

## DRAFT Meeting Summary | September 22-24, 2009

### Altamont Scientific Review Committee

Developed by the Center for Collaborative Policy

Not yet edited or approved by the SRC

## 1. Key Outcomes

### Continuation of Altamont Monitoring

The Scientific Review Committee recommended that the APWRA Monitoring Team continue at its current state until there is a redesign of Altamont monitoring.

### Analytical Approach to Diablo Winds, Seasonal Shutdown and Three-Year Analysis

During an analytical workshop, the SRC, members of the Monitoring Team and members of the public reached consensus agreements on many of the data filters and analytical approaches to Diablo Winds and Seasonal Shutdown. Some items of consensus were also reached on analytical aspects of the upcoming report comparing current study data to baseline study information. The consensus items are identified in this meeting summary.

## 2. Future SRC Meetings in Alameda County

- October 19-20, 2009
- December 2-3, 2009

## 3. Action Items & Meeting Follow-Up

Party	Due Date	Action
Joanie Stewart		Confirm 660 kW turbine height
Monitoring Team		Clean search interval outlier issue in database
Alameda County	10/15/09	Change P68: Add turbine 4323 -- rated 8.5 Add turbine 844 -- rated 9
Alameda County	11/1	Define "high risk" on compliance monitor's table
Alameda County	12/09	Report back on how many "unproductive turbines" are end-of-row towers
Alameda County	11/1	Post table of removed turbines
Alameda County	12/09	Create table of turbines: <ul style="list-style-type: none"> <li>▪ Total #of turbines for each company</li> <li>▪ Total towers for each company</li> <li>▪ Separate column headers for each high-risk turbine # (i.e., 7, 7.5, etc.)</li> <li>▪ Separate column header showing # removed</li> </ul>

		<ul style="list-style-type: none"> <li>▪ Provide data on percentage removed</li> <li>▪ Allocated replacement sites and the number of them above rating 7</li> </ul>
Monitoring Team	11/01	Add SeaWest information to baseline data
Monitoring Team	12/01	Add hazardous turbine data and hazardous turbine removal information to string data
Sue Orloff/SRC	10/08	Provide list of recommended documents to Wayne Spencer after SRC review and input.
Jesse	10/05	Prepare memo on 3-year APWRA-wide 50% reduction report issue: baseline/current study data filter issues on search interval, number of searches and consecutiveness of searches
Monitoring Team	12/15	For repowering analysis, explore Buena Vista report/conclusions

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## 4. Analytical Workshop

The bulk of the SRC 22-24 September 2009 meeting occurred in the format of a data analysis workshop, involving real-time data review, data filtering and data analysis. The workshop was preceded by a September 17 webinar meeting (recording available for download from the SRC website at [www.altamontsrc.org](http://www.altamontsrc.org)) to provide an initial walk-through of the data to SRC members, wind farm companies and members of the public.

At the September 22-24 meeting, SRC and audience members worked with the Monitoring Team to review data and procedures and to develop consensus agreements on forthcoming Monitoring Team analytic reports on Diablo Winds and Seasonal Shutdown. In addition, consensus agreements were reached on some aspects of the analysis comparing current monitoring data to the baseline study. Workshop participants discussed introductory report information, central analytical questions, recommended comparisons, biases and complications, data filtering, and variables to be analyzed. Outcomes of the workshop are summarized below.

### 4.1. Data Summaries

#### Related Documents

M37\_Fatalities Table Data Dictionary (9-10-09)

M38\_Altamont Database Technical Reference

Jesse Schwartz of the Monitoring Team gave an overview of raw observation numbers and data on fatalities. The Monitoring Team is working with Loan Tran of NextEra to ensure that Bill Warren-Hicks' data is synced with the Monitoring Team's database. The Monitoring Team can publish an Access version of the database that can be viewed in Excel, for those members of the public who prefer to use Excel.

#### Consensus on Strings

- After reviewing data, the string number data set is operable. No participant articulated any concerns with this string number data set.

