, and general meeting and process issues. In Table 2, I often changed the wording for conciseness, but took care to maintain the meaning of the recommendation or concern. Wherever I stated that certain actions had not been taken, the statement applied by the date of the last draft of this report. Following Table 2 is a summary of the degree to which recommendations were followed, to the best of my knowledge. I will correct any mistakes that are pointed out to me.

Table 1. Summary of most important recommendations and statements of concern from the SRC, and a brief summary of the response(s).

RECOMMENDATIONS AND CONCERNS FROM SRC	ACTIONS
To achieve a 50% reduction in raptor mortality during the program period, and to be able to detect such a reduction, the permit conditions need to be met and substantial mitigation measures implemented.	Insufficient; mortality was not reduced.
Repowering should be considered as another means of potentially achieving mortality reductions in the long term, though it should not be thought of as mitigation.	None.
The companies should shut down all the wind turbines for four months during the winter of 2007-2008.	The companies shut down turbines for only two months.
All applicable Tier 1 and 2 turbines (152 turbines identified by Smallwood and Spiegel 2005c) should be removed.	Likely done, but too late (See SRC P145).
All turbines rated 7-10 by SRC in late 2007 (457 trubines/towers) should be relocated or removed.	Fewer than 50% of these turbines were moved, and much too late (SRC P145).
Companies should better inform SRC about turbine removals and relocations.	Insufficient.
Derelict towers used as end-of-row flight diverters should be removed immediately.	Not done.
All derelict towers should be removed or put back into service with functional turbines. Companies should consult with SRC regarding derelict tower removals and functional turbine relocations.	Not done.
Compliance monitoring is needed from trusted third party or by the SRC. The monitoring team should be kept informed of land use decisions and changes to the arrangement and functionality of the wind turbines.	Insufficient.
County should grant NextEra credits for 96 turbines moved in 2004 to reduce bird mortality. SRC assumed (1) NextEra will remove an additional row of Tier 1 turbines (4286 to 4294) within 15 days of being granted credit as stipulated in the settlement agreement, and (2) NextEra will continue removing Tier 1 & 2 turbines through attrition.	Credits were granted, though NextEra missed turbine removal deadline.

<p>AWI should move forward with a blade painting study once it produces a study proposal the SRC can approve. Also, the County should not grant AWI’s requested exemption against the winter shutdown of all its turbines in exchange for performing the blade painting study.</p>	<p>AWI did not present an acceptable plan.</p>
<p>The companies should provide power output data for individual turbines so that the SRC can test hypotheses related to causal mechanisms of collisions and so that recommended turbine removals can better balance mortality reduction with minimizing loss of power generation in the APWRA.</p>	<p>Power data were not given to SRC or used in monitoring report.</p>
<p>The SRC recommended a focused burrowing owl behavior study in order to learn why burrowing owls are being killed at such high rates near wind turbines.</p>	<p>Note done.</p>
<p>Need intensive fatality searches in a short-term study to improve estimates of scavenger removal rates of American kestrels and burrowing owls. The monitoring team was asked to do the study in fall 2007 and spring 2008.</p>	<p>Study was completed, but removal rates disputed and final report not submitted.</p>
<p>Concerned about monitoring team not being able to establish relation between spatial analysis and mortality, due to insufficient budget.</p>	<p>This issue was not resolved.</p>
<p>The SRC was concerned that if funding was curtailed by the Board after the first year, a gap in monitoring could occur or no one will be available to analyze the data. The potential implications for stopping the monitoring were significant.</p>	<p>Funding was extended after first year, but too late to avoid monitoring team shake-up.</p>
<p>Fatality monitoring at Diablo Winds should continue uninterrupted.</p>	<p>NextEra agreed.</p>

Table 2. Detailed summary of SRC recommendations and concerns. The dates in parentheses refer to the written meeting notes for the date that the SRC met. In some cases, SRC documents or portions of documents are cited in parentheses. Maroon font represents recommendations or concerns that have not been addressed to the degree that I think would be deemed satisfactory by the SRC. References to ‘settling Parties’ or to ‘Parties’ represent the parties to the settlement agreement that was approved by the Alameda County Board of Supervisors (often referred to as the Board or BOS) on 11 January 2007. ‘Settling companies’ refers to the wind power companies that settled with plaintiffs in the agreement approved by the Board on 11 January 2007. “CUPs’ represents conditional use permits, which were issued by the Board on 22 September 2005, and most of which were modified by the Board on 11 January 2007 to incorporate terms of the settlement agreement.

RECOMMENDATIONS AND CONCERNS FROM SRC	ACTIONS ON SRC RECOMMENDATIONS & CONCERNS
<u>Measuring mortality reduction – the goal</u>	
<p>Target 45% reduction in mortality of 4 target raptor species pooled together (4-6 Dec 2006). This goal was reaffirmed in memo to Board of Supervisors (5-7 Feb 2007), though the settlement agreement of 11 Jan 2007 set the goal at 50%. (Background: The BOS Resolution directed the SRC to oversee the fatality monitoring to ensure the measurement of change in mortality is scientifically sound, and to recommend measures that will substantially reduce mortality. Because the 2005 CUPs did not identify the percentage reduction considered as “substantial,” the SRC addressed the reduction goal during its first few meetings.)</p>	<p>After agreeing the reduction goal will be 45%, the settling parties set the goal at 50%. By the end of 2007, the number of fatalities per MW per year had not declined significantly, and the 50% reduction goal was far from being reached. At the end of the Program in December 2009, the monitoring team concluded that fatality rates of the 4 target raptor species had not been reduced.</p>
<p>Examine percent reduction of individual species, understanding that the precision of the estimated reduction will be lower than for pooled species (4-6 Dec 2006).</p> <p>The SRC and monitoring team warned that while it may be possible to reduce pooled species mortality by 50%, doing so for red-tailed hawk alone is unlikely. Also, the monitoring results might detect a mortality reduction for another species but with lower confidence due to small sample size (27 Feb 2007).</p>	<p>No change was made to the CUPs or to the Program’s funding in response to the warning. Error terms were large by Program’s end, and no reductions in fatality rates were detected for any target raptor species or for all four species pooled together.</p>
<u>Compliance with permit conditions</u>	
<p>Meeting the conditions of the permit is dependent upon the companies implementing the conditions (21 Dec 2006).</p>	<p>Nearly all deadlines in the CUP schedule were missed, and the County relaxed some CUP requirements.</p>
<p>According to the Settling Parties, the Companies will not remove artificial rock piles</p>	<p>Little was done to further reduce raptor mortality. The SRC</p>

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<p>or derelict turbines or derelict towers. It does not appear that additional mortality reduction measures will be implemented until 2010. Assuming the half-winter shutdown of turbines is continued beyond the winter of 2007/2008, and assuming all Tier 1 & 2 turbines are actually shutdown permanently, then the measures might achieve a 27% reduction in mortality of the 4 pooled raptor species. It remains unlikely the 50% mortality reduction target will be achieved using these measures. It is unlikely it will be achieved by performing experiments on turbines peripheral to the monitoring sample (Attachment 2 in SRC S20).</p>	<p>recommended that some Tier 1 & 2 turbines be allowed to continue operating as credits for turbines NextEra said they shut down or relocated in 2004 (20 Jul 2007), and the County relaxed some other CUP requirements. Most Tier 1 & 2 turbines were shut down 2 years after the BOS deadline and 8 months after the settlement agreement deadline (SRC P54). Winter shutdowns were short of SRC recommendations, and derelict towers were not removed. Fatality rates were not reduced (SRC M21 v. 2009).</p>
<p>The SRC discussed a concern related to the Settling Parties being able to meet the 50% reduction requirement without substantial measures being implemented to reduce mortality (20 July 2007) by the settlement deadline of November 2009 (20-22 Aug 2007). The SRC will submit a memo this fall [2007] once the SRC has reviewed the final report of the most recent monitoring period.</p>	<p>A draft monitoring report was released on 31 Jul 2008, reporting mortality increases rather than reductions. The SRC was then told to stop work, so was unable to issue a memo stating its concern the Program was not on track to reaching the 50% reduction goal. However, the SRC had stated its concern at a meeting with the settling parties on 10 Oct 2007.</p>
<p>The SRC warned that the later the wind companies implement mitigation measures, the less likely sufficiently precise estimates of mortality will be obtained to assess effectiveness, and the less likely the goal will be reached (10-12 Dec 2007).</p>	<p>Nothing changed in the APWRA that would have dampened the SRC’s warning. Fatality rates were not reduced (SRC M21 v. 2009).</p>
<p><u>Compliance with permit conditions – EIR preparation</u></p>	
<p>AWI was asked what progress had been made toward repowering 10% of turbines. AWI said they hadn't started the first annual letter because there is no EIR establishing conditions for repowering. This action was supposed to occur before the EIR (5-7 Feb 2007).</p>	<p>The County will discuss the issue with AWI (5-7 Feb 2007). The County has been “distracted,” so the EIR process should begin in May 2008 (12-14 Feb 2008). Then the County said the monitoring team was not budgeted to prepare the EIR Scoping document, so County Staff will do it (23-24 Apr 2008). County staff thought preparation may begin in July 2008 (23-24 Apr 2008), but revised its startup date to the end of the year (2 Jul 2008). Funds were not allocated or sufficient for developing the EIR scoping document (23-24 Apr 2008). The County later said it replaced the EIR requirement with a plan to develop an HCP/NCCP (18 May 2009).</p>

