

**NEW INFORMATION REGARDING ALAMEDA COUNTY SRC DECISION OF 11
APRIL 2007 TO GRANT FPLE CREDITS FOR REMOVING AND RELOCATING
WIND TURBINES IN 2004**

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23 April 2007

The settlement agreement of 7 November 2006 included a term allowing the wind companies to request that the SRC grant them credits for having relocated or shut down wind turbines prior to the settlement agreement. These credits would allow the companies to continue operating wind turbines classified by Smallwood and Spiegel (2005) as Tier 1 or Tier 2. Otherwise, the settlement agreement requires permanent shut down of Tier 1 & 2 turbines.

I declined to grant credits for several reasons. One, I found the evidence unconvincing that reducing raptor mortality was the reason for moving or shutting down the 96 turbines in 2004, or that these shutdowns/relocations offset mortality caused by Tier 1 & 2 turbines. Two, the wind companies have not committed to mitigation measures sufficient to achieve a 50% reduction in mortality of the four target raptor species by November 2009. Three, WEST, Inc. (2006) reported APWRA-wide mortality last year was higher than ever before reported, even after FPLE shut down or relocated 96 turbines. Four, after inventorying wind turbines I could view from public roadways during April 3-5, I saw no change in the number of old-generation wind turbines that appeared to be operating today as compared to the period of the NREL/CEC study in 1998-2003. Five, the SRC had yet to determine how to monitor the effectiveness of the relocation and shutdown of these turbines.

1. Evidence justifying credits was unconvincing

In a document to the SRC dated November 27, 2006 and entitled, "Compliance reporting: Exhibit G, Sept. 22, 2005," FPLE identified information that was used to decide which wind turbines to relocate or shut down during 2004, and for which FPLE requested credit on 10 April 2007. This document identified Grainger Hunt's study of golden eagles as the source of the decision to focus on the northwestern area of the APWRA for relocations and shutdowns, but Hunt's study did not appear to guide decisions on which specific turbines to relocate or shut down. The Nov. 27 document also identified the 1998 Repowering EIR and a draft of the CEC 2004 report as source material, as well as flight corridors identified by Lois Culp (no report was cited) and flight activity reported in a report by Curry and Kerlinger.

On 10 April 2007, FPLE supplied the SRC with document P24A, which provided more detail underlying decisions to shut down or relocate specific turbines. Each removed/relocated turbine was associated with four¹ "considerations for removal decisions," three of which were based on recommendations in Smallwood and Thelander (2004). It was unfortunate the SRC was not

¹ Five considerations were listed on the first page of document P24A, but only four were cited on the Table appearing on pages 2 and 3.

supplied P24A in advance of the April 9-11 meeting, so that its members could have substantiated the considerations for removal decisions.

Specific consideration number 1 at least partly justified the removal/relocation of 45 wind turbines, according to FPLE. This consideration cited Smallwood and Thelander's (2004) recommendation no. 9 in support of removing turbines from strings with a mix of both operating and non-operating turbines and where there were multiple recorded fatalities. In fact, Smallwood and Thelander's (2004) recommendation no. 9 did not state anything about recorded fatalities, and Smallwood and Thelander (2004, page B-1) otherwise warned against relying on Wildlife Reporting and Response System (WRRS) data. Each use of WRRS data in support of wind turbine removal/relocation was an incorrect application of Smallwood and Thelander's recommendation no. 9.

Acknowledging that *specific consideration number 1* could have relied on the Smallwood and Thelander (2004) recommendation no. 9, and not just whether WRRS data were used, I examined the FPLE map for situations where recommendation no. 9 would have applied. The removals of turbines 2108-2111, 2239-2242, 2325-2331, and 2565-2571 were inconsistent with the recommendation of removing turbines from strings with a mix of both operating and non-operating turbines. That is, 22 of 45 turbine removals (49%) did nothing to unify the operational status of the turbines in their strings. The removals of turbines 2108-2111, 2239-2242, and 2325-2331 achieved the opposite condition recommended by Smallwood and Thelander (2004), resulting in strings with gaps in them and with a mix of operating turbines and derelict towers. Thus, 15 of the 45 turbine removals (33%) increased the number of gaps in strings and the incidence of mixing of operating and non-operating turbines.

