

Review of the December 2010 Draft of M-21: Altamont Pass Wind Resource Area Bird Collision Study

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I reviewed the latest draft of M-21. The previous draft was circulated for review one year ago, in December 2009, and it received numerous comments from SRC members. The SRC will meet about the 2010 draft on 13 December, so my comments herein are in support of that meeting. Please be aware that my comments are directed mostly to my disagreements with the report. Unstated are specific conclusions in the report with which I concur and improvements to the presentation of the report which I appreciate. I hope my comments can help to revise the report.

Overall, I expected much more from this report. This draft was a year in the making, and the underlying data were the most extensive of any wind energy project in the world. The field biologists searching for fatalities and surveying for living birds have put in a lot of effort collecting very good data. The wind companies have a lot at stake in this report, and so do the birds and bats that are at issue. I do not understand why this report could not have been more carefully prepared and more expansive. Furthermore, another entire year of fatality monitoring has passed. The SRC has no idea about fatality rates or management effects over the last year – a year when the effects of substantial management actions should have been detectable. Not only is there no report on the last year, but SRC members cannot access the data to check for themselves.

I cannot rely on the results presented in this report due to a methodological mistake that was made (see page 2-9, paragraph 2). Inconsistent with the SRC's recommendations on how to expand average fatality rates to APWRA-wide annual fatality estimates, the monitoring team calculated average fatality rates at nameplate capacity and then expanded these rates to installed capacity, which biased fatality rates lower as total installed capacity lessened through time. The SRC recommended estimating deaths/MW/yr for nameplate capacity and then expanding this rate to the permitted nameplate capacity of the APWRA. The SRC also agreed that it would be fine to estimate deaths/MW/yr for installed capacity and then to expand this rate to the total installed capacity of the APWRA for the corresponding year. The basis of the expansion has to be consistent the calculation of the average.

Imagine expanding the rate from a single turbine string of 10 turbines to an operating group of 100 turbines, and all turbines have a rated capacity of 0.1 MW. Imagine further that in 2005 all the turbines in the monitored string and larger operating group were operational, but in 2009 half were operational in both the string and in the larger operating group. Two red-tailed hawk fatalities found in 2005 would yield an unadjusted rate of 2 deaths/MW at that string of 10 turbines, and the expansion to the operating group would be 20 deaths for the year (2 deaths x 10 MW). In 2009 we might find 1 red-tailed hawk fatality because half the turbines in the string had been removed. Using nameplate capacity of all the addresses as the basis, we'd calculate the fatality rate as 1 death/MW. The expansion to the total nameplate capacity of the larger operating group would yield 10 red-tailed hawks for the year (1 death x 10 MW), which would

make sense because a 50% reduction in fatalities corresponded with halving of the operational turbines. The monitoring team's approach, however, expanded the 1 death/MW value to only the 50 turbines composing the installed capacity in the larger operating group, yielding 5 red-tailed hawk fatalities (1 death x 5 MW). It was a mistake to use nameplate capacity as the basis for calculating average fatality rates and then to expand these rates to installed capacity.

At the 12 January 2010 SRC meeting, the monitoring team said it would provide the following in the final draft report:

- An appendix with a page of data on every turbine string;
- Adoption of Julie Yee's approach to detecting the effects of winter shutdown; and,
- An analysis of the 2009-2010 winter shutdown to further test for a shutdown effect.

I did not find any of the above elements in the latest draft report.

In its 12 January 2010 meeting, the SRC recommended revisions to the report. It recommended more discussion of background information and of the analysis. This new draft did provide more background information and discussion of analysis, though some of the details of the background discussion need to be clarified or corrected (see notes below). For example, the description of the 2005 Tier classification needs to be corrected. In January 2010, the SRC also recommended the following specific additions to the report:

- A timeline table summarizing which management actions were implemented and when;
- Building on the 2009 draft Figures 3-9 and 3-10, develop figures showing annual fatality rates superimposed on lines indicating dates of management actions;
- Test whether turbines next to removed turbines caused higher fatality rates now that they are end of row turbines;
- Add biological context for the four species to help readers interpret the results;
- Include a discussion of wind company practices that could hinder the reductions of raptor fatality rates, such as not removing vacant towers and broken turbines;
- Discuss the results of the 48-hour search interval study and the biases in scavenger removal rates that we suspect we are still experiencing in lieu of additional research;
- Discuss how the winter shutdown measure was a tradeoff between reducing fatality rates and minimizing loss of power generation;
- Incorporate the operational data in the analysis;
- Discuss other alternative analyses or interpretations;

- Discuss the bird abundance data, because the analyses of these data was part of the original study plan;
- Include statistical tests
- Include non-native species in the results;
- Identify exactly who authored the report.