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<p><u>Compliance with permit conditions – turbine removals</u></p>	
<p>Companies should provide more information regarding Tier 1 turbine removals to date, preferably in map form (11 Sep 2006).</p> <p>Companies should provide map and turbine number in response to Exhibit G, Item 1 -- removal of Tier 1 turbines (4-6 Dec 2006).</p>	<p>Maps were provided to the SRC a year later on 29 Nov 2007, and these maps depicted turbines that were removed. However, the SRC did not review the Tier 1 and Tier 2 turbine removals in any directed manner.</p>
<p>In the mitigation compliance report (p.2), the SRC noticed that 42 NextEra tower structures remained as “pylons.” The SRC again recommended that these towers be removed (5-7 Feb 2007).</p>	<p>The County informed the SRC that its recommendation was not forwarded to the Companies (5-7 Feb 2007). Whether these towers were ever removed remains unknown.</p>
<p>Companies should clarify whether blades and motors are being moved to other towers when Tier 1 and 2 turbines are “removed.” The language of the settling parties implies the companies can move turbines to existing pads that do not have towers (13 Mar 2007).</p>	<p>The SRC never verified that blades and motors were moved from Tier 1 and 2 locations to vacant turbine addresses. No third party verification was attempted until summer 2009, but the third party consisted of County interns and the SRC was not provided a comprehensible report.</p>
<p>Relocated turbines should be moved to lower risk sites designated Tiers 4, 5 or 6, otherwise companies should consult on new locations with the SRC. The SRC supports flexibility in the companies' approach and use of professional judgment. When a company decides to move a turbine to a site other than Tier 4, 5 or 6, or to one not classified, or if the company has special considerations, the company should consult with the SRC (9-11 Apr 2007).</p>	<p>The SRC was not made aware of which, if any, turbines were relocated. Various company reports were provided to the SRC, but the SRC has not checked on or evaluated the reported relocations. There was no third party verification, unless one considers unidentified County interns as the third party.</p>
<p>It is incumbent on NextEra to put together a proposal to ensure that the SRC is in compliance with the settlement agreement in issuing its credit for turbines said to have been shut down in 2004 (12 Jun 2007).</p>	<p>NextEra submitted a proposal. Four of the SRC members found it technically adequate, and one did not.</p>
<p>County should grant NextEra credits for 96 turbines they say they moved in 2004 to reduce bird mortality. The SRC assumed (1) NextEra will remove an additional row of high risk Tier 1 turbines (4286 to 4294) within 15 days of issuing this credit as stipulated in the settlement agreement, and (2) NextEra will continue to remove Tier</p>	<p>In Oct 2007, the County said it granted the credit for removing high risk turbines in exchange for Tier 1 and 2 turbine removals. Two months after the deadline, NextEra completely removed the additional turbine row recommended by the SRC (16 Oct 2007).</p>

RECOMMENDATIONS AND CONCERNS FROM SRC	ACTIONS ON SRC RECOMMENDATIONS & CONCERNS
1&2 turbines through attrition (20 Jul 2007, also see SRC P40).	
Reiterated previous recommendation that all Tier 1 & 2 turbines be removed or relocated (20-22 Aug 2007).	Sandra Rivera said no Tier 1 or 2 turbines remain among settling companies, except those covered by a credit issued to NextEra in 2007 as part of the settlement agreement (10-12 Dec 2007).
The Monitoring Team should track a sample of turbines that are supposed to be removed. Alameda County will provide a list of the turbines slated for removal to the Monitoring Team so that the team can track a random sample from the list (12-13 Sep 2007).	In winter 2008-2009 and in response to my query, the monitoring team reported it was not supplied a list of turbines to track. No turbine tracking data were posted on the SRC website, and none were used in the draft final report (M21 v. 2009).
Reiterated that the settlement agreement required Tier 1 and 2 turbine removals based on a model not necessarily designed for this purpose, and without considering possible consequences. The SRC advised that ‘common sense’ should contribute to turbine removals and discouraged any removals without assessing the mortality-related effects (12-13 Sep 2007).	On 29 Nov – 1 Dec and 10 Dec 2007, the SRC visited the APWRA and observed gaps in turbine rows left by enXco’s removals of Tier 3 turbines, thus demonstrating that the SRC’s recommendation was misunderstood or misapplied. It is unknown whether the other companies followed the recommendation.
The SRC remains concerned over full compliance with the Tier 1 and 2 removal requirement and its potential contribution to mortality reduction (12-13 Sep 2007).	The SRC was not given the means to confirm permit compliance, and was supplied only with company reporting of compliance.
<u>Compliance with permit conditions – partial winter shutdown</u>	
Finish the existing seasonal shutdown study, scheduled to be completed in February 2007 (11 Sep 2006).	Completed.
AIC should report on seasonal shutdown actions (4-6 Dec 2006).	I’m unaware whether this recommendation was followed.
<u>Compliance with permit conditions – verification</u>	
County should clarify what is meant by “confirmed determination is required by the SRC” for permit conditions in Exhibit G. One SRC member preferred first-hand or trusted third-party verification (5-7 Feb 2007).	See recommendation on 9-11 Apr 2007. SRC voted to change the language of the CUPs. However, the SRC lacked authority to change the CUPs, and I doubt the CUPs were changed.

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<p>County should consider the ideal method of “confirmed determination” to be third party verification. If that is not possible, a report from the monitoring team from sampled sites would be the next best alternative. The SRC will continue to welcome company reports at its meetings and to visit the wind farm annually to see mitigation measures firsthand (9-11 Apr 2007).</p>	<p>There was no third party verification, nor did the monitoring team summarize mitigation compliance. The SRC visited the wind farm on 29 Nov – 1 Dec and 10 Dec 2007, not to verify compliance, but did notice numerous derelict turbines and vacant towers.</p>
<p>In response to questions that arose about previous recommendations, the SRC urged the permittees to e-mail the County and/or SRC when they have a question or implementation concern about SRC recommendations. The SRC can then respond to the issue at its next conference call or regular meeting. Company representatives said they preferred dealing with one contact, so they can e-mail the County, which will forward the concern onto SRC members (9-11 Apr 2007).</p>	<p>Only once do I recall queries from the companies being relayed by County staff on SRC recommendations, and that was on several turbines rated as hazardous by the SRC.</p>
<p>County should revise the language of Exhibit G from “confirmed determination by the SRC” to “on recommendation of the SRC” so that the SRC is no longer in the role of verifying company compliance (9-11 Apr 2007).</p>	<p>Unsure whether the recommendation was followed, or whether approval to change Exhibit G was needed from settling parties or the Board.</p>
<p><u>Compliance with settlement agreement</u></p>	
<p>Some of the settlement agreement provisions, such as the blade painting study, may require additional studies peripheral to the monitoring program to prevent confounding monitoring results. If the monitoring program includes too many mortality reduction schemes, it may fail to provide conclusive data on each scheme's effectiveness. For example, excluding the painted turbines from the winter shutdown would decrease the sample size of the turbines committed to the winter shutdown experiment and thus reduce the ability to detect a change in mortality. Additionally, it would add confounding factors to the analysis (5-7 Feb 2007).</p>	<p>No additional mortality reduction methods were implemented, except for unverified removal of some turbines the SRC rated 9.5 and 10, and except for AWI having painted one blade black on 42 turbines. AWI requested approval for a larger blade painting study, but also requested all of its ~920 turbines be exempt from the winter shutdown requirement. In response, the SRC warned that this exemption could confound the results of the APWRA-wide monitoring program. No other turbines were painted.</p>
<p>The County should clarify which terms under Exhibit G-2 are required under Exhibit G-1 (13 Mar 2007).</p>	<p>The settling parties said the companies were no longer obligated to move rock piles or derelict turbines, due to language in the agreement (SRC S13). The County did not reconfirm requirements for removing derelict turbines under G-1 (20-22 Aug 2007). Most derelict turbines were not moved.</p>

RECOMMENDATIONS AND CONCERNS FROM SRC	ACTIONS ON SRC RECOMMENDATIONS & CONCERNS
<p>The SRC is concerned about the parties’ ability to achieve the 50% reduction. The SRC recognizes its charge to recommend management strategies to assist in achieving the 50% reduction, but questioned limitations on its role in light of the recent settlement (13 Mar 2007).</p>	<p>Nothing happened in the APWRA that would dampen the SRC’s concern. The SRC was told, however, that some SRC recommendations will indeed be decided by the Settling Parties, such as the mortality adjustment factor (24-25 Apr 2008).</p>
<p>The criteria in settlement agreement Exhibit A do not guarantee that turbines will be relocated to “less risky locations” for birds. These criteria disallow relocations within specified distances from slopes with certain features and percentage rates of change in elevation. However, the slope conditions are vague, and subject to a wide range of interpretations. For example, Exhibit A does not specify where on a slope its rate of elevation change should be measured. What constitutes a dip, notch, draw or canyon to one person will not necessarily be considered so by another. The SRC also notes Exhibit A gives the Companies sole discretion over determining whether relocation criteria are met. This is of concern to the SRC because the Companies may not be using the most appropriate selection criteria that provide the least possible risk to birds.</p> <p>Additionally, the way they are written, neither the settlement agreement nor Exhibit A disallows replacement of turbines at other sites (besides certain percentage slopes and slope features) that were considered relatively more dangerous by Smallwood and Thelander (2004). Such sites include the ends of rows in relatively low terrain, relatively isolated sites, or sites next to artificial rock piles, as examples. There is no requirement in section 5(c) of the settlement agreement or Exhibit A for the Companies to consult with the SRC, except for cases when the Companies decide that the slope criteria in Exhibit A are not met. But again, this decision over whether slope criteria are met is the Companies’ alone (SRC S20).</p>	<p>The SRC was not provided sufficient documentation to determine whether wind turbines were relocated, or to evaluate the criteria used in the relocations. The SRC did not review turbine relocations. Also, neither the settlement agreement nor the permit conditions were modified to address the SRC’s concerns over relocation criteria.</p>
<p>If settling Parties are correct that their agreement eliminated the requirement for the companies to remove the rock piles and the derelict turbines/towers, then the Parties need to understand the collective mitigation measures they have thus far committed to using will be less likely to achieve a 50% reduction in mortality (see Attachments 2 and 3). At this time the only mitigation measures directed toward the 2,500 wind</p>	<p>The companies did not remove rock piles or derelict turbines or vacant towers, nor did they submit a blade painting proposal or shut down turbines for 4 months over winter. Also, the SRC did not confirm Tier 1 and 2 turbines were removed, and NextEra continued operating some Tier 1 and 2 turbines due to the credit</p>

