

# **Interim Summary on the Effectiveness of the Winter Period Turbine Shutdown in the Altamont Pass Wind Resource Area**

## **Un-reviewed Draft**

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Authors: Wallace Erickson and Dale Strickland. WEST Inc., 2003 Central Ave., Cheyenne Wyoming 82001

## **INTRODUCTION**

The following report contains preliminary analyses designed to estimate the initial effectiveness of the winter shutdown of turbines in the Altamont Pass Wind Resource Area (APWRA). This report describes and summarizes standardized fatality data collected within the APWRA from January 2005 – October 2006 that are most relevant for understanding the effectiveness of the shutdown of turbines for reducing overall raptor mortality in the APWRA. This report can be considered an addendum to the report entitled “Wildlife Monitoring at Altamont Pass, Winter 2005 – Early Fall 2006, Preliminary Draft Results” by the APWRA Avian Monitoring Team (2006). We also provide additional standardized fatality data collected in January and February 2005 at the Patterson Pass Wind Project. This project was shutdown in late 2004 through February 2005 because of substation upgrades. The project was searched for fatalities at during this shutdown period to provide some initial information on the effectiveness of winter time shutdown of turbines.

A description of the methods used in field data collection and reporting is found in APWRA Avian Monitoring Team (2006). A second more detailed report will be completed in May 2007 that includes the results of the second year of winter season shutdown of turbines. This report has not been reviewed by the APWRA Avian Monitoring Team or the Scientific Review Committee (SRC), but has been submitted to both groups for the purpose of discussion at the April 9, 2007 SRC meeting.

## **PATTERSON PASS WINTER SHUTDOWN (JANUARY AND FEBRUARY 2005)**

WEST was contracted to conduct searches of the Patterson Pass Project during a period when the turbines were shutdown due to substation work in January and February 2005. Methods for searching followed those described in APWRA Avian Monitoring Team (2006). A clearing search was conducted in early January 2005 of all 336 65 kW Nordtank and Bonus turbines (see Table 1 for description of the turbines). During the clearing search, several very old carcasses or evidence of fatalities were recorded and removed. Most were either just feathers, or were dry bones and feathers. No carcasses were observed during the 2<sup>nd</sup> search in February, suggesting low fatality rates during the period of shutdown of turbines.

## **TURBINE SHUTDOWNS BETWEEN NOVEMBER 2005 AND OCTOBER 2006**

### **Santa Clara Site**

Turbine search plots 54, 55 and 56 selected as part of the APWRA-wide monitoring (APWRA Monitoring Team 2006) are located on the Santa Clara site (Figure 1). The Santa Clara site is currently leased and managed by AES - SeaWest. This site consists of 200 Vestas 100kw upwind turbines, of which 128 turbines are being monitored within the search plots. These turbines were shutdown at the end of 2005 for avian purposes and then they were continued to be shutdown in 2006 due to transfer in project ownership. These turbines were shutdown part of the time between Nov. 1 and December 31, 2005 because of confusion by the operators as to whether they were to be shutdown during the first or second period. These turbines were not scheduled to be shutdown until January 1, 2006. A red-tailed hawk fatality was found at an early January search. During 2006, when turbines were shutdown, 4 potential raptor fatalities were documented. One record included parts of a likely juvenile barn owl found during the period of shutdown. A great horned owl, also found in 2006, showed evidence of grease and oil on its feathers. Two other raptor fatalities, a red-tailed hawk and a burrowing owl were also recorded during this period of shutdown.

Several rock dove and a few other non-raptor casualties were also recorded during the period the turbines were shutdown. Most did not have visible signs of collision and cause of death is uncertain.

### **AES – SeaWest Ralph Site**

Turbine search plots 111, 112 and 113 consist of 40 kW Enertech turbines owned and operated by AES Seawest. These turbines are shutdown from Nov 1<sup>st</sup> typically through mid-March each winter because of maintenance issues related to precipitation. These turbines were not operating at all between the 1<sup>st</sup> search (clearing search conducted before 1<sup>st</sup> search) and the 4<sup>th</sup> search. No raptors were observed during this period. Between the clearing search and the 1<sup>st</sup> regular search when turbines were mostly in operation, 3 raptors were found. During the 5<sup>th</sup>, 6<sup>th</sup> and 7<sup>th</sup> searches, 10 raptors were documented.