Most of these recommendations were not implemented, and a few were implemented in part. For example, a winter shutdown schedule was provided, but there was no information on when hazardous turbines were relocated or removed. There was speculation about burrowing owls being killed by predators, but no other biological context was provided for the target species. Some of the SRC's recommendations were implemented (not all are listed above), but most were not.

Individual SRC members also provided written reviews of the 2009 draft of the report. I looked back at my comments to see whether and to what extent mine were addressed in the 2010 draft. Some were addressed, but the following were not:

- Explain how data collected by the East Bay Regional Parks fatality monitoring crew at Tres Vaqueros were incorporated into this monitoring report;
- Share the operating data with the SRC to improve transparency;
- Post the turbine operating status data (collected by the monitoring team) on the SRC's web site;
- The legend of Figure 1-3 [Figure 1-2 in current draft] should cite the source of the data depicted;
- The claim should be removed that the baseline study provided no standard definition of what evidence qualified as a fatality – this claim is untrue;
- Include incidental and WRRS fatality records in the analysis because most are of large-bodied birds, and usually are raptors, which we believe last longer in the field; and,
- The monitoring report should mention that the SRC believed that end-of-row vacant towers used as flight diverters actually increased collision hazard to raptors, thereby offsetting the effects of winter shutdown.

Specific Comments

Page v, para. 1: Perhaps it could be rephrased that more than 5,000 turbines have been in the Altamont since 1966. The first large commercial developments began in the 1980s.

Table 1-1: I think Dangren was misspelled.

Table 1-1: I thought the Micon turbines were 65 KW.

Table 1-1: I recall that Polenko turbines were 108 KW.

Table 1-1: Aren't the Kenetech turbines 400 KW in size, rather than 300 KW?

Figure 1-3: The depiction of the Buena Vista project appears inaccurate.

Page 2-1, last para.: The characterization of the baseline study is incorrect in several ways. First, the distinct phases are incorrect. The NREL study was from March 1998 to September 2001. The CEC phase continued the monitoring of the same turbines for another year before switching to a more expansive search involving 2 searches separated by about 90 days among 2,548 turbines that had not been previously monitored. Also, the average search interval was less than 53.6 days. If one excises the gaps in monitoring, which should be done, then the average search interval was 49.7 days.

Figure 2-1: The figure legends are garbled, but I think I understand what is being presented.

Table 2-1: The CEC study could be summarized more accurately. It consisted of a year of continued monitoring at the NREL turbines, followed by 2 expansive searches that should not be used to estimate fatality rates (I thought we went over the utility of these searches in past meetings).

Page 2-2, para. 1, line 1: Other parts of the report stated that fewer than 4,500 turbines operate in the AWPRA.

Page 2-2, para. 1: How is it that monitoring continued unchanged from 2005 through 2009? I thought that about 500 turbines were added in 2007.

Page 2-2, para. 1: Why was the report limited to 2005 through the 2008 bird year? Maybe the report needed to define bird years by this point.

Figure 2-3: The legends present conflicting information, so it is unclear to me what the black dots and vertical lines represent.

Page 2-2, bottom: Litigation prompted some mitigation measures, but others were required by the County before litigation. For example, repowering was required of AWI, and so were Tier 1 and Tier 2 turbine removals. These requirements stemmed from the Board Resolution following an appeal of a decision by the East County BZA.

Page 2-4, para. 1: The characterization of the Tier classes was inaccurate. Tier 1 included 54 turbines composing 5.01 MW of capacity, Tier 2 included 101 turbines at 9.02 MW, and Tier 3 included 152 turbines at 15.23 MW.

Page 2-4, para. 2: The SRC recommended *relocation*, not removal, of hazardous turbines. Also, the SRC recommended that hazardous situations be remedied for all turbines rated 7-10, not 8-10. The standing recommendation is for relocation or remedy of turbines rated 7-10, and the remedies are not limited to removals.