Specific consideration number 2 at least partly justified the removal/relocation of 32 wind turbines, and entirely justified the removal/relocation of 12 turbines, according to FPLE. This consideration cited the Repowering EIR and Curry & Kerlinger in support of moving turbines from "topography and/or observed flight paths and clusters of fatalities indicated." This consideration was unclear, and the citation of Curry & Kerlinger was vague, since Curry and Kerlinger issued several reports to FPLE. How were the removals of turbines 2609-2612, 2613-2621, 2715-2719, and 2792-2796 consistent with the Repowering EIR or Curry & Kerlinger? Looking over the topographic map supplied by FPLE, I can see these 23 turbines (72%) were not located in dips or notches. How were the locations of these turbines different from the locations of turbines left in place?

Specific consideration number 3 at least partly justified the removal/relocation of 35 wind turbines, according to FPLE. This consideration cited Smallwood and Thelander's (2004) recommendation no. 5 in support of removing end-of-row turbines or creating pylons. However, Smallwood and Thelander (2004) did not recommend using derelict lattice towers for reasons explained in their recommendation no. 9. Also, recommendation no. 5 specifically stated end-of-row pylons should be "designed to disallow perching." Recommendation no. 5 went on to suggest tapering the pylons to a point so that raptors cannot perch on them. FPLE's specific consideration number 3 incorrectly relied upon Smallwood and Thelander's (2004) recommendation no. 5.

Specific consideration number 4 justified the removal/relocation of 2 wind turbines, according to FPLE. This consideration cited Smallwood and Thelander's (2004) recommendation no. 10 in support of relocating isolated turbines to gaps in existing strings. However, Smallwood and Thelander (2004) was more detailed in its recommendation no. 10, specifying the isolated turbines to move are those on steep slopes and relatively low on the terrain, such as in canyons. Nevertheless, the 2 turbines associated with consideration number 4 fit the description in Smallwood and Thelander (2004), if it was not for the fact they had already been removed by fall 2002. In fact, FPLE could not have relied on Smallwood and Thelander's recommendation number 4 because the relocations of these two turbines preceded Smallwood and Thelander's report by two years.

Since comparing FPLE's turbine removal/relocation data to data I hold on the wind turbines in the APWRA, I have come to the conclusion at least some of the wind turbines FPLE says were shut down or relocated in 2004 were actually shut down or relocated at least two years previously. Of the 96 turbines said to have been shut down in 2004, I have information on the operational status of 60 during fall 2002. During fall of 2002, 42 of the 60 were operational and 18 turbines (30%) had already been shut down and their towers removed. The data I have do not inform when any of the 18 non-operational turbines were shut down prior to the fall of 2002 so I cannot say how long they were not operational, but it appears they were shut down at least two years prior to the release of any draft of Smallwood and Thelander (2004). FPLE could not have relied on Smallwood and Thelander (2004) in support of the removal/relocation of 30% of the 60 wind turbines FPLE says were shut down in 2004 and for which I have 2002 data.

According to FPLE, 19 turbines were shut down or relocated based on a consideration (number 2) other than recommendations in Smallwood and Thelander (2004). Of these 19 I can confirm only that 7 were operational in fall 2002 because I lack data on the other 12. However, all 7 that were operational in 2002, and 15 of the total 19 (79%), also appeared to be inconsistent with specific consideration number 2 (see above). Only 4 of these turbines appeared to have been located in dips or notches, based on my examination of the topographic map provided.

2. Insufficient commitment to raptor mortality reduction measures

The majority of the Tier 1 & 2 wind turbines in the APWRA apparently continue to operate. The Tier 1 turbines were supposed to be removed by 31 October 2005, according to the Alameda County Board of Supervisors resolution of 22 September 2005. After reviewing a compliance reporting summary issued by the County and updated 1 February 2007, I was under the false impression all the Tier 1 turbines had been shut down. My own visit to the APWRA showed me otherwise on April 3-5 (Attachment A), and so did the FPLE documents submitted to the SRC in support of its request for credits. Not only was the 31 October 2005 deadline missed, but the settlement agreement deadline of 11 February 2007 was also missed for shutting down turbines belonging to Tiers 1 and 2.

Most of the other mitigation measures required by the 22 September 2005 Alameda County Board of Supervisors resolution were also missed. The derelict and non-operating turbines were not removed, the electric distribution poles were not retrofitted to APLIC standards, the artificial

rock piles were not moved, and none of the alternative measures were implemented in consultation with the SRC. The settlement agreement vacated the compliance deadlines set by the Board of Supervisors in 2005, but the new deadlines are already being missed as far as I can tell. (The new deadlines are vague.)