RECOMMENDATIONS AND CONCERNS FROM SRC	ACTIONS ON SRC RECOMMENDATIONS & CONCERNS
<p>turbines in the SRC’s monitoring program are half-winter shutdown and unverified permanent shutdown and relocation of some Tier 1 and Tier 2 turbines. NextEra is requesting credit toward shutdown of Tier 1 and Tier 2 turbines, and the blade painting experiment remains uncertain and no experimental design has been submitted to the SRC. Even a full winter shutdown, let alone a half-winter shutdown, standing alone, is not expected to achieve a 50% mortality reduction (SRC S20).</p>	<p>granted by the County for prior removals. The actions taken did not change the SRC’s conclusion that it was unlikely the 50% mortality reduction goal would be met, and in fact the data verified that the goal was not met after two years of the Program (SRC M21 v. 2008b, SRC P76) and after the Program was completed (SRC M21 v. 2009, SRC P145).</p>
<p>It is extremely important to use comparable methodologies when comparing the percent reduction between post-mitigation mortality and baseline mortality. Since mortality estimates are proportionally related to the adjustment factors for searcher efficiency and scavenger removal, the comparability of two mortality estimates is based on the comparability of the methods used to derive the corresponding adjustment factors. Comparability can also be affected by the selection of turbine sites where fatalities are searched. The Settlement has introduced the possibility of actions by the Parties that can potentially compromise the comparability between baseline and post-mitigation comparisons (SRC S20).</p>	<p>The County instructed the monitoring team to compare their new estimates to the baseline values appearing in the settlement agreement (12-14 Feb 2008). The County told the monitoring team and the SRC that adjusted baseline estimates could be developed for comparison, but that these adjustments and any adjustment coefficients used will need to go to the settling parties for their approval. Note that this requirement by County refutes Audubon’s response no. 8 to my concern that the baseline was determined by non-scientists outside the SRC (SRC S6). However, the monitoring teams draft final report relied on surprisingly small adjustment factors and did not use the baseline value specified in the settlement agreement.</p>
<p>The Parties state that the 50% mortality reduction target applies APWRA-wide.¹ The SRC understands fatality monitoring at Buena Vista has yet to begin, nearly three months after power generation began [at the time of the concern]. Neither the SRC nor the monitoring team has any influence over the fatality monitoring at Buena Vista. Likewise, the SRC has no influence over the fatality and relative bird abundance monitoring at Diablo Winds. Consequently, it is premature to conclude that the Alameda County monitoring team/SRC can incorporate the results from these projects into the “APWRA-wide” mortality reduction estimate, as the results may not be comparable due to disparate methodologies (SRC S20).</p>	<p>Buena Vista operated for 1 year before fatality monitoring began in Jan 2008. NextEra also improved the situation by agreeing to continued fatality monitoring at Diablo Winds. Northwind Energy was the only company that refused to participate, thus nixing an APWRA-wide comparison. Methodologies also differed at Buena Vista, Diablo Winds and Tres Vaqueros, but adjustments were available to improve comparability. However, the draft final report (SRC M21 v. 2009) did not directly integrate Buena Vista data and appeared to gloss over the different methods at Tres Vaqueros. Despite these problems, the draft final report presented</p>

¹ Parties’ Response to SRC Query 4.

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	fatality rate estimates that were nearly APWRA-wide in scope.
<p>If the SRC concludes the results from these studies (see above) cannot be incorporated into its larger effort, then the baseline mortality estimate used in the settlement will need to be revised because Smallwood and Thelander’s (2004) estimates included fatality data from the wind turbines at Buena Vista and Diablo Winds projects prior to repowering (SRC S20).</p>	<p>The repowered projects were incorporated into the draft final report (SRC M21 v. 2009), though not to the same degree as in SRC P145 and Smallwood and Karas (2009).</p>
<p>The utility of an NCCP as a tool to help achieve the 50% reduction through repowering or other means remains unclear. While potentially contributing to mortality reduction, the decision to repower is based primarily on economic considerations of the wind energy companies, which would be beyond the scope of an NCCP. Also, the process to develop and approve an NCCP is likely beyond the required timeframe for mortality reduction as specified in the Settlement Agreement. The SRC has no control over whether an NCCP developed at a future date will consider whether Buena Vista and Diablo Winds repowering projects can or should be measured as part of the 50% mortality reduction (SRC S20).</p>	<p>This concern would remain. The NCCP under preparation would cover only a few species, leaving the majority without take permits. Furthermore, the NCCP under preparation has not proposed a single mitigation measure that would reduce avian fatalities; it simply refers to adaptive management measures, which otherwise remain undefined.</p>
<p><u>Mitigation measures – strategies</u></p>	
<p>After reviewing strategies, the SRC agreed the greatest potential for reducing raptor mortality is, in order:</p> <ol style="list-style-type: none"> 1. Repowering turbines; 2. Winter shutdown of turbines; and, 3. Relocating hazardous turbines to less dangerous areas. <p>Other strategies that may warrant additional studies include blade painting, erecting non-perchable flight diverters at the ends of turbine rows, and moving artificial rock piles farther away from turbines (9-11 Apr 2007).</p>	<p>Repowering has not been pursued. The winter shutdown was not extended from two months to four months, as recommended. It remains unknown how many hazardous turbines were relocated to less dangerous areas, which turbines were moved, and when they were moved, and no relocations were verified by the SRC. The companies and the County agreed to move only a fraction of the turbines recommended by the SRC (12-14 Feb 2008), but the SRC has not verified these relocations. A blade painting study plan not approved. No artificial rock piles were moved. Only one non-perchable flight diverter was placed at the end of a turbine row.</p>
<p>Repowering should be considered as another means of potentially achieving mortality reductions in the long term. The SRC agreed it should not be regarded as</p>	<p>No plans for repowering were submitted to the SRC. The EIR was repeatedly postponed and finally abandoned in favor of an</p>

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mitigation, but still could reduce mortality when initiated (20-22 Aug 2007).	NCCP/HCP, but the latter process appears to lack meaningful participation from state and federal permitting agencies.
<p>Should no longer consider the following mitigation measures:</p> <ul style="list-style-type: none"> • Installing alternative perches; • Using sound as a deterrent; • Using radar as a deterrent; • Using lighting as a deterrent; and • Study of non-perching pylons at ends of turbine rows, because they would probably be infeasible once taller repowered turbines replace older turbines, and because the experiment would be costly (20-22 Aug 2007). 	None of these measures have been pursued, though one company created one end-of-row flight diverter, which has not been studied despite the SRC’s request to establish special observation points around it to record raptor flight patterns in response to the diverter.
<u>Mitigation measures – hazardous turbine removal</u>	
The Tier Classification should be further examined (11 Sep 2006).	The SRC followed through in Nov/Dec 2007, but the companies said they believe the underlying science of the SRC’s new ratings was unsound (12-14 Feb 2008).
Companies should use the June 2005 classification [Smallwood and Spiegel 005] and professional judgment based on field experience and on-the-ground knowledge. If a company has reason to believe different turbines might be considered or certain turbines could create other problems, such as additional end points and the like, the company should approach the SRC with an explanation (4-6 Dec 2006).	The companies appear to have relied on the June 2005 assessment. None approached the SRC with any alternative lists of turbines to be removed. Instead, the companies and the County agreed to alternate lists of turbines for removal/relocations, independent of the SRC, and resulting in net fewer turbine removals/relocations (Agreement to Terminate Mediation, 1 Feb 2009).
Unclassified turbines should be classified into risk tiers with the intention to remove or relocate Tiers 1 & 2 of the newly classified turbines (20-22 Aug 2007).	The SRC later reversed this recommendation.
The approach of using expert judgment along with the tier classification is superior to relying solely on the tier classification [for selecting hazardous turbines to remove] because (1) the tier classification alone does not consider the turbine arrangement remaining after top-tier turbines are removed, and (2) a quantitative approach alone	The SRC recommended a list of turbines for relocation (4 Jan 2008), but the companies, declaring the underlying science was unsound, declined to relocate the turbines (12-14 Feb 2008) and shut down turbines for only 2 months of the winter. The County