#### Issues

- Shawn Smallwood reported that during the baseline study, searchers were not given access at first to a large number of turbines, but eventually got access near the end of the study. Therefore, a number of turbines were searched only two times.
- The Diablo Winds data set had several records with a 70- and 80-day search interval (compared to 57 days for the mean). The Monitoring Team will review these records since this interval between searches is unlikely.

### 4.2. Application of the Horvitz-Thompson Estimator to Simulated Fatality Data

#### Related Documents

P121\_Yee Simulations (9-10-09)

P123\_Yee PPT Presentation (9-22-09)

SRC Member Julie Yee, a statistician with the U.S. Geological Survey, presented the latest results from her simulations designed to assess the performance of the current fatalities estimation method, known as the Horvitz-Thompson estimator, which applies adjustment factors to raw fatality counts in order to adjust for undetected fatalities. Her results indicate that, although the adjusted fatalities are prone to bias, if there is a large reduction in fatalities and if the rate of bias is consistent over the period of reduction, the monitoring program can be expected to detect the reduction. Her results also suggest observer detection error, which allow undetected fatalities to be detected in a later search although they have already been accounted in the adjustment, could lead to additional bias in estimating change between the baseline and the current study, with a tendency to underestimate the reduction in mortality. For example, a 50% reduction in reality could be estimated as 45%.

### **4.3. Bayesian Model Parameter Development through Monte Carlo Simulations**

#### **Related Documents**

[P120\\_Warren-Hicks Altamont Mortality Model \(9-2-09\)](#)

P124\_Warren-Hicks PPT Presentation (9-22-09)

Bill Warren-Hicks of Eco-Stat, Inc., a consultant for NextEra wind company, presented the approach he is developing to use a Bayesian statistical model to analyze current study and baseline fatality data. It will show information in probability distributions rather than point estimates. He hopes to use not only the data set, but also information from external studies and the expertise of knowledgeable scientists in his model. He would also like to incorporate geographic characteristics. He is also looking to see if there are differences between strings with zero fatalities versus strings with one or more fatality. At this stage, he is exploring the data. He would like direction from the biological experts.

#### **Discussion**

In response to a question, he and Emre Ergas of NextEra said he will be using the Monitoring Team's data so the data sets for each analysis will be identical except that one may be more up-to-date than the other due to the timing of the analysis.

SRC members raised the following points in response to Warren-Hicks's presentation:

- It would be important in the expansion to incorporate information about variable bird use into the model, as bird use of the Altamont is not constant.
- It will be important to incorporate species differences; for example, burrowing owls behaving differently.
- It would be interesting to look at strings by turbine type, or sum rotor swept area by turbine type.
- Small turbine strings have a higher percentage of end turbines and could therefore have higher mortality.

- One analytical approach would be to look at strings with no mortality versus strings with mortality, and consider spatial statistics, including whether fatalities are related to the whole string or its end turbines.
- It would be useful to incorporate geographical/topographical factors into the analysis.
- Geographical information and geographical issues are contained in the SRC's various documents on hazardous turbines, including the guidelines for siting hazardous turbines. The SRC members found value in going out and looking at the actual topography and configuration, rather than a geographical data surrogate.

#### **4.4. Model Selection for the Evaluation of a Zero-Dominated Data Set**

##### **Related Documents**

P125\_Stark PPT Presentation (9-22-09)

Philip Stark, Professor of Statistics at UC Berkeley, an invited guest lecturer, discussed some of the approaches used in other fields for zero-dominated data sets and their potential applicability to the Altamont.

##### **Discussion**

Bill Warren-Hicks disagreed with Philip Stark's statement that a Poisson approach would not be appropriate to this situation. In response, Stark said a Poisson model assumes wind turbine-caused fatalities are independent random events. Professor Stark recommended searching the data for patterns rather than assuming fatalities are random. He used bird flocks as an example of highly non-random flight patterns, and he argued that certain turbine configurations and landscape settings should be expected to cause bird flight patterns to deviate far from random paths.

Jesse Schwartz said the discussion underlines the large degree of uncertainty and the variety of possible approaches to this analytical process. Each analysis will have to clearly articulate assumptions and methods.