The only mitigation measures implemented to date include half-winter shutdown, retrofits of at least some of the electric distribution poles, and presumably the cessation of wind companies' funding of rodent control. However, compliance monitoring has only been administrative, and there has been no verification that the electric distribution poles meet APLIC standards or that wind companies have indeed ceased funding rodent control. As far as I can tell, only the half-winter shutdowns have been implemented.

I estimated a half-winter shutdown can achieve a 20% reduction in mortality of the four target species (SRC document S15), and removal of Tier 1 & 2 turbines could achieve another 7% reduction if implemented. Commitments to these measures would move the avian protection plan only half way towards the settlement agreement goal of 50% mortality reduction, but the FPLE credits could dampen the 7% portion of the reduction if the turbines removed in 2004 were not as dangerous to the target species as the Tier 1 & 2 turbines. Furthermore, the majority of the Tier 1 & 2 turbines have not been shutdown. On April 11, FPLE said they will shut down or relocate their Tier 1 & 2 turbines the next time each requires maintenance, but FPLE would not even guess when these maintenance calls might be made or when the shutdowns/relocations might be completed.²

During the 9-11 April meeting, the SRC discussed multiple mortality reduction measures, but my impression was that the representatives of the companies resisted every measure discussed. There is still no commitment from the companies to do anything more than a half-winter shutdown of old-generation wind turbines. Thus, I'm left wondering how a 50% mortality reduction can possibly be achieved when the companies are unwilling to commit to substantial mitigation measures that could lead to such a reduction. Had I seen commitments to substantial measures for reducing mortality, and had I seen convincing evidence the turbines relocated or shutdown in between 2002 and 2004 were more dangerous than most other turbines, then I would have agreed to grant credits to FPLE for wind turbines they shut down or relocated since May 2002.

3. Raptor mortality may be increasing

After I accounted for the half-winter wind turbine shutdown experiment, the WEST, Inc. (2006) report of the first year of monitoring about 2,200 wind turbines across the APWRA indicated raptor mortality had not decreased since the NREL/CEC study of 1998-2003 (see Attachment B). In fact, it appears red-tailed hawk mortality increased 79% and the pooled target species³

² As a reminder, the Companies are supposed to provide the SRC with a mitigation implementation schedule, according to term 1 of the settlement agreement. Am I to understand that FPLE's implementation schedule amounts to its assurance that Tier 1 & 2 turbines will be removed upon the next maintenance visit?

³ Golden eagle, red-tailed hawk, American kestrel, and burrowing owl

mortality increased 45%. With such an increase in mortality I find it difficult to justify granting credits to FPLE for wind turbines shut down during 2002 to 2004.⁴

4. There appeared to be no change in number of old turbines operating APWRA-wide

At the same time FPLE requests credits for wind turbines shut down previous to the settlement agreement, my survey of wind turbines from public roads during April 3-5 indicated there was no change in the number of operating, old generation wind turbines in the APWRA since the NREL/CEC study of 1998-2003 (see Attachment A).⁵ That is, there was no net gain in APWRA-wide raptor safety due to wind turbine removals/relocations, unless those relocations were strategically directed toward improving raptor safety. As explained above, I was not convinced by the evidence that the turbine removals/relocations were strategically directed toward improving raptor safety.

5. Monitoring plan not designed to measure effect of removals in 2002-2004

Of the 96 wind turbines for which FPLE requests credits for having been moved or shut down in the past, only 9 are included in the sample of turbines selected by the monitoring team for fatality monitoring. Of these 9 turbines, only 1 was monitored during the CEC study of 2002/2003. Therefore, before and after comparisons of mortality can be compared at only one turbine. There is no way for the monitoring plan to assess the effectiveness of the shut downs/relocations.

References

Smallwood, K. S. and L. Spiegel. 2005. Combining biology-based and policy-based tiers of priority for determining wind turbine relocation/shutdown to reduce bird fatalities in the APWRA. Unpublished CEC staff report, June 1. 9 pp.

Smallwood, K. S., and C. Thelander. 2004. Developing methods to reduce bird mortality in the Altamont Pass Wind Resource Area. Final Report to the California Energy Commission, Public Interest Energy Research – Environmental Area, Contract No. 500-01-019. Sacramento, California. 531 pp.