Page 2-5, para. 3: I disagree with the exclusion of fatality records consisting of incidental finds and WRRS records. I stated this same disagreement in my comments on last year's draft of the report.

Page 2-5, para. 4: Repeating last year's comment, I disagree with the exclusion of non-native species from fatality rate estimates. The SRC recommended including these species. Though I did not include these findings in my recent report to the SRC, I did find some intriguing trends in fatality rates between raptors and European starlings and rock pigeons, suggesting predator-prey cycles. I think we could learn from the inclusion of the non-native species.

Figure 2-5: Pie-charts use a lot of space without conveying much information. I suggest replacing them with tables or text.

Page 2-6, para. 3: Exclusion of fatalities from incomplete bird years seems overly arbitrary to me. It is very easy to conclude that a string was searched for less than a bird year. I would think that some decision rules would be in order, such as excluding data from bird years when continuous monitoring was briefer than 9 months. I thought the SRC made a recommendation along these lines – that all seasons needed to be represented but not necessarily 365 day stretches.

Page 2-8, bottom: Fatality rates are being estimated, not mortality rates.

Page 2-10: The evaluations of winter shutdowns and repowered turbines were likely compromised by the expansion of fatality rates from nameplate capacity to installed capacity. For example, the nameplate and installed capacities were equal among the Diablo Winds, but they were not equal among the old-generation turbines, so the comparison was not valid.

Page 3-2: Discussions of increases or any changes in unadjusted fatality rates from baseline to current study periods is meaningless because the search intervals differ. The differences in search interval must be taken into consideration, which is why adjusted fatality rates are compared.

Table 3-5 on Page 3-3: The adjusted fatality rates are obviously wrong. For example, during the current study the annual APWRA-wide golden eagle fatalities was estimated to be 34 based on the all strings data set and 30 for the common strings data set. However, the monitoring team found 32.5 golden eagles per year on average, and these findings were only at 55% of the turbines because only 55% were monitored. Even without adjustments for searcher detection and scavenger removal, the extrapolation of the number found to the APWRA's capacity would be more like 60 golden eagles. The same is true of the baseline period. The monitors found 12.6 eagles per year at 25% of the capacity, so the extrapolation without fatality rate adjustments

would be 50 eagles per year. The estimates in Table 3-5 were 15 and 17 eagles per year, depending on which data set was used. The monitoring team has made some mistake(s) in the estimation of fatality rates.

Page 3-4 and Figure 3-3: The trends in fatalities over time are incorrect because the expansions from rates at strings to total installed capacity were inappropriate.

Figure 3-4: Comparing unadjusted fatalities per search can be misleading because more time is available to accumulate carcasses when the search was preceded by a longer interval since the last search, so one can expect this index to decline through time due to a declining trend in search interval. I cannot accept any of the trends in this Figure as valid check on trends obtained from adjusted fatality rates.

Page 4-2, para. 2: *“There is some evidence to suggest that the winter shutdown of turbines has an adverse effect on burrowing owls.”* I think I must have missed this evidence. The next sentence in the paragraph claimed that the percentage of burrowing owls killed in winter increased with each year into the current study, corresponding with an increase in the winter shutdown treatment effect. I did not see this, and Table 3-7 did not seem to support this statement.

Page 4-2, Assessment of the Effectiveness of the Seasonal Shutdown: I could not agree with the arguments in this discussion. The analysis of winter shutdown effects was crude, with no consideration of shutdown durations or turbine reactivations in the crossover design. Also, I could not figure out the meaning of Figure 3-5.

Appendix A-1b, bottom: The turbine in the photo is one of three sizes. Which is it? I think Dangren was misspelled.

Appendix A-1c: I believe the Vestas turbines depicted in the top photo are 95 KW, not 65 KW.

Appendix A-1d, top: KVS-33 turbines have been characterized as 400 KW in size, but not 300 KW.

Appendix A-1d, bottom: No analysis of mortality at this turbine type was presented in the report.

Appendix A-1f: I don't think Polenko turbines were 100 KW in size.

Appendix A-1g: I don't believe the photo depicts a Howden 750 KW turbine.