#### **4.5. Insights from Modeling Presentations**

- Statistics may take different approaches but may result in the same answers.
- Different approaches may give different answers. This is fine as long as they are characterized accurately and assumptions are clearly spelled out.
- Given the presentations, what analytical approaches could help control variability? One important source of variability is bird use, which calls for prioritizing the digitizing of bird use data.
- Julie Yee's presentation showed that it's possible to measure certain biases, which enables analyses to adjust for those biases.
- The Monitoring Report should have a section on potential biases.

## 5. Analyses

### 5.1. Diablo Winds Repowered Site Analysis

#### Central Analytical Questions

- Does repowering reduce mortality?
- How does repowering affect different species?

#### Descriptive Information

- 31 turbines in 13 strings
- Capacity = 20.4 megawatts
- Different heights (24 @ 165 ft; 7 @180 ft)
- Replaced vertical axis turbines
- Operate at 37% capacity in 2006 versus 13% capacity of older generation turbines
- Have operating hours for Diablo Winds, but do not have them for old turbines.
- Diablo Winds turbines are available to operate 98% of the time.
- Search radius: 75m (50m for old-generation turbines, but 60m at Howdens)
- Current Study Data filter: Fatalities outside 125m excluded (same as for old turbines) [NOTE: for this analysis—agreed to change data filter to 150m for Diablo Winds turbines only]
- Seasonal shutdown occurred for old generation turbines during the study period. Diablo Winds was not shut down.
- Reference Buena Vista analysis in conclusion

#### Biases & Complications

- Older strings of other turbine types are interspersed among the repowered Diablo Winds turbines
- Some Diablo Winds turbine string search areas overlap with older turbine search areas
- Not all the old-generation turbines that are in the immediate vicinity of the Diablo Winds turbines are searched
- *Placement Issues:* Consult initialization report in web site research library (R33) for more details. Location tied to location of previous turbines; high wind; impact on species; optimized sites within a limited site, ridges; constrained by the infrastructure (power lines, pads/existing turbines).
- No shutdown in Diablo Winds; other turbines (even within the Diablo Winds area) experienced winter shutdown

#### Diablo Winds Analysis Metrics

- String number unique identifier
- Search effort by string
- Metrics: Megawatts, String, # turbines, how many "ends" = end-row turbine

#### Variables Discussed

- Rated capacity used to look at absolute number of birds;

- First Search Options: Option 1) Add average search interval from before first search. Include fatalities that are back-dated into the previous interval. or Option 2) throw out first search as clearing search
- Search Interval Options Discussed
  - Compare turbines with a similar search interval
  - Drop the search interval
  - Consider how fatalities change as the search interval range changes (rate)
- Search Radius: Issue—how to deal with the search radius? Assumption: Larger turbines throw birds further, and bigger birds are thrown further than smaller birds. Question: should birds found outside of the search radius be included in the analysis? Birds found outside search radius have a different searcher efficiency and detection rate and can potentially bias results, but dropping records may not sufficiently address the differences between large and small turbines and thus not sufficiently address the potential benefit of repowering. Analyze data within the 75m-radius for results that minimize bias on the basis of searcher efficiency, but then analyze again by including data outside of the 75m.

**Agreed: Make Part of Methods Section (not part of the analysis)**

- How survey conducted
- Search interval = method (even if differed from the protocol, i.e. 35 days)
- Statistics on search intervals

**Agreed: Filters / Factors for Analysis**

- **Search Interval:** include those strings with a mean search interval of 25-40 days (note: this includes all Diablo Winds Turbines; Interval may be revisited depending on further data review.)
- **First search:** Non-issue because searches started before study time periods
- **Time Period for Analysis:** use exact overlapping periods 12/1/2005 to 10/09
  - First Draft: 12/1/2005 to 8/09
  - Final in 3-year Report: 12/1/2005 to 10/2009
- **Search Area & Radius:** conduct three analyses
  - Analyze all fatalities regardless of distance found from turbine
  - Search radius: 75m for Diablo Winds; 50m and 60m for other turbines
  - Data Filters: 125m for old turbines; 150m for Diablo Winds