WEST, Inc. 2006. Wildlife monitoring at Altamont Pass, Winter 05 –early Fall 06: Preliminary draft results. Unpubl. report to Alameda County Scientific Review Committee, Alameda County Community Development Agency, Planning Department, 224 W. Winton Avenue, Rm. 111, Hayward, California. 55 pp.

⁴ Further complicating comparison of mortality estimates between monitoring periods, 30% of the turbines for which FPLE requested credits (and for which I had data in 2002) were not operating during the time of the NREL/CEC study because they had already been shut down by the time the CEC fatality searchers actually searched the FPLE wind turbines in the northwest portion of the APWRA.

⁵ This comparison did not include any wind turbines removed as part of repowering projects, or those that were constructed in repowering projects.

ATTACHMENT A

Verification of Tier 1 & 2 Wind Turbine Shutdowns and Relocations

K. Shawn Smallwood

15 April 2007

During the Alameda County Scientific Review Committee (SRC) meeting of 5-7 February 2007, the issue was raised of what it means for the SRC to provide confirmed determinations certain mitigation measures were implemented by the Companies, as required or recommended under the 22 September 2005 Alameda County conditional use permits or the 7 November 2006 settlement agreement. Options discussed included direct verification by the SRC member, verification by a trusted third party, or trusting Company reports. The County of Alameda said it lacked sufficient budget to provide verification for the SRC. To test whether Company reports would suffice as verification, I surveyed the APWRA for the operational condition of wind turbines, a certain number of which was said to have been shut down and another number relocated.

During 3-5 April, I surveyed wind turbine in the APWRA visible from public roads and other vantage points where I had access. I carried maps of wind turbines I produced from a GIS data base. Based on visual observations, I recorded the operational status of each wind turbine I could see, except for those replaced or constructed in the Buena Vista and Diablo Winds repowering projects. I might have made a few errors due to some long-range surveys using binoculars, e.g., I might have recorded some turbines as operational when in fact they were broken.

As a first step, I must point out some of the wind turbines rated for collision threat to raptors (Smallwood and Spiegel 2005) were removed for repowering projects, i.e., Diablo Winds and Buena Vista. These turbines numbered at least 194 (this is the number in my data base, and another 130 removed turbines were not rated by Smallwood and Spiegel). They included 2 Tier 1 turbines and 14 Tier 2 turbines, so at least 16 Tier 1 and 2 turbines have not been available for shutdown since before the Alameda County Board of Supervisors approved conditional use permits on September 22, 2005 and before the settlement agreement of November 7, 2006. The available pool of Tier 1 and 2 turbines has not been 154, but rather 138.

Of the 97 Tier 1 & 2 wind turbine sites I could see last week, 79 (81%) were operational and only 18 (19%) were not (Table 1). Both the turbine and tower was removed from only 1 of these 18 non-operational Tier 1 & 2 turbine sites, whereas derelict towers occupied the other 17 sites.

The map of wind turbine status submitted to the SRC by the Companies (document P16) appeared mostly accurate for the Tres Vaqueros portion of the APWRA, including all turbines west of Vasco Road and north of the access road to Los Vaqueros Reservoir (see maps below). The map was often inaccurate throughout the rest of the APWRA, in terms of which wind turbines remained versus which had been removed.

As a point of interest, Table 2 demonstrates the dynamic nature of wind turbine operational status in the APWRA. Of the 2862 operational turbines during the 1998-2003 study that I could see last week, 211 (7%) had since been shut down. However, of the 16 previously non-operational turbines that I could see last week, 12 (75%) are now operating. Of the 220 previously derelict towers, 170 (77%) are now operating. Of the 48 previously removed towers, 29 (60%) of these sites support operational turbines. Overall, it appears more of the old-generation wind turbines were made operational than were shut down since 1998-2003.

Table 1. Condition of APWRA wind turbines rated by Smallwood and Spiegel (2005) for their level of collision threat to raptors.