RECOMMENDATIONS AND CONCERNS FROM SRC	ACTIONS ON SRC RECOMMENDATIONS & CONCERNS
<p>can easily miss many of the patterns detected by direct on-site observation and with maps in hand (10-12 Dec 2007). The SRC recommended (1) removal of turbines it rated 8 to 10 on a 10-point scale, (2) removal of turbines rated 7 and 7.5 if the winter shutdown is shorter than 3 months, and (3) the SRC returns to the APWRA to rate turbines not previously rated (4 Jan 2008).</p>	<p>required removal of turbines rated 9.5 and 10 as a replacement for the Tier 3 turbine removal requirement (12-14 Feb 2008). The SRC reiterated that its recommendations of 4 Jan 2008 were in effect, but withdrew its recommendation to revisit the APWRA to rate more turbines because the companies would not implement the SRC’s other recommendations on winter shutdown and hazardous turbine removal (12-14 Feb 2008).</p>
<p><u>Mitigation measures – removing derelict towers</u></p>	
<p>Remove end-of-row lattice towers to reduce perching by functional turbines. Place non-perching flight diverters at ends of rows, or remove the towers entirely (4-6 Dec 2006).</p>	<p>End-of-row derelict towers were not removed. On 10 Dec 2007, AWI showed the SRC they had converted one derelict tower into a non-perchable flight diverter.</p>
<p>All derelict towers should be removed as soon as possible (5-7 Feb 2007).</p> <p>End-row towers should be removed (27 Feb 2007).</p> <p>Regardless of whether a tower is “vacant” or “derelict,” the SRC is concerned that these towers may be hindering the goal of a 50% reduction in raptor mortality (SRC P67).²</p>	<p>On 12-13 Sep 2007, Alameda County summarized enXco’s and NextEra’s compliance with removal of derelict turbines (SRC P54). EnXco said all its derelict turbines would be gone by the end of 2007. On 29 Nov to 10 Dec 2007, the SRC saw many derelict turbines in the APWRA, including at ends of rows. The companies said they were developing a definition of “derelict” turbines (12-14 Feb 2008). The County’s compliance report (SRC P75) was vague regarding whether derelict turbines had been removed, and later said it was still working on the definition of “derelict” (2 Jul 2008). The County, Audubon and companies defined ‘unproductive turbines’ as those that did not generate power for ≥12 months, and assigned an annual allotment for removal (1 Feb 2009 agreement to terminate mediation). Derelict turbines remained at ends of rows well into 2009.</p>
<p>Requested information on vacant and derelict turbines as part of compliance because the information is important for determining hazardous conditions for raptors. SRC</p>	<p>The SRC was not provided status updates. Instead, the County, Audubon and the companies agreed to hire a compliance monitor</p>

² According to the Companies, vacant towers are those which the companies have yet to decide when or whether another turbine will be mounted.

RECOMMENDATIONS AND CONCERNS FROM SRC	ACTIONS ON SRC RECOMMENDATIONS & CONCERNS
<p>asked for status updates when turbines become vacant, and whether or not they become derelict (10-12 Dec 2007).</p>	<p>who would verify that a certain allotment of unproductive turbines were removed. The compliance monitor quit within 6 weeks and County interns had to complete the job (SRC meeting 22-24 Sep 2009). I still do not know how many vacant or derelict towers were removed, when they were removed, or from where removed.</p>
<p>Requested a definition of when a vacant turbine becomes a derelict turbine. Alameda County could work with the companies to develop a definition (10-12 Dec 2007).</p>	<p>NextEra said the SRC should define what it means by <i>derelict tower</i> (4 Jan 2008), then later said they were developing a definition (12-14 Feb 2008), and the County said they are working with the companies on this definition (SRC P75; 2 Jul 2008). Nearly at the end of the Program, the companies, County and Audubon defined ‘unproductive turbines’ as those having not produced power for 12 months (Agreement to Terminate Mediation 1 Feb 2009).</p>
<p><u>Mitigation measures – rock piles</u></p>	
<p>By 1 Sep 2007, the rock piles should be moved down the slope at least 100 m from the turbines. When moving piles is infeasible or doesn’t “make sense,” turbine owners should discuss it with the SRC, preferably using photos (4-6 Dec 2006).</p>	<p>In April 2007, AIC reported to the SRC that WRRS fatality data did not correlate with rock piles (SRC R37). However, WRRS data were unsuitable for such a test and no actual test results were provided. R37 presented photos of rocks that were not rock piles, apparently mocking Smallwood and Thelander’s definition of rock piles. R37 falsely claimed that I declined to provide data on the locations of rock piles, and it asked the SRC to have me provide spatial data. However, I provided the data twice, to WEST, Inc, and to the County.</p> <p>On 20-22 Aug 2007, the County reported it had been working to gain information from the USFWS about permitting requirements for moving rock piles near turbines, but had not yet been able to secure the information (20-22 Aug 2007).</p>
<p>Rock piles should be removed in the summer of 2007, subject to a consultation with</p>	<p>The County told the SRC that the U.S. Fish and Wildlife Service</p>

RECOMMENDATIONS AND CONCERNS FROM SRC	ACTIONS ON SRC RECOMMENDATIONS & CONCERNS
California Department of Fish & Game and US Fish & Wildlife Service regarding the appropriate timing of the removal (5-7 Feb 2007).	required formal consultation before the rock piles could be moved, and that it would need to authorize the taking of federally listed species due to this action (16 Oct 2007).
Considered moving rock piles less feasible as a management tool because the Service required consultation and because there are uncertainties regarding the value of rock pile removal to reduce avian mortality. This measure is not recommended for immediate implementation (16 Oct 2007).	The decision by the US Fish and Wildlife Service reverses statements it made to participants of the Altamont Working Group during 2004 and 2005. Also, Contra Costa County was allowed to move rock piles away from the turbines in the Buena Vista Wind Energy project (though the rock piles remain).
<u>Mitigation measures – blade painting</u>	
AWI should report on its experimental design for Hodos painting scheme, and is invited to discuss with SRC at February meeting (4-6 Dec 2006).	AWI did report on its trial blade painting effort in Dec 2006.
AWI should present study plan for a blade painting study to the SRC for approval, and plan should replicate and intersperse treatments among turbines (5-7 Feb 2007).	Plans were submitted, but were not approved due to problems with the study design.
In response to settlement agreement, SRC advised the companies to transfer the shutdown exemptions applied to the turbines used in the blade painting experiment to other turbines the monitoring team and SRC will not be monitoring (SRC S20).	Company representatives said they would confer with their colleagues and answer the SRC, but no answer was given. However, in hindsight, this recommendation would have complicated the extrapolation of the mortality estimates from monitored turbines to non-monitored turbines.
AWI should work with Lee Neher to develop a stratified random sample to ensure the blade painting experiment is sound (20-22 Aug 2007).	AWI employed Mr. Neher, but he was instructed to select a random sample from a pool of turbines the SRC later found ill-suited for the study.
AWI’s blade painting experiment should include a sample size of 135 control and 170 painted turbines, but more power analysis is needed to account for the 4-month winter shutdown and pooling of 4 target species (18 Sep 2007).	The power analysis was completed, and the SRC maintained its recommended sample size (24 Sep 2007).
AWI’s painted turbines need to be in rows or strings and randomly stratified.	A revised plan was not submitted to the SRC.

RECOMMENDATIONS AND CONCERNS FROM SRC	ACTIONS ON SRC RECOMMENDATIONS & CONCERNS
<p>Currently painted turbines that were not within rows or strings selected during this process could not be used in the study, unless they are relocated to randomly selected rows (24 Sep 2007).</p>	
<p>The monitoring team will monitor the painted turbines and collect the data for the turbines in the AWI study because the independence of the monitoring and analysis is critical. The monitoring team will make the data available to AWI and the SRC for analytical purposes (24 Sep 2007). In November, 2007, the SRC reiterated its recommendation that control and management of the data needs to be with the monitoring team, and independent analysis is absolutely necessary (7 Nov 2007).</p>	<p>A revised plan was not submitted to the SRC.</p>
<p>Advised the County to recognize that granting AWI’s 3-year exemption from the winter shutdown in exchange for the blade painting study will make it less likely to reach the 50% reduction (24 Sep 2007). The SRC clarified that it did not vote in support of an exemption (16 Oct 2007), and later agreed that the County should not grant an exemption to the 4-month winter shutdown for the AWI blade painting study (13 Nov 2007).</p>	<p>A revised plan was not submitted to the SRC, so presumably no action was taken by the County. Note, however, that the decision on whether to exempt 920 turbines from the winter shutdown was the County’s and not the SRC’s, contrary to Audubon’s understanding stated in response number 12 to my concerns about the settlement agreement (SRC S6).</p>
<p>After learning AWI’s selected turbines for the blade painting experiment are within wind walls, the SRC felt this was a fundamental flaw to the study and suggested that AWI revisit the sample and report back to the SRC (13 Nov 2007).</p>	<p>A revised plan was not submitted to the SRC.</p>
<p>SRC approved the AWI study design with 136 and 170 turbines in the sample size, contingent on AWI modifying the study plan to (1) create an option to expand the study period by 12 months if needed to confirm the effect of blade painting, and (2) an independent analyst will gather data, conduct the analysis and prepare a report for SRC review (13 Nov 2007).</p>	<p>A revised plan was not submitted to the SRC.</p>
<p>The health effect justification claimed in AWI’s study design is not supported by the SRC, and should be removed from the proposal (13 Nov 2007).</p>	<p>A revised plan was not submitted to the SRC.</p>
<p>The SRC is dubious about the long-term applicability of the blade painting management strategy (13 Nov 2007).</p>	<p>This concern was of no consequence because it was directed toward larger modern turbines, but repowering is not underway.</p>