### **Results for Turbines Shutdown for Two Months and Operating for Two Months – November 2005 – February 2006**

With the exception of the Howden 330 kW turbines located in Contra Costa County, which are not subject to seasonal shutdown, the remaining turbines sampled in the APWRA-wide monitoring were shutdown for two months from November 1<sup>st</sup> 2005 through February 28, 2006. Most of the turbines included in this analysis are the Kenetech 56-100 downwind turbines. When these turbines are shutdown, they do not turn except at high wind speeds and at very low rpm's (Figure 2). The turbines located to the north of I580 and to the north of Altamont Pass Road (Figure 1) were shutdown

from November 1<sup>st</sup> – December 31, 2005. The remaining turbines were shutdown from January 1 – February 28<sup>th</sup>, 2006.

For this summary analysis, we compared the number of raptors found during the 2<sup>nd</sup> search (late December 2005/early January 2006) and the number found during the 3<sup>rd</sup> search (February – early March 2006). For the northern turbines, this 2<sup>nd</sup> search represents the shutdown period, while for the southern turbines, the 3<sup>rd</sup> search represents the shutdown period.

There was an apparent measured effect of seasonal shutdown when looking at the fatalities per search for the turbines in the North that were shutdown from Nov. 1<sup>st</sup> – December 31, 2005 and the turbines in the South that were shutdown from Jan. 1<sup>st</sup> – Feb. 28<sup>th</sup>, 2006. The overall observed fatality rate (#/MW/search) was approximately 50% higher for operating turbines than the shutdown turbines (Table 2). If we include the data from the AES - Seawest 40 kW Enertech turbines that were shut down from November 1 2005 – February 28<sup>th</sup> 2006, and the Patterson Pass turbines shutdown from January – February 2005, we estimate an observed fatality rate (#/MW/search) approximately 70% higher for operating turbines than the shutdown turbines (Table 2).

## **SUMMARY**

While there was some measured effect of seasonal shutdown on raptors overall, the fact that some raptor casualties were observed during the shutdown periods is somewhat puzzling. For some of the records, it is possible the fatalities occurred during a period when the turbines were operational, since some of the searches used for estimating the shutdown effect were conducted after the turbines had been turned back on. In other cases, the fatalities that occurred in areas where turbines are shutdown may have been caused by something other than a collision with a moving wind turbine. For example, there were four raptors found at the Santa Clara site in 2006 when turbines were not operating for long periods of time. One of the great horned owls had grease on its flight feathers. It is difficult to ascertain whether the fatalities occurred by collision with a non-moving structure and therefore wind project related, or whether the fatalities were caused by factors not related to the wind project. A 2<sup>nd</sup> more complete report will be completed by the end of May that includes the results of the 2<sup>nd</sup> winter of the seasonal shutdown experiment.

## **REFERENCES**

APWRA Avian Monitoring Team. 2006. Wildlife Monitoring at Altamont Pass, Winter 2005 – Early Fall 2006. Preliminary Draft Results. Technical report prepared for: Alameda County Scientific Review Committee, Altamont Pass Wind Resource Area, November 2006.