Tier	Tower sites not observed	Tower sites observed	Operational ⁶	Derelict tower	Broken turbine	Turbine/tower removed	Total shutdown
1	23	29	20	9	0	0	9
2	19	68	59	8	0	1	9
3	47	105	89	12	0	4	16
4-6	1301	2273	2090	101	5	77	183
Total	1390	2475	2258	130	5	82	217

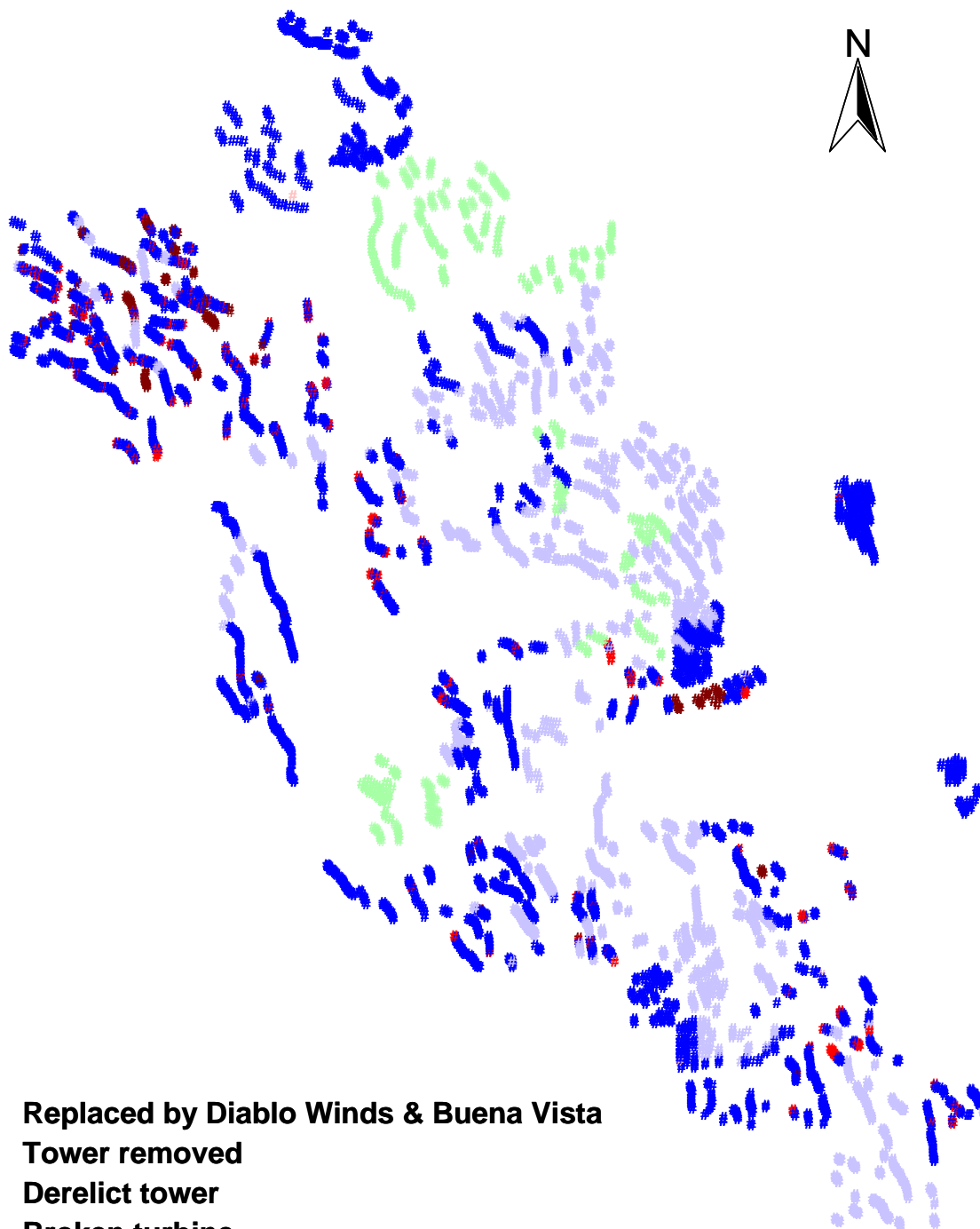
Table 2. Condition of wind turbines in 2007 compared to condition in 1998-2003.

Status in 1998-2003	Status in 2007						
	Tower sites not observed	Tower sites observed	Operational ⁷	Derelict tower	Broken turbine	Turbine/tower removed	Total shutdown
Operational	1659	2862	2651	136	5	70	211
Non-operational	13	16	12	4	0	0	4
Derelict tower	139	220	170	33	0	17	50
Tower removed	14	48	29	3	0	16	19
Total	1825	3146	2862	176	5	103	284

I also noticed that specific wind turbines I had previously been told were shut down were in fact still intact and still operating. I had been told an entire string of turbines was removed from the north side of a turbine field previously owned by Enron and then Santa Clara. This turbine string had killed many raptors during the 1998-2003 study, and appeared to serve as a good example of using multiple sources of information to make decisions about which turbines to remove or shut down. Since September I had been under the impression these turbines were all shut down. My misunderstanding of the status of these turbines probably resulted from a miscommunication, but this miscommunication, in my opinion, further demonstrates the need for verification of mitigation measures through the SRC's own observations or those of trusted third parties.