RECOMMENDATIONS AND CONCERNS FROM SRC	ACTIONS ON SRC RECOMMENDATIONS & CONCERNS
<u>Mitigation measures – flight diverters</u>	
<p>SRC proposed a compromise position that NextEra would receive credits for turbines removed in 2004 after removing one string of Tier-1 turbines (4286 to 4294) and agreeing to participate with an end-of-row flight diverter study (9-11 Apr 2007).</p>	<p>The recommendation was rejected by NextEra the next day, because they said flight diverters would be too expensive.</p>
<p>The SRC thought AWI’s end-of-row flight diverter design might prove effective, and recommended raptor behavior observations be directed to it (10-12 Dec 2007).</p>	<p>Behavior observations were not directed to the new flight diverter. Only one SRC-approved flight diverter was installed APWRA-wide.</p>
<u>Mitigation measures – winter shutdown</u>	
<p>The SRC asked the settling Parties about the scientific value in their decision to shorten the previously required duration of the winter shutdown. Why did the Parties feel the SRC needed consistency in the inter-annual duration of the winter-time shutdown? The SRC may have been given an answer during the February 5th meeting, but remains unclear about the answer. The SRC will consider the duration of future winter shutdowns as potential mitigation measures, and will make recommendations shortly (SRC S20).</p>	<p>No clear answer was provided. However, Audubon, in its responses (SRC S6) to my concerns about the settlement agreement, stated they compromised on the winter shutdown requirement in exchange for expedited removal of Tier 3 turbines (see response no. 11 in S6). Since then, the County exchanged the Tier 3 removal requirement for the removals of turbines the SRC rated 9.5 and 10 (12-14 Feb 2008), despite the SRC recommending that prior to this exchange the SRC visit the APWRA and rate all Tier 3 turbines using its new approach to ensure the exchange is equitable (4 Jan 2008). The basis for Audubon’s compromise proved to be unreliable.</p>
<p>Referring to the experimental cross-over design and results presented by WEST, Inc., SRC members were concerned about the high number of fatalities recorded during shutdowns (9-11 Apr 2007).</p>	<p>After reviewing data and analysis at its 20-22 Aug and 12-13 Sep 2007 meetings, the SRC recommended replacing the cross-over shutdown with a universal shutdown that is synchronized with fatality searches.</p>
<p>A four-month winter shutdown should be implemented over the 2007-08 winter season to strive to achieve a 50% reduction in mortality during the period January 2007 through November 2009. A more substantial shutdown period (four months) is the only currently available means of achieving a marked reduction in mortality (12-</p>	<p>The companies synchronized their turbine shutdowns with the monitoring team’s fatality searches, but NextEra reactivated non-monitored turbines on 2 Jan 2008, without consulting the SRC (4 Jan 2008). These turbines were turned off again shortly after the</p>

RECOMMENDATIONS AND CONCERNS FROM SRC	ACTIONS ON SRC RECOMMENDATIONS & CONCERNS
<p>13 Sep 2007).</p> <p>The Monitoring Team and wind companies should work together to sequence shutdown timing so monitors can search turbines shortly after they are shut down to improve data validity. Each turbine would be shut down for 4 months: the shutdown would begin mid-October for some turbines and run through early March for others to achieve a 1 Nov 2007 to 28 Feb 2008 shutdown (12-13 Sep 2007).</p> <p>In the absence of other measures that would provide a reasonable level of confidence that the 50% reduction would be achieved, the SRC maintained its recommendation for a 4-month winter shutdown and to not recommend a 2-month universal shutdown (16 Oct 2007).</p>	<p>January 4th conference call with the SRC, but they were turned on again a week later. All turbines were activated after the second fatality search of the winter. The companies rejected the four month shutdown recommendation.</p> <p>The companies shut down old-generation turbines for 3 months over the winter of 2008-09. AWI’s permit required a 3-month shutdown that winter and the settlement agreement required a 3-month shutdown if the other measures had not been implemented, which they were not. The agreement to terminate mediation required a winter shutdown beginning 1 November, but did not specify an end date or duration.</p>
<p>Shutdown and reactivation of turbines should be nearly simultaneous during winter shutdown of 2009-2010 (19-20 Oct 2009).</p>	<p>Shutdown proceeded accordingly, but it won’t matter to measuring the effectiveness of the Program because the Program period ended already.</p>
<p><u>Mitigation measures – locking down non-operating turbines</u></p>	
<p>There is insufficient justification to consider the issue of turbine feathering versus locking down as a potential management strategy for turbines that are in non-operating status (10-12 Dec 2007).</p>	<p>No action was needed or expected.</p>
<p><u>Measuring mortality reduction – the metric</u></p>	
<p>Companies should provide power output data (11 Sep 2006).³</p> <p>Power output data from individual turbines are critical to understanding mortality, so the companies should provide weekly data from Oct 2005 into the future, and SRC will later revisit the need for data from 1998-2003. County should change permits to require companies to provide power output data for analysis, and should develop a</p>	<p>NextEra asked the County and SRC the following questions:</p> <ol style="list-style-type: none"> 1. “Please explain the intended purpose and specific uses of this data. 2. For what specific analyses will this data be used? 3. How will providing this information contribute to reducing

³ Based on Smallwood’s hand-written note on Woodfin Hotel Stationary and on memory.

RECOMMENDATIONS AND CONCERNS FROM SRC	ACTIONS ON SRC RECOMMENDATIONS & CONCERNS
<p>confidentiality agreement between wind farm companies and analytical team (4-6 Dec 2006).</p> <p>Companies should provide power output data:</p> <ul style="list-style-type: none"> • In kWh per turbine per day; • In operating time per turbine per day (number of 10-minute intervals >0); • As average RPM per turbine per day with frequency distribution; • From Oct. 2005 forward; and, • If not available per day, at the smallest time interval available. <p>County should follow up with a letter to the companies regarding power output data, and the facilitator should check on Brown Act issues related to data confidentiality. Data deemed confidential will not be shared outside SRC/monitoring team, will not be e-mailed, and will be labeled by Companies as “Confidential” (5-7 Feb 2007).</p> <p>The companies should provide power output data for individual turbines or the smallest unit of turbines possible (10 Jul 2007).</p> <p>The SRC reiterated that having the power output data would help the SRC make decisions that minimize power output loss. The SRC asked Alameda County for the status of the response to the SRC request for power output data (10-12 Dec 2007).</p>	<p>avian fatalities?” (SRC P38)</p> <p>The SRC answered the questions on 10 Jul 2007. The County said it would continue discussions with the companies about this recommendation. (10 Jul 2007)</p> <p>In August 2007, the County expected to communicate with enXco and AWI on power output data in the next couple weeks. The companies are developing a confidentiality agreement. (20-22 Aug 2007)</p> <p>NextEra said they would shortly provide monthly operating hours for their turbines (12-14 Feb 2008).</p> <p>AIC provided operating hours to the County in March 2008, but County held the data until it developed a confidentiality agreement for the monitoring team and SRC (23-24 Apr 2008). The SRC was excluded from the agreement and barred from viewing the data.</p> <p>Sandra Rivera said the County is working through issues with company lawyers (10-12 Dec 2007) and County attorneys (23-24 Apr 2008).</p> <p>NextEra told the SRC they will not turn over power output data until the monitoring team publicly releases the fatality monitoring data. (8-9 Jul 2008). The County soon after released the monitoring data without consulting the SRC, which created problems over the next 18 months due to data base errors. Data on operating hours were delivered to the monitoring team, but have not been summarized in any reports. Also, the SRC is still barred from viewing the data.</p>