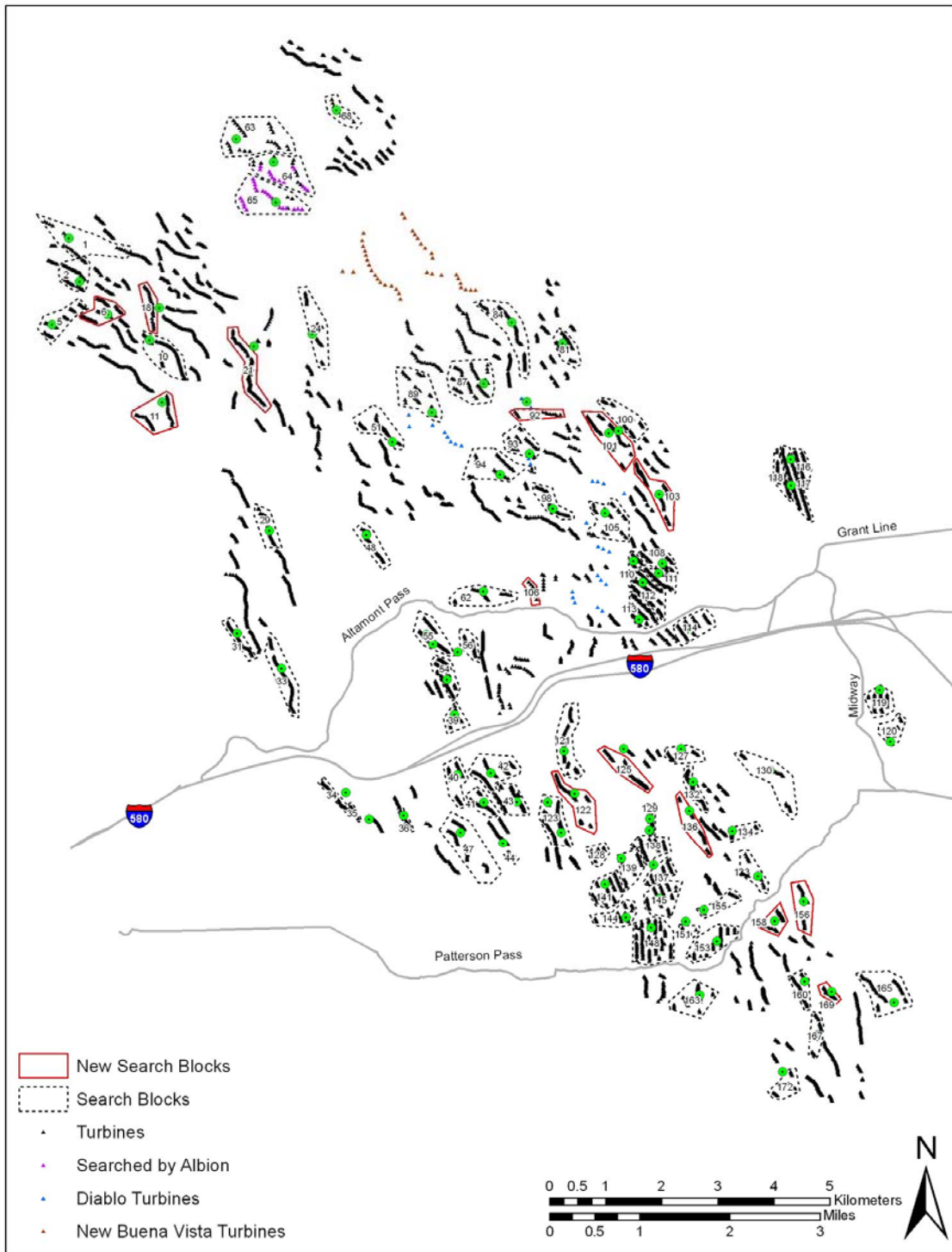
**Table 1. Site and Turbine Characteristics for the Patterson Pass Wind Project for carcass searches conducted in January and February 2005.**

Characteristic	Patterson Pass		
	Nordtank	Bonus <sup>1</sup>	Combined
turbine model	Nordtank	Bonus <sup>1</sup>	Combined
# turbines	133	203	336
rotor diameter	16	16	16
rotor swept area (m2)	201	201	201
total RSA (m2)	26741	40816	67557
turbine rated capacity (kW)	65	65	65
project rated capacity (MW)	8.6	13.2	21.8
tower height (m)	24.6	24.6	24.6
lower blade reach (m AGL)	16.6	16.6	16.6
high blade reach (m AGL)	32.6	32.6	32.6
approximate area (acres)			1000

**Table 2. Summary results for the effectiveness of winter shutdown in the APWRA.**

	Turbines Shutdown			Turbines Operating		
	# raptors found	MW	#/MW/search	# raptors found	MW	#/MW/search
North Turbines	8	86	0.093	17	86	0.198
South Turbines	11	95	0.116	11	95	0.116
Subtotal	19	181	0.105	28	181	0.155
<b><u>Other Data</u></b>						
Patterson Pass - Jan. 2005	0	22	0			
AES - Seawest Enertech - Nov. 2005 - Feb. 2006	0	6	0			
Total	19	209	0.091			

Figure 1. Location of search plots and avian observation stations in the APWRA.