⁶ Based on my observations from vantage points in the APWRA. I cannot confirm that all wind turbines I identified as operational were actually operational because it is possible the rotors of some turbines that were non-operational continued to move in response to the wind.

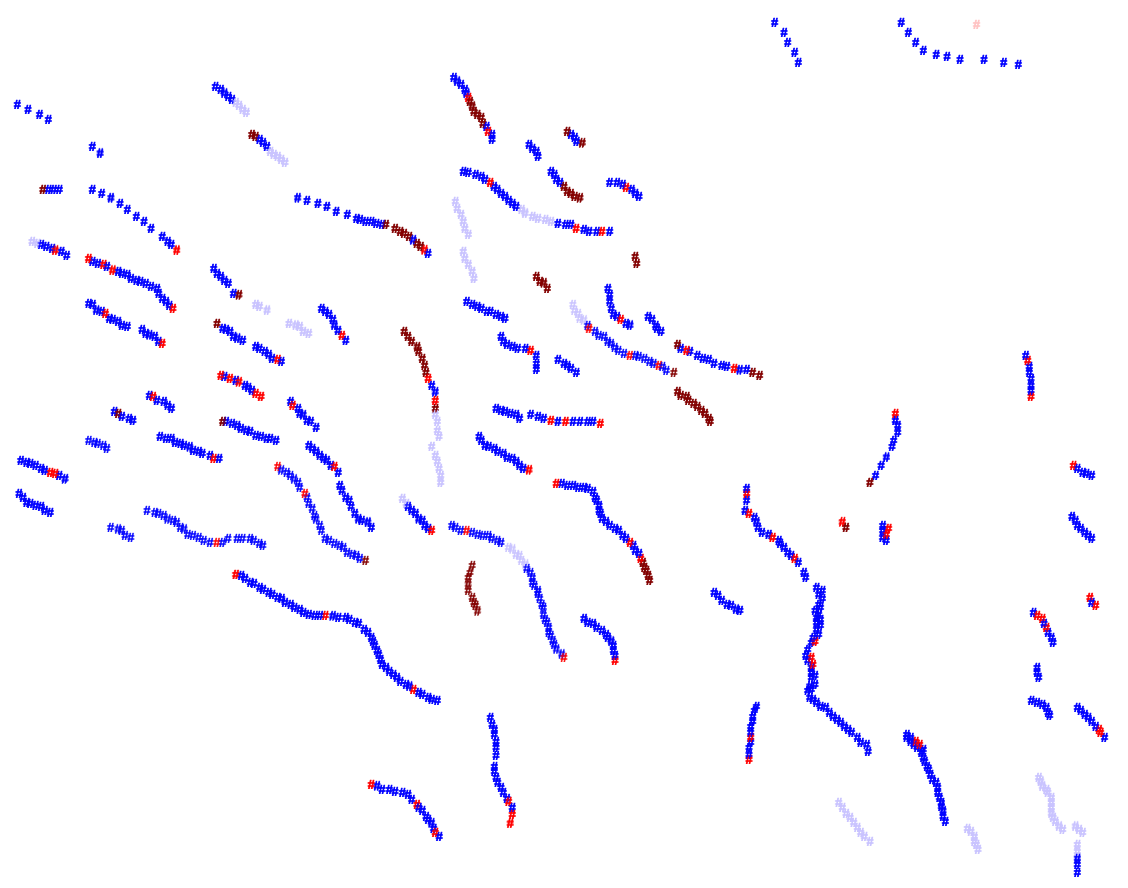
⁷ Based on my observations from vantage points in the APWRA. I cannot confirm that all wind turbines I identified as operational were actually operational because it is possible the rotors of some turbines that were non-operational continued to move in response to the wind.