RECOMMENDATIONS AND CONCERNS FROM SRC	ACTIONS ON SRC RECOMMENDATIONS & CONCERNS
<p><u>Measuring mortality reduction – precision</u></p>	
<p>Data precision should be 15% (23 Oct 2006).</p>	<p>The SRC changed its precision to 10% (7 Feb 2007).</p>
<p><u>Measuring mortality reduction – the baseline</u></p>	
<p>Tentatively consider using Smallwood & Thelander (2004) and Orloff & Flannery (1992) as baseline mortality estimates, possibly recalculated based on new assumptions (11 Sep 2006).</p> <p>Baseline is from 1998-2003 in Smallwood and Thelander (2004) study (4-6 Dec 2006).</p>	<p>The settling Parties set the baseline mortality estimate as the upper end of the range for all raptors in Smallwood and Thelander (2004), or 1,300 per year. County staff said the baseline values in the settlement agreement have to be used, as specified in the settlement agreement (12-14 Feb 2008). Note: Doing so would be unscientific because the methodology and the estimates changed. The draft final report (SRC M21 v. 2009) did not use the baseline specified in the settlement agreement.</p>
<p>Neither the settlement nor the amended permits mention the number 1130.2 as a baseline mortality estimate [for the four target species]. They use the number 1300 for all raptors. ...the letter of a legal agreement controls, not subsequent verbal interpretations of, and representations regarding, the intent of the agreement (SRC S16, referenced in SRC S20).</p>	<p>The SRC’s concern about this wording in the agreement has yet to be tested, perhaps because the new estimates far exceeded the baseline values, which is the opposite of the trend the SRC felt would prompt the companies to hold fast to the number in the agreement (SRC M21 v. 2008b, 2009).</p>
<p>If the SRC cannot incorporate the fatality data from the new (repowered) turbines composing the Buena Vista and Diablo Winds projects, then it will have to recalculate baseline mortality used in the settlement to exclude Buena Vista and Diablo Winds. This would be done by excluding the fatalities from the original turbines in these repowered project areas in order to accurately compare mortality estimates before and after implementation of Alameda County avian protection measures. In other words, the APWRA-wide mortality comparison would not be accurate if the SRC compared the existing baseline estimate used in the settlement, which includes these original turbines, to a 2007-09 estimate which excludes these turbines.</p> <p>Also, the SRC will have to address the absence of the Northwind turbines from the</p>	<p>The SRC’s concern about this wording in the agreement was restated by the companies as if the SRC and the monitoring team were negligent in extrapolating the mortality rates to the rated capacity of the APWRA (12-14 Feb 2008). Furthermore, the County reiterated that the monitoring team has to compare the new mortality estimates to the baseline values used in the settlement agreement (12-14 Feb 2008).</p> <p>In the end it was possible to calculate fatality rates for the repowering projects, but the turbines owned by Northwind Energy were not available for comparison to the baseline (SRC M21 v. 2009 and SRC P145).</p>

RECOMMENDATIONS AND CONCERNS FROM SRC	ACTIONS ON SRC RECOMMENDATIONS & CONCERNS
<p>current monitoring program because Northwind Energy has refused to participate. Smallwood and Thelander made 268 fatality searches at those turbines during 2002-2003. These searches produced 35% more raptor fatalities per search than did the searches throughout the rest of the APWRA. Again, to make an accurate comparison, the baseline mortality used in the settlement will need to be recalculated without the Northwind turbines and the resulting comparison of mortality estimates will not be APWRA-wide (SRC S20).</p>	
<p><u>Measuring mortality reduction – the current program</u></p>	
<p>If SRC has no idea how the program is performing until year 3, there will be no room for correction. If point estimate doesn't show a reduction, the SRC will be concerned (28 Nov 2006).</p>	<p>By 2008 the SRC had an idea of how the program was performing (SRC M21 v. 2008b; SRC P76). The average annual number of fatalities in the APWRA did not lessen.</p>
<p>Year 0 will be Oct 2005-Dec 2006, including a 2-month winter shutdown. Year 1 will be 2006-2007, including 2-month winter shutdown. Years 2 and 3 will be 2007-2009, including measures yet to be recommended (4-6 Dec 2006).</p>	<p>Mortality estimates were reported for years 0 and 1 (SRC M21 v. 2008b), but the SRC requested M21 be revised to overcome flaws. The monitoring team and County declined to revise M21 (4 Sep 2008), so the SRC requested that its written comments be posted along with M21 (4 Sep 2008). The County posted SRC comments (SRC P107), but they were disconnected from M21 on the SRC website for a year. The draft final report was given the same report number (M21), which I refer to as v. 2009, and it reported on years 0 through 3.</p>
<p>In response to settlement agreement, SRC agreed to apply its best scientific methods in estimating mortality adjustment factors and to ensure the baseline and 2007-09 mortality estimates are compared using the same methodologies and assumptions (19 Mar 2007).</p> <p>The SRC intends to report the most accurate estimates of percent reduction based on comparable methodologies (SRC S20).</p> <p>The AG's Office presented the SRC with a quantitative assessment of the</p>	<p>County staff stated that any adjustments outside the range allowed in the Agreement will have to go before the settling parties for their consideration (12-14 Feb 2008). However, M21 (v. 2009) relied on adjustments that were unusually small and would not prompt action by settling parties. My adjustments are not so small (SRC P145), but I will not change them in response to dictates from non-scientists.</p>

RECOMMENDATIONS AND CONCERNS FROM SRC	ACTIONS ON SRC RECOMMENDATIONS & CONCERNS
<p>consequences of comparing mortality estimates based on different adjustment factors (SRC S14). Whereas the Parties may have intended to prevent gaming of the system by setting parameters within which the SRC must compare mortality estimates, the settlement agreement appears to give the Parties the power to override the SRC and to force a comparison of mortality estimates based on different adjustment factors. The Parties need to understand that this sort of comparison would be unscientific and misleading, despite good intentions (SRC S20).</p>	
<p>On February 5th, the SRC asked the Parties whether it will be restricted to the two mortality adjustment factors referenced in the settlement. An answer may have been provided on February 5th, but that answer remains unclear to the SRC. The SRC will plan on using additional mortality adjustment factors as needed (SRC S20).</p>	<p>The settling Parties have not clarified whether they will use the language of the agreement to intervene should the SRC use any additional adjustment factors, such as for crippling bias.</p>
<p>SRC will consider the point estimate in the context of the uncertainty term associated with it, such as the confidence interval. If the mortality reduction is estimated as 50% ±10%, then the SRC will conclude the actual mortality reduction was likely somewhere between 40% and 60%, but will not be able to conclude a 50% reduction was achieved with any reasonable scientific certainty (SRC S20).</p>	<p>No change was made to the settlement agreement or CUPs. Since mortality estimates were first compared (SRC M21 v. 2008a), representatives of the companies expressed concern over the upper and lower bounds of the confidence intervals around the estimates (12-14 Feb 2008).</p>
<p>After some confusion in several recent discussions, the SRC discussed the length of the monitoring period for the Altamont-wide monitoring program and agreed that the monitoring period would run from November 2006 through November 2009 consistent with the settlement agreement (17 Aug 2007).</p>	<p>Confusion and debate continued over the period over which mortality should be estimated and compared to the baseline (10-12 Dec 2007), but the SRC finally agreed to measure mortality over 3 years, as well as at two year intervals and yearly (12-14 Feb 2008).</p>
<p>The APWRA Monitoring Team should continue at its current state until there is a redesign of Altamont monitoring (22-24 Sep 2009). Monitoring should continue uninterrupted through at least Feb 2010 (19-20 Oct 2009).</p>	<p>The monitoring has continued as of Jan 2010.</p>
<p><u>Measuring mortality reduction -- Confounding factors</u></p>	
<p>Develop a protocol to monitor land owner practices, such as rodent control, which can affect avian use and fatality data. Suggested the wind companies work with the</p>	<p>No action was taken (12-14 Feb 2008), and draft final report made no mention about trends or changes in land use management (SRC</p>

RECOMMENDATIONS AND CONCERNS FROM SRC	ACTIONS ON SRC RECOMMENDATIONS & CONCERNS
land owners, and notify designated monitor whenever rodent control was stopped or started (23 Oct 2006).	M21 v. 2009).
Warned about implications of detecting a 45% mortality reduction while relative abundance data show a decrease in raptor use (4-6 Dec 2006).	The CUPs have not been changed to consider relative abundance when comparing mortality estimates. Furthermore, the relative abundance data were not processed or analyzed, so did not appear in draft final report (SRC M21 v. 2009).
The tiered turbine removal is another confounding variable to the studies (27 Feb 2007).	The issue of confounding applies to the experimental attribution of treatment effects to mortality reduction, which may be less important than achieving the mortality reduction goal.
As pointed out in the February 7 th meeting, the settlement agreement exempts wind turbines used in the blade painting experiment from both the winter and permanent shutdowns. Therefore, if these turbines are also to be included in the monitoring sample of 2,500 turbines, their shutdown exemptions will add another source of variation that could complicate the subsequent hypothesis-testing. Their inclusion would also decrease the sample size of turbines used to test the effectiveness of the winter shutdown. If the turbines used in the blade painting experiment are to be included in the monitoring sample of 2,500 turbines, then it would be much less complicated to treat these turbines the same as the other turbines in all respects other than the painting treatment, i.e., include them in the winter shutdown (SRC S20).	The settling Parties did not reverse the exemption provision in the post-settlement CUPs. However, the settling companies never produced a plan to experimentally paint blades of turbines, so this exemption provision has not been an issue.
It remains unclear whether the settling parties intended additional mitigation measures to be tested within the pool of 2500 monitored turbines, or outside of the pool (Attachment 2, SRC S20).	The settling Parties never did clarify their intention on this point, but no additional turbines have been proposed for testing the effectiveness of any mitigation measures.
The County should establish a system to provide updated information on turbine shutdowns, removals and relocations every 30 days, so that the Monitoring Team has accurate information for its monitoring program (20-22 Aug 2007).	No such program was developed (12-14 Feb 2008), and in the end the monitoring team lacked reliable data on turbine removals and relocations, so no analysis was performed (SRC M21 v. 2009).
Discussion should continue about pursuing a focused burrowing owl behavior study to learn why burrowing owls are being killed near wind turbines (12-13 Sep 2007).	Throughout fall and winter 2007 there was no evidence of an initiative to implement a focused study of burrowing owl behavior