**Conduct the Following Analyses**

Diablo Winds Repowered Turbines are compared to:

- 1) Old generation turbines in same area
- 2) AIC turbines
  - a. All AIC turbines, using operating minutes
  - b. AIC turbines in close proximity (0.5 miles or modified, depending on number of turbines), using operating minutes
- 3) Tubular Towers (not lattice towers)
- 4) All turbines monitored, by operated capacity
  - a. Nameplate capacity (as modified by turbine status)
  - b. Shutdown/output by day

## 5.2. Seasonal Shutdown Analysis

### Central Analytical Questions

- Does seasonal shutdown reduce fatalities? For the 3-month shutdown, for the 2-month shutdown, for the 3.5-month shutdown?
- How much difference in winter fatalities as a percentage of the study year between shutdown and operating?

### Descriptive Information

Schedules—Companies presented a summary schedule table

- 2 cross-over years (Use selectively) (05-06; 06-07)
- 1 year of 2+ month shutdown (07-08)
- 1 year of 3-month shutdown (08-09)
- 144 EnerTech turbines shutdown Nov-Feb all years (See P76)
- Santa Clara site Vestas year-long shutdown (06-07)
- Diablo Winds turbines had no shutdown

### Possible Comparisons

- Shutdown versus operating turbines, baseline compared to current study
  - Compare Fatalities for Sept & Oct (leading up to shutdown) plus Mar & April (following shutdown) TO Fatalities for Nov-Feb to show trajectory before and after winter shutdown compared to baseline years
- Decommission status: turbines that have been removed. Look at monitored strings with turbines removed
- If there are greater than 2 fatalities per string, consider if particular end-row characteristics are associated with fatalities

### Biases & Complications

(To be expanded upon by Monitoring Team in their report)

- Baseline search intervals longest in the fall
- 2005 searches only occurred Oct.-Dec.
- Operated Capacity—Variables Considered & Discussed
  1. Nameplate capacity – data exists for all turbines
  2. Turbine status (Source: Monitoring Team): how many of those turbine locations have an operational turbine.
    - a. Baseline: One observation
    - b. Current Study: multiple observations for monitored and, if available, non-monitored turbines
  3. Capacity factor: % capacity for operation (for Baseline)
  4. Shutdown or operating by day based on schedule and informed by “turbine status”. Data available only for current study.
  5. Operating minutes: data for AIC turbines only.
- Anomaly for high number of feather spots in year 2007
- Feather spot and carcass backdating occurred differently between baseline and current studies.

### Agreed-to Filters / Factors for Analysis

- **Study Period**

- Sept thru April for each year
- 2005: Searches only occurred Oct-Dec. Start with November, after clearing searches
- **Search Interval**
  - 0-60 days mean search interval per string
  - (60 days parallels M32 48-hour Search Interval (KB) Study)
- **Search Radius:** 50m for baseline and current study
- **Search Area:** 125m (fatalities found >125m from turbine are not included in the analysis)
- **Operated Capacity**
  - For current study: Use shutdown and operating by day for all turbines and strings, informed by operating minutes and turbine status (Operating minutes correlates well with shutdown and operating by day.) Also consider evaluating operating minutes where available as a separate analysis.
  - For baseline: Capacity factor provided by companies and turbine status (only 1 sample)

**Agreed: Conduct the following Analyses**

- Compare Fatalities
  - A. For baseline and current study
  - B. Compare trends of different seasons -- look at all 9 years
    - “Off” = Nov | Dec | Jan | Feb
    - “On” = Sept | Oct | Mar | April
- Fatalities per megawatt
- Fatalities per operated capacity
- NREL Core Set: Turbines monitored in both the baseline and current study
- Compare fatalities with Diablo Winds fatalities in current study

## 6. APWRA-Wide Expansions

### 6.1. Comparison with Baseline: Number of Searches Issue

The Monitoring Team is concerned that the difference in search interval, number of searches per string and the degree to which searches were consecutive differs between the baseline and current study and may be producing bias. The data set presented at the meeting contained a number of strings with a small number of searches (300 string records have 1-2 searches). This remains even within the data set of strings limited by a search interval of 0-60. The data set was supposed to have had all CEC turbines removed, but this may not have occurred and it needs to be error-checked. Assuming this is not a data set error, it could result in bias. The low-search strings in the baseline study have very few fatalities.