- # Replaced by Diablo Winds & Buena Vista
- # Tower removed
- # Derelict tower
- # Broken turbine
- # Could not see the turbine
- # Operational



East of Los Vaqueros Reservoir



- # Replaced by Diablo Winds & Buena Vista
- # Tower removed
- # Derelict tower
- # Broken turbine
- # Could not see the turbine
- # Operational



ATTACHMENT B

Comparison of APWRA Mortality Estimated by WEST, Inc (2006) and Smallwood and Thelander (2004)

K. Shawn Smallwood

Preliminary Draft, 8 January 2006 (updated 15 April 2007)

The following are calculations of the annual mortality estimates which account for fatality searches at wind turbines while they were shut down for a winter-time shutdown experiment. These calculations are preliminary because WEST, Inc. continues to perform quality control of the data.

WEST, Inc. (2006) compared unadjusted mortality estimates from their one year of fatality searches at wind turbines totaling 228.3 MW of rated capacity to mortality estimates from Smallwood and Thelander's (2004) study, where unadjusted mortality estimates are the number of fatalities found per MW per year of searches. However, the WEST, Inc. comparison did not account for the half winter while the wind turbines they searched were shut down as part of an experiment. The WEST, Inc. mortality estimates need to incorporate the number of fatalities not found as a result of the winter-time shutdown. The most direct way to do that would be the following:

$$M_U = (F + (F_{wo} - F_{ws})) / MW / Year ,$$

where M_U is unadjusted mortality, F is the number of fatalities during the study, F_{wo} is the number found during winter at operating wind turbines, F_{ws} is the number found during winter at shutdown turbines. WEST, Inc. (2006) did not sufficiently report the results of the winter shutdown experiment, so I cannot use the above estimator at this time.

As an alternative, the following estimator was used to account for the number of fatalities that should have been found during the half-winter the sampled wind turbines were shut down:

$$M_U = \left(F + \left(F \times 0.146 \times \frac{O_W}{E_W} \right) \right) / MW / Year ,$$

where 0.146 is the proportion of the year spanning half the winter, F is the counted number of fatalities during the study, $O_W \div E_W$ is the ratio of the observed and expected number of fatalities found during winter (Smallwood and Thelander 2004, Smallwood and Spiegel 2005a), where the expected number accounts for fatality search effort during the winter.

Table 1 shows the results of the adjustments using the latter estimator, and compares them to the results of Smallwood and Thelander (2004). Red-tailed hawk mortality and overall raptor mortality appeared substantially greater during the WEST, Inc. study, and golden eagle mortality was similar. American kestrel and burrowing owl mortality appeared lower during the WEST, Inc. study, but uncertainty ranges have yet to be considered.

Table 1. Comparison of point estimates between Smallwood and Thelander's (2004) mortality estimates and those of WEST, Inc. (2006) adjusted for the half-winter wind turbine shutdown. The annual APWRA fatalities are compared assuming a capacity of 580 MW during both studies.

Species	Fatalities used by WEST in mortality estimates	O_w/E_w	Estimated missing fatalities from $\frac{1}{2}$ winter	Mortality estimates (Fatalities/MW/yr)		Annual APWRA fatalities		Change in mortality from 1998-2003 to 2005/2006
				Revised WEST (2006)	Smallwood & Thelander (2004)	Revised WEST (2006)	Smallwood & Thelander (2004)	
Golden eagle	19	1 ^a	2.77	0.09536	0.10000	55.3	58.0	-5%
Red-tailed hawk	98	1.35	19.32	0.51389	0.28741	298.1	166.7	+79%
American kestrel	15	1.61	3.53	0.08117	0.09603	47.1	55.7	-15%
Burrowing owl	20	1.20	3.50	0.10293	0.13638	59.7	79.1	-25%
Raptors	209	1.27	38.75	1.08519	0.74931	629.4	434.6	+45%

^a χ^2 test result was not significant.

References

- Smallwood, K. S. and L. Spiegel. 2005a. Assessment To Support An Adaptive Management Plan For The APWRA. Unpublished CEC staff report, January 19. 19 pp.
- Smallwood, K. S., and C. Thelander. 2004. Developing methods to reduce bird mortality in the Altamont Pass Wind Resource Area. Final Report to the California Energy Commission, Public Interest Energy Research – Environmental Area, Contract No. 500-01-019. Sacramento, California. 531 pp.
- WEST, Inc. 2006. Wildlife monitoring at Altamont Pass, Winter 05 –early Fall 06: Preliminary draft results. Unpubl. report to Alameda County Scientific Review Committee, Alameda County Community Development Agency, Planning Department, 224 W. Winton Avenue, Rm. 111, Hayward, California. 55 pp.