RECOMMENDATIONS AND CONCERNS FROM SRC	ACTIONS ON SRC RECOMMENDATIONS & CONCERNS
<p>A study is needed of burrowing owl behavior and possible predation near wind turbines, using thermal imaging and visual observations. It would incorporate an adaptive sampling method. Specifics of the study include:</p> <ul style="list-style-type: none"> • Study time to occur in winter, between Thanksgiving and January • Simultaneously observe comparable sites with and without wind towers • Divide ridges into 3 high, medium, and low elevations • Observe each of the 3 areas for 2 hours, for a total of 6 hours • Before the 6 hours of nighttime viewing, 1 hour of binocular viewing before dark, for a total of 7 hours of viewing • Select areas of high burrowing owl density, with lattice and tubular towers • Conduct viewing for 20 nights at 40 sites • Study would encompass 4 pairs or replicates, each viewed 5 times • Randomly select the 3 elevation areas for viewing in random order • View on side of the slope with prevailing wind • Measure wind speed • Mark distance with thermally contrasting marker – pin flag or plastic bag • When fatality searches occur on these plots, they should include all segments 	<p>around wind turbines. No funding was offered, and no hint that the County or the Companies discussed the SRC’s recommendation. The SRC insisted that it needs to develop a study plan before May 2008 (12-14 Feb 2008), so it scheduled two meetings in April and May. The April meeting occurred, but the May meeting was canceled by County staff without consulting the SRC. The rescheduled 13 June 2008 meeting was again canceled by County staff without consulting the SRC. A meeting was scheduled for 8-9 July, but the crowded agenda minimized time to develop recommendations. Furthermore, throughout spring, County staff told the SRC that funding would be sought through a PIER grant proposal solicitation, but it was learned in June that no such solicitation existed. The SRC submitted a research proposal to the County in summer 2008, but never heard back. No burrowing owl study was performed.</p>
<p><u>Measuring mortality reduction – monitoring</u></p>	
<p>County should enter into a short-term contract with the avian monitoring consultants, and SRC would like to review and make recommendations on the scope and budget at its December meeting (11 Sep 2006).</p>	<p>Completed.</p>
<p>Need intensive fatality searches in a short-term study to improve estimates of scavenger removal rates of American Kestrels and Burrowing Owls (11 Sep 2006). Select sample areas where turbines are killing the birds (23 Oct 2006).</p> <p>County should eliminate ambiguity over the SRC’s support for its recommended intensive study on American kestrels/burrowing owls. This study is an integral, required part of the Altamont-wide scope and budget (27 Feb 2007).</p>	<p>The intensive monitoring effort for American kestrel and burrowing owl fatalities was funded and the monitoring completed, albeit incompletely during the first week. A report (SRC M32) was produced in July 2009, but the scavenger removal rates stemming from this project were still being modified in December 2009 and the draft final report (SRC M21 v. 2009b) used rates that could not support the number of small raptors</p>

RECOMMENDATIONS AND CONCERNS FROM SRC	ACTIONS ON SRC RECOMMENDATIONS & CONCERNS
	actually found to develop the rates.
<p>Concerned about monitoring team not being able to establish relation between spatial analysis and mortality, due to insufficient budget (4-6 Dec 2006).</p>	<p>The monitoring team’s apparent ability to perform spatial analysis remains weak, and there remains no evidence that any spatial analysis has been or is about to be performed. The first two years of data are to be outsourced by the County for digitizing, but the County cannot give a date when the task will be initiated (23-24 Apr 2008).</p>
<p>The settlement agreement has NOT prompted a need for changes in the approach to the monitoring program put forth in the 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 ±10% (7 Feb 2007 Memo to Board).</p>	<p>Nothing has happened to likely change this recommendation.</p>
<p>The County should not adopt the monitoring program achievable with the County’s desired \$2 million budget cap (7 Feb 2007 Memo to Board).</p>	<p>The County adopted a monitoring plan for only one year, but added funding the following year. However, it did not fund the level of monitoring and study recommended by the SRC as the optimal program.</p>
<p>In the absence of the County’s imposed cost constraint, the program should include the following elements:</p> <ul style="list-style-type: none"> • A sample size of 3,000 turbines; • Fatality search interval of 15 days, consistent with CEC guidelines; • Background mortality surveys; • Necropsies of bird carcasses to more accurately determine cause of death and time since death; • Daily searches for one-month periods per season at a sample of turbines to better understand scavenger removal rates of small-bodied birds and bats; • Weekly bird behavior observation surveys at all 67 plots; and, • Monitoring of ranchers’ practices to incorporate knowledge of rodent control activities (7 Feb 2007 Memo to Board). 	<p>This program was not adopted. If it had been adopted, the monitoring team and SRC would have been much more capable of comparing fatality rates and testing hypotheses on the effectiveness of mitigation measures and on patterns of bird fatalities and utilization, which would have facilitated formulation of mitigation measures and planning for repowering.</p>

RECOMMENDATIONS AND CONCERNS FROM SRC	ACTIONS ON SRC RECOMMENDATIONS & CONCERNS
<p>With cost constraints, the program should include the following elements:</p> <ul style="list-style-type: none"> • A sample size of 2,500 turbines; • Fatality search interval of 30 days; and, • Fatality search interval of 2 days over two 2-month periods in one year at a sample of turbines to better understand scavenger removal rates of small-bodied birds. <p>Advised the Board that this program would likely be unable to achieve a 45% reduction in red-tailed hawk mortality, and unable to detect a 45% reduction in golden eagle mortality (7 Feb 2007 Memo to Board).</p>	<p>The Board approved this monitoring program, but funded it for only one year at a time. County staff and the monitoring team were instructed to find public funds to support the last two years of the program (BOS Decision, 24 April 2007), though no public funding was found.</p> <p>Funds were insufficient for processing the utilization data. No funds were allocated to Lee Neher, who was named in the Organization Chart approved by the SRC, and who would have been instrumental for spatial data analysis.</p>
<p>To address the Board’s cost concerns, the SRC recommended:</p> <ol style="list-style-type: none"> 1. Changing consulting team structure and reducing administrative overhead; 2. Rather than doing one long-term study with 15-day interval, do a short-term intensive study at small sample of turbines combined with a long-term study with 30-day search interval at much larger sample of turbines; 3. Limiting the relative abundance study to raptors; and, 4. 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 (7 Feb 2007 Memo to Board). 	<p>The monitoring team did not change their practices to be consistent with the SRC’s recommendations (3) and (4). However, the monitoring team lacked management actions to which they could have directed behavior observations. One flight diverter was installed by AWI, and the SRC did recommend that behavior observations be directed to it, but one flight diverter may not have been enough of a measure for the monitoring team to justify shifting its resources in response to it.</p>
<p>SRC is concerned the Board could move forward on the monitoring program budget without realizing that additional studies could be necessary, which might raise future funding issues (27 Feb 2007).</p> <p>The companies are not clear about their responsibility to pay for additional studies recommended by the SRC and required by the County. The County should inform the companies that additional studies might need to be separate, peripheral programs (27 Feb 2007).</p>	<p>Only a small fund was added to the budget to handle emerging study needs, but this amount was directed toward continued monitoring of the Diablo Winds turbines (9-11 Apr 2007).</p> <p>There was no evidence of any initiative to fund additional studies recommended by the SRC, and the SRC’s attempts to develop research recommendations and budgets were frustrated by County’s cancellations of meetings.</p>
<p>It is absolutely critical that the monitoring program continue uninterrupted, because</p>	<p>Funding was not committed by 1 Jul 2008, as promised to the lead</p>

RECOMMENDATIONS AND CONCERNS FROM SRC	ACTIONS ON SRC RECOMMENDATIONS & CONCERNS
<p>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. The budget is appropriate (17 Apr 2007 Memo to County).</p>	<p>on the monitoring team. Because the monitoring team was owed \$1.1M for work already completed, the County's failure to pay by 1 July resulted in the University of California at Santa Cruz withdrawing from the monitoring team and letting go the team leader and 3 colleagues. Jones & Stokes Associates was hired by the County to be the new lead.</p>
<p>County staff should clearly state to the Board the SRC's support for full funding of a three-year fatality monitoring program, and not just for one year (23 Apr 2007).</p>	<p>County staff conveyed the SRC's support, but funding was approved for only one year.</p>
<p>Concerned that if funding is curtailed (one year instead of 3, as decided by the Board), a gap in monitoring could occur or no one will be available to analyze the data. The potential implications for stopping the monitoring are significant (8 May 2007).</p>	<p>The Program was funded, but only after the leadership of the monitoring team was changed due to lack of payments. However, even after funding was extended, the County did not reactivate the SRC until summer 2009.</p>
<p>Fatality monitoring at Diablo Winds should continue uninterrupted (9-11 Apr 2007, after SRC learned the monitoring was scheduled to end this month).</p>	<p>NextEra granted permission for the monitoring to continue at Diablo Winds (9-11 Apr 2007).</p>
<p>As the SRC suggested, the Monitoring Team is working with Lee Neher to use his maps for establishing observation points for behavioral monitoring. The monitoring program has budgeted the item, but may have to supplement the budget to digitize the data. (16 Oct 2007). (Actually, the recommendation was to use Neher's computer-based maps (ortho-photos warped over DEM) and ArcGIS mapping capabilities to record bird locations using notebook computers.)</p>	<p>Lee Neher worked with the monitoring team through July 2008, refining the data recording system to meet the specific needs of the monitoring team. However, after UC Santa Cruz left the project at the end of July, Jones & Stokes Associates – the new lead on the monitoring team – terminated the approach developed by Neher. The SRC was not consulted.</p>
<p>Alameda County should conduct a Data Quality Assurance/Quality Control Study to improve the estimates for scavenging and searching efficiency in calculating avian mortality in the APWRA Monitoring Program. The current analytical practice of using these correction factors in the science of avian mortality could be biasing mortality estimates. The study would add searches for avian carcasses by a second team at a subset of the monitored turbines. The QAQC study will move forward with the following parameters:</p> <ul style="list-style-type: none"> • To start in October 2008 and run for one year. 	<p>The SRC submitted a proposal to Alameda County during summer 2008, but never heard back from the County on this matter. The monitoring program was not changed.</p>