Possible ways SRC members discussed to address this issue include:

- Use only strings with more than 3 searches. However, this would cut the number of strings analyzed by 33-45%.

- The Monitoring Team could look at the data to explore why so many turbines have such few searches.
- The Monitoring Team could undertake the analysis both ways.
- The Monitoring Team could run the analysis with a 0-60 day search interval, using only strings with two years of consecutive searches, and with the CEC and Energetch turbines eliminated.

Issues for the Monitoring Team to keep in mind in performing the analysis:

- Consistency across analyses
- Do turbine fields defined by geography and turbine model represent the entire Altamont Pass Wind Resource Area?
- Optimize all three: search interval, number of searches and consecutiveness
- Representing all four seasons and interannual variation

**Next Steps**

The Monitoring Team will draft a memo to the SRC on this issue, its implications and possible approaches to addressing it.

**6.2. Hazardous Turbine Removal**

A consensus approach to the analysis must take into account that, aside from hazardous turbines/towers that were removed, the companies regularly remove other turbines as a result of breakdowns. There is a background turbine attrition rate which we need to determine. The analysis could ignore the rated capacity of the string or look at a fixed rate.

**Consensus Approach**

**Process**

1. Take Step 1. If there is a relationship found, stop and use this approach (i.e. Step 1)
2. If there is no relationship found, go to Step 2.

**Step 1:** Use Chi Test or Fisher's Exact Test to determine if there is a relationship

String Category	Time Period in Relation to Hazard Turbine Removal	
	Prior to removal	After removal
Strings with hazardous turbines removed	X <sub>11</sub>	X <sub>12</sub>
Strings without removal	X <sub>21</sub>	X <sub>22</sub>

X<sub>ij</sub> = # Fatalities

Determine dividing point (time of removal) based on when most hazardous turbine removal has occurred. Determine the dividing point using data from summer months.

This approach would control for seasonal and annual variation

**Step 2:** Compare fatality rate for time interval (example: Year 1 to Year 2) based on percentage removal.

### 6.3. Turbine Types and Relation to Mortality

Turbine type would be considered to inform the extrapolation to the APWRA-wide analysis and to determine hazard of particular types for repowering.

#### Consensus Attributes to Use for Analysis

- Height
- Tower (tube, lattice)
- Size = rotor diameter

#### Confounding Issues

- Different turbine heights and area of blade sweep
- Types tend to be concentrated (Enertech, Howdens)
- Some turbines are in “wind walls”
- Each turbine type may be associated with different habitat characteristics (i.e., steep slopes) or turbine string features (more end rows) that may themselves be related to mortality. So separating the effects is difficult.

### 6.4. Adjustment Factors

#### Consensus Agreements for Scavenger Removal Rate Correction Factors

Carcass Condition	Correction Factor
Small, whole, fresh	Use 48-Hour Search Interval (KB) study (similar to Smallwood)
Large, whole, fresh	Scavenger Removal Trials Memo
Small birds	Use Smallwood 2007 study
*Feather spots	Use 48-Hour Search Interval (KB) study

\*For this issue, most participants preferred a curve modified in some way from the feather spot curve. This item was placed in the parking lot for later discussion.

#### Brainstorm

Meeting participants brainstormed a number of adjustment factor-related issues prior to reaching consensus agreements. Issues raised include:

### Scavenger Removal

- Different carcass found-conditions lead to different rates for whole carcasses, partial carcasses, and feather piles
- There is a relationship of curves to the carcass changes
- In this context, the curves vary over time
- Feather spot relationships are more linear
- The question is, which rate(s) to use?
- Golden Eagle are not used in trials
- Are Golden Eagles ever removed?
- Large raptors often remain 90 days
- Predator preferences affect scavenger rates
- There are differences between large and small birds
- Feather spots may more likely be predation-related
- There is less confidence in feather spots
- One reference is the Vasco Caves study
- The decay rate issue discussed in 48-Hour Search Interval (American Kestrel / Burrowing Owl) Study: there are linear decay rates for partial & feather spots, and a curved decay rate for whole carcasses to 30 days.