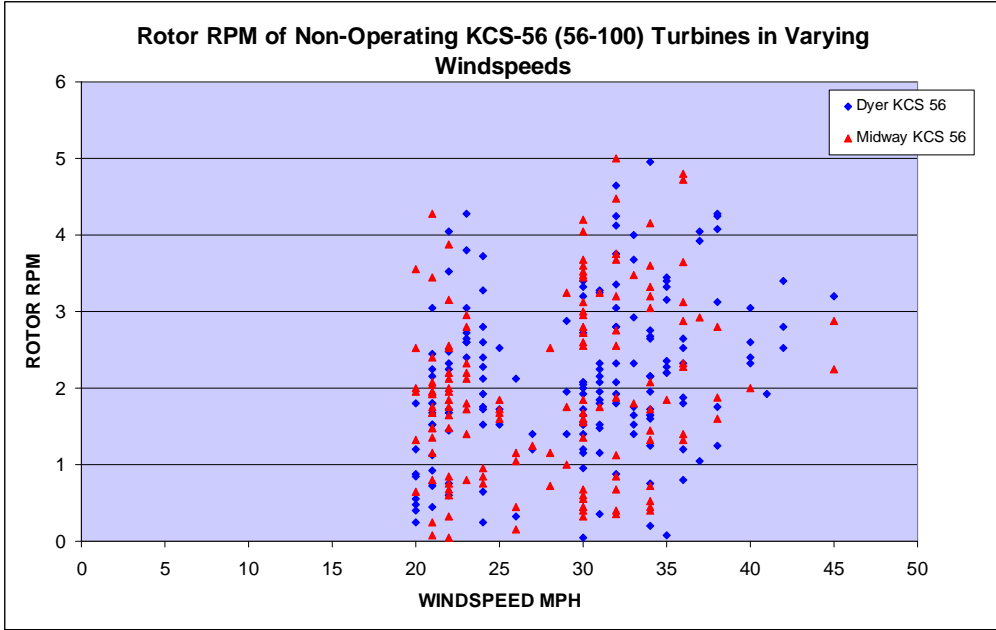


Figure 2. Relationship of wind speed (mph) and turbine rotor rpm (revolutions per minute) for shutdown KCS 56-100 turbines in the APWRA. These 100 kW turbines with 9 m blades are the most common turbine in the APWRA, and when producing power, are turning at 72 rpm's. Data provided by J. Stewart (AIC).

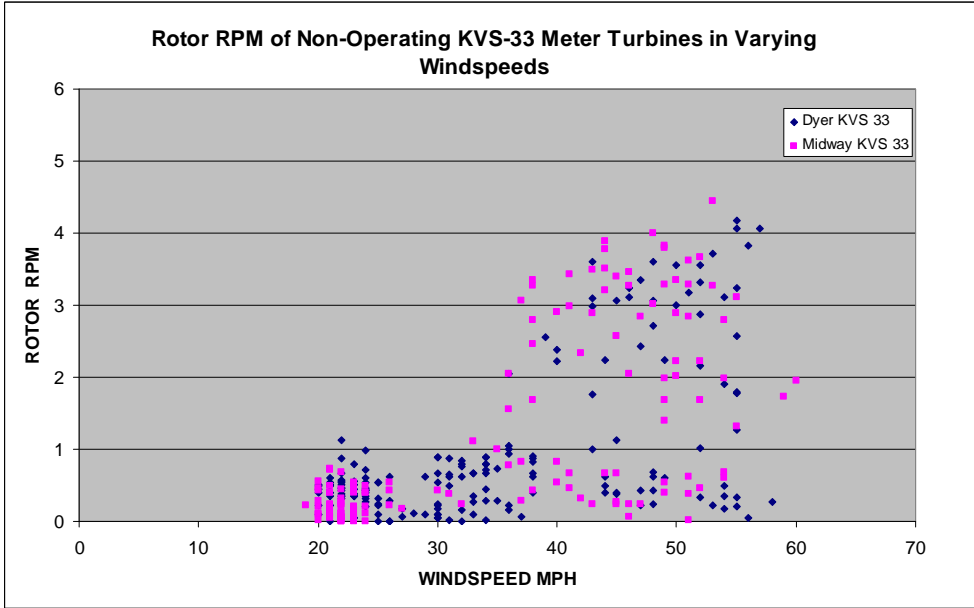


Figure 3. Relationship of wind speed (mph) and turbine rotor rpm (revolutions per minute) for shutdown KVS 33 turbines in the APWRA. These 400 kW turbines (referred to as 330 kW turbines in some literature) with 16.5 m blades are the largest turbines in the APWRA (excluding repowered turbines). When producing power, they turn at approximately 27 rpm. Data provided by J. Stewart (AIC).