RECOMMENDATIONS AND CONCERNS FROM SRC	ACTIONS ON SRC RECOMMENDATIONS & CONCERNS
<ul style="list-style-type: none"> • Designed with a 90% confidence level • ±15% margin of error • There would be no proxies • To include all bird species • Study to be assessed after 6 months to determine feasibility of reducing the sample size • Searches would occur at an average rate of once per month. 	
<p>A background mortality study should be performed in areas within the APWRA that lack turbines, but on terrain similar to that with wind turbines. (8-9 Jul 2008).</p>	<p>County staff informed me to stop work on the background mortality proposal. (4 Sep 2008). No such study was performed.</p>
<p>The companies should prepare a memo to County, monitoring team and SRC by 1 Nov 2009, assuring that the capacity data the companies provided the monitoring team were more accurate than the data they provided annually to the California Energy Commission (19-20 Oct 2009).</p>	<p>No such memo was provided. The monitoring team produced the report, including extrapolations of fatality rates to the companies' unverified total capacity values.</p>
<p><u>General</u></p>	
<p>County should not follow the CEC's statewide guidelines suggestion that an oversight committee such as the SRC be composed of regulatory agency-based scientists, especially at the Altamont Pass, given its uncertainty and complexity. The SRC Charter should be modified to state that the County is better served by a committee composed of independent scientists, as scientific expertise is more important in this situation than is membership in a regulatory agency (5-7 Feb 2007).</p>	<p>The Charter was not revised.</p>
<p>Henceforth all written materials to be reviewed by the SRC should be delivered to the SRC at least 3 days in advance of the meeting at which decisions are expected (23 Apr 2007).</p>	<p>Late document submittals continued to be a problem for the SRC. The monitoring team was granted permission to submit a report at an SRC meeting, which happened to be the day of the public workshop. The SRC actually obtained the report 30 min after the meeting started, and felt unprepared for the public workshop (12-14 Feb 2008). The SRC repeatedly reminded the facilitator of its expectation, but again the monitoring team presented a draft report</p>

RECOMMENDATIONS AND CONCERNS FROM SRC	ACTIONS ON SRC RECOMMENDATIONS & CONCERNS
	to the SRC on the day of the meeting on 8 Jul 2008. A final draft was posted on the County's web site at the same time it was delivered to SRC members. Reports were delivered to SRC subcommittee members within 5 minutes of the start of a meeting on 17 Aug 2009.

SUMMARY

The goal statement

The SRC's early concerns about the stated program goal were not dealt with in any substantial manner. It remains possible that none of the target species die at wind turbines for the same reasons, and that separate suites of management actions may be needed to reduce mortality of each species by 50%. Management actions benefitting golden eagles may not benefit red-tailed hawks, and in fact may increase mortality of red-tailed hawks. Similarly, American kestrels and burrowing owls may often be killed by predators, so reducing mortality of these species may require entirely different strategies. Pooling these 4 species together likely decreased the likelihood the Program goal was to be achieved.

Another problem with the goal statement was the large uncertainty terms associated with the mortality estimates, and whether these errors were so large that detecting a 50% change in mortality may have been impossible (SRC P44, Smallwood and Thelander 2008). The duration of the monitoring program related to the magnitude of the confidence interval of the mortality estimate, so the longer the duration of the monitoring underlying the mortality estimate, the smaller would be the confidence interval and the more likely a 50% mortality reduction could have been detected (SRC P44).

My opinion is that substantial decreases in fatality rates could have been detected despite the large error terms we have been measuring. I found significant differences in fatality rates between repowered and old-generation turbines (Smallwood and Karas 2009), so it should have been possible to detect differences between the baseline and current studies if something substantial had been done to reduce fatality rates. However, the companies relocated or removed only 47% of the turbines identified by me or the SRC as relatively more hazardous to raptors, and many of these relocations were not carried out until the last year of the current study. The winter shutdown would have covered 16 months of the last four years had the companies implemented my recommendation from 2005 (Smallwood and Spiegel 2005a), but turbines were shut down only 56% of that time and included reactivations in the middle of the winter period when large aggregations of raptors were present. Also, the number of derelict towers appeared to increase throughout the current study, adding increased hazard to raptors and other birds using the APWRA.

Compliance with permit conditions

The SRC warned repeatedly that the companies did not appear to be complying with the terms of their permits, and if this trend continued, the mortality reduction goal would not be achieved. Although the SRC was charged with confirming that the companies were in compliance with their permits, the SRC was not given the means to provide such confirmation. The SRC recommended that a trusted third party be used for compliance monitoring, and it recommended specific monitoring methods, none of which were implemented.

The SRC expressed concerns over the terms of the settlement agreement, including the elimination or modification of required mitigation measures the SRC felt could have reduced raptor mortality. The SRC sought clarification on much of the language of the settlement agreement, but the agreement remained vague and contradictory on multiple key provisions. The SRC issued statements on how it intends to apply the scientific method, despite statements in the settlement agreement that tended to restrict methodology and to put non-scientists in the position of over-ruling scientific interpretations. Nevertheless, the language in the settlement agreement contributed to confusion and repeated delays in recommendations and implementation.

Mitigation measures

The SRC deliberated over mitigation strategies and recommended specific measures to reduce raptor mortality. These recommendations were not implemented, except for actions that did not require more than minor changes to wind turbine operations in the APWRA. The SRC recommended repowering be pursued, but it was not. It recommended the Tier 1 & 2 turbines be removed, but they were removed later than the permit deadlines, in some cases considerably later. The SRC repeatedly recommended the derelict towers be removed, including those the companies left at the ends of rows as flight diverters, but hundreds of derelict towers and non-functional turbines remained throughout the Program. Only one non-perchable flight diverter was installed in the entire APWRA, and no artificial rock piles were relocated. Most importantly, the companies rejected the SRC's recommendation to shut down the turbines over the entire winter period. Instead of shutting down their turbines for 4 months, they shut them down for only two months (three months in the last year). The companies, citing their distrust of the SRC's scientific foundation, also rejected the SRC's recommendation to relocate turbines the SRC rated 7 to 10 on a 1 to 10 hazard scale and the County required the removal of turbines the SRC rated 9.5 and 10 as a replacement of the CUP term requiring Tier 3 turbine removals. Therefore, the core elements of the SRC's mitigation strategy were not implemented, and they were not required by the County.

Measuring mortality reduction

The SRC's recommendations on funding were largely not followed. The approved funding levels were lower than could support the monitoring elements that were recommended by the SRC and that were expected based on the language of the BOS Resolution. As a result, the large confidence intervals around the mortality estimates made it more difficult to detect a 50% reduction in mortality, and key questions went unanswered regarding cause of death of burrowing owls and scavenger removal rates in the APWRA. There was no spatial analysis of the data, and the relative abundance data was unsuitable for analysis or for comparison to fatality data.

The companies did not provide their power output data from individual wind turbines, thereby preventing the SRC from developing the mortality metric in a manner that would be most useful for hypothesis-testing and for deciding on which turbines to recommend for shutdown to achieve reductions in bird mortality while minimizing loss of power generation in the APWRA. The SRC requested the power output data since its first meeting in September 2006, but was barred from viewing the data.

The SRC recommended that provisions in the settlement agreement be clarified as to their restrictions on the SRC's use of the baseline mortality estimate. As mentioned earlier, the SRC ended up issuing statements on how it planned to proceed, but it remains to be seen how the settling parties will deal with the SRC's decisions over the baseline mortality estimate and the mortality adjustment factors. The County insisted that the monitoring team compare their new estimates to the baseline values in the settlement agreement, even though the assumptions and methods differ (12-14 Feb 2008).

The SRC recommended greater coordination between the monitoring team and the companies in regards to wind turbine management actions and land owner management actions. The SRC felt that the monitoring team needed to be kept informed of wind turbine operations, when wind turbines become functional or nonfunctional, and when and to where wind turbines were relocated. The SRC felt the monitoring team needed to know when and over what extent of the land area the land owners may have poisoned ground

squirrels or did something else that may have affected the monitoring results. However, none of these recommendations were followed.

On the positive side, NextEra agreed to allow the monitoring team to continue monitoring fatalities and bird activity at Diablo Winds. Also, the companies agreed to synchronize their 2007 winter shutdowns with the monitoring team's fatality search schedule. The companies also agreed to allow the SRC access to the APWRA to evaluate wind turbines for their hazards to birds. All of these actions were helpful to the Avian Wildlife Protection Program, but none of them included any sacrifice of wind power generation to reduce bird mortality.

General

Perhaps because it is a consensus-based organization or perhaps because the SRC has had to deal with too many issues over a short period, it has been difficult to keep track of SRC recommendations. Its meeting notes were often vague and appeared incomplete. It was often difficult to determine whether a recommendation was from the entire SRC or from one or a few members. I hope this review will help improve the SRC's effectiveness in making and monitoring its recommendations.

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