### Searcher Efficiency

- Carcass condition likely affects searcher efficiency, though the effects have not been quantified

### Other Adjustment Factor Issues

- The estimate has uncertainty. Standard error should reflect that in the mortality estimate.
- Does the adjustment factor reliability decline or change as the search interval gets longer? This compounds uncertainties.

### Feather Spot Issue Discussion

- They may represent fatalities very quickly removed or scavenged within minutes
- There is a different disappearance rate from whole or partial carcass removal rates because they are affected by different removal mechanisms such as blowing away in the wind and disintegrating into the grass due to rain
- There are species-specific factors
- One possibility would be to run two parallel analyses (carcass and feather spot) added at the end

### Other feather spot issues raised during the 3-day meeting:

- Feather spot backdating occurred differently between baseline and current studies.
- Feather spot aging is problematic, with the current study showing a midpoint of 45 days dead.

## 6.5. Agreed-to Filters / Factors for Analysis

- *Search Interval:* 0-60 days mean search interval per string, if enough data. Look at the data and try both with and without the 0-60 mean interval filter; would need to provide reasons to use inconsistent sets.
- *Search Radius:* 50m for Baseline and Current Studies
- *Search Area:* 125m, 150m for Diablo Winds (fatalities found >125m or >150m from turbine are not included in the analysis)
- *Operated Capacity – Same as in Seasonal Shutdown Analysis:*
  - For current study: Use shutdown and operating by day for all turbines and strings, informed by operating minutes and turbine status (Operating minutes correlates well with shutdown and operating by day.) Also consider evaluating operating minutes where available as a separate analysis.
  - For Baseline: Capacity factor provided by companies and turbine status (only 1 sample)
- *Reporting Metric:* Total fatalities. There is a concern that the fatalities per megawatt metric won't answer the 50% question, because it will not change even though the megawatts may have changed.

### **6.6. Next Steps: Unresolved Analytical Issues May Require Follow-Up**

- Agreement needed on feather spot correction factor and modification to curve identified in M32 48-Hour Search Interval (KB) Draft Study.
- Extrapolating to APWRA-wide from a consistently searched set of turbines in the Baseline may be challenging. The NREL core turbines were most consistently searched. However, they are not fully representative of the APWRA, as they contain no northern turbines. NextEra says it did significant mitigation in the northern area of the APWRA, which would not be reflected in the NREL core turbines.
- The absence of data on bird use at the Altamont, which varies by year and season, makes interpretation difficult. The Monitoring Team has collected data, but it has not been digitized. Shawn Smallwood and Lee Neher have received funding to digitize the data, but have just begun their work. It will unlikely be ready in time to inform the Monitoring Report. Some SRC members suggested that bird use data for the common NREL turbines should be prioritized.
- Hotspot strings: An initial shutdown analysis during the meeting indicated about 10% of the strings had two or more red tail hawk kills. It would be important to look at the string characteristics, including end row characteristics, and whether high-risk turbines were removed.
- Year 7 data may need QAQC. There was a large feather pile spike that year for AES turbines. Consider revisiting Year 7 fatalities and analyze without feather spots.

- Possible error issues in the shutdown analysis in relation to days dead to shut down. The set needs peer review and QAQC. Do we really know when and where shutdown occurs?
- Turbine attrition will probably affect results
- Continue exploring data (review 2004 & 2005 for baseline)

## 7. Alameda County Compliance Report

### Related Documents

[P68 SRC Hazardous Turbine Rating List](#)

[P126 Alameda County APWRA Compliance Report 9-22-09](#)

[P127 NextEra Outline of Seasonal Shutdown Process SRC 9-23-09 Meeting](#)

Sandra Rivera gave a report on the activity of the compliance monitor the County hired under the terms of the Agreement to Terminate Mediation (S29). The Agreement calls for the monitor to physically confirm and document by digital photographs the removal and relocation of high-risk turbines. It also calls for the confirmation of timely removal/relocation of derelict turbines, which are now labeled, according to the Agreement (S29), "unproductive turbines and towers." Under this Agreement, companies are each allowed to have a certain number of unproductive tower sites held in reserve so they can move turbines to these sites (see P126 for specifics).

### Comments and Questions

- Rivera was asked how many in total of the hazardous turbines recommended by the SRC for removal have been removed. She said she could supply that information at a later time. The SRC requested this information by company and hazard rating.
- In response to a question, Rivera said aerial maps supplied by the companies meet the Agreement's term calling for the list of hazardous turbines to be updated.
- In response to questions, wind company representatives said the Agreement gives different numbers of unproductive tower sites held in reserve to each company, because some companies had far more turbines, or more high-rated turbines.
- Agreement term 2bii, calling for the County to confirm the status of high-risk turbines after consulting with the SRC, did not happen, because the SRC was not under contract at the time.
- In response to a question, Rivera said the compliance monitor the County originally hired quit; work was postponed and completed by County interns.

### Discussion

Rivera asked the SRC to clarify two issues from their March 16, 2008, list of hazardous turbines (P68): two turbines that are not included in the list. SRC members provided the following information:

- Turbine 4323 is in the same string as turbines 4321 and 4322, and is likewise rated 8.5.

- Turbine 844, which currently has no risk level, should be rated 9.

In removing and relocating turbines, SRC members stressed the importance of removing end row derelict turbines and of choosing relocation sites rated below 7 (These are the SRC's standing recommendations to Alameda County). The SRC asked the County to provide a table showing removals and relocations.

### **Next Steps**

The County will:

- Edit P68 to incorporate information on Turbines 4323 and 844.
- Add a definition of high risk to the monitor's table
- Report back on how many "unproductive turbines" are end-of-row towers
- Post table of removed turbines
- Create a table of turbines showing:
  - Total #of turbines for each company
  - Total towers for each company
  - Separate column headers for each high-risk turbine # (i.e., 7, 7.5, etc.)
  - Separate column header showing # removed
  - Provide data on percentage removed
  - Allocated replacement sites and the number of them above rating 7

### **2008-09 Winter Shutdown**

Joan Stewart and Loan Tran of NextEra gave a PowerPoint presentation on the procedures used to conduct and validate winter shutdown for the 2008-09 year and to time shutdowns and startups with monitoring searches. Companies strived to make the process as transparent as possible. The winter shutdown lasted three months (see P127 for specifics).

### **Related Issue: Adaptive Management/Mitigation Required in Settlement Agreement**

Rivera said that data was not available for the SRC to meet its June 2009 deadline, under the Settlement Agreement, to prioritize adaptive management measures, but the intent is to forge ahead, despite the delays. Under the Agreement, settling parties would bring an adaptive management plan to the SRC if it was projected that the 50% decline in mortality would not be met. However, prior to that, the SRC was to prioritize management measures.

### **Discussion**

SRC members asked for clarification of the definition of "adaptive management measures," and whether the intended term was "mitigation measures." Rivera said the intent is whether there are additional management actions, beyond seasonal shutdown, siting variations and hazardous turbine removal that might come forward.

## 8. Preparing to Brief Science Advisers to the Conservation Plan

### Related Documents

P122\_CBI APWRA Science Process Update Memo (9-17-09)

Wayne Spencer of the Conservation Biology Institute discussed the Independent Science Advisory Process for the APWRA Conservation Plan. The Science Advisers are seeking a briefing from the SRC to inform their process.

The SRC briefing will be in the form of a panel presentation. Wayne Spencer will frame the initial questions, and then a discussion session will follow. Spencer will send a list of questions to SRC members to discuss at the meeting.

### Next Steps

Some SRC members will develop a list of recommended documents for the Science Advisers to review. Sue Orloff will begin the list, to be completed by October 8.

## 9. SRC Steps & Products to Close out Three-Year Process

### Questions to SRC from Some Settling Parties

#### Related Documents

[P119 Request from Audubon, County and Settling Party Companies to SRC \(8-18-09\)](#)

SRC members provided individual answers to a set of questions from some of the Settling Parties.

1. Could the SRC comment on the suitability of the baseline 1,300 number?
2. If the 50% reduction is not met:
  - A. What priority management measures would the SRC recommend to meet the 50% reduction?
  - B. What level of effort of monitoring is needed?
3. If the 50% reduction is met, what kind of monitoring level of effort is needed until the NCCP takes precedent to show the trend in mortality?

### 9.1. Suitability of the baseline 1,300 number

Jim Estep: Two to three years ago the SRC discussed the baseline issue.

Joanna Burger: It's not suitable. We have a lot more analyses now than we had before. A better procedure is to use the best science available at this time to determine the number.

Shawn Smallwood: The 1,300 number is from the 2004 report and was derived from the Oregon (Stateline) scavenger removal trial and Sue Orloff's study on small raptors. The 1,300 number is unsuitable. I was pressed by a settling party to come up with a number during the parties' deliberations over the settlement agreement, and I repeatedly advised that party to rely on the SRC to establish the baseline. The baseline needs to be comparable using common methods.

Sue Orloff: We have all these new data on adjustment factors to make it comparable. I would repeat that the comparison to baseline doesn't make a lot of sense unless you have bird use data.

Joanna Burger: In general, as human populations increase, there could be more concentration of birds in the Altamont, so the numbers of birds in the Altamont could have gone up. Thus if the number of birds present doubled, but the mortality remained the same, there would actually be a 50% reduction.

Julie Yee: I'm unsure if the target in the Settlement Agreement is intended to be 50% or the number 650. If it is 50%, the baseline of 1300 is not suitable. We want to use comparable methods in both the baseline and the current study. If it is 650, then it is just an agreed-upon benchmark. I can't speak to if it is suitable.

#### **Public Comment**

Mike Lynes of Golden Gate Audubon said the number may have been a mistake. SRC members are not constrained by the Settlement Agreement in how they consider the information, but their decision will help inform the Settling Parties.

Mike Boyd of CARE said the 1300 number was the Settling Parties' best guess. All the Settling Parties must agree for it to be changed. There was no bird use data at the time.

### **9.2. If the 50% reduction is not met, what priority management measures would the SRC recommend to meet the 50% reduction?**

Jim Estep: In the long term, clearly repowering is at the top of my list.

Sue Orloff: Conducting hazardous turbine removal analyses for the entire Altamont would be a good thing.

Joanna Burger: Other than repowering, evaluate the relative risk of towers and removing those towers that are most risky is an important measure. Repowering

won't happen overnight, it's expensive and slow. So after that, looking at risky turbines is the best solution.

Julie Yee: Pass.

Shawn Smallwood: The SRC has standing recommendations. Most were not implemented on time or completely. They're not achieving the 50% reduction goal. Repower the Altamont Pass as soon as possible, with careful siting and enforcement of permit conditions and applicable laws.

### **9.3. If the 50% reduction is not met, what level of effort of monitoring is needed?**

Joanna Burger: The kind of monitoring should include a subset of current monitoring. Questions that haven't been addressed: What should the real search area be for different towers in order to extrapolate APWRA-wide? In wind farms with large towers, how far are birds thrown? The species involved in fatalities for the larger turbines should be looked at, from vultures to burrowing owls.

Jim Estep: The burrowing owl study is important.

Sue Orloff: It depends on how long the monitoring continues. If a trend analysis was conducted for many years, you could have a smaller sample.

Jim Estep: If there is repowering, it will modify the program.

Joanna Burger: The monitoring should address different questions, while maintaining some consistency.

Shawn Smallwood: The current monitoring program should continue. I agree with the recommendation of pursuing the burrowing owl study, and an additional directed study of scavenger removal rates.

Joanna Burger: We really need data from the camera study of burrowing owls, to determine whether mortality is due to turbines, predators, or if the turbines increased predation. The burrowing owls are a real enigma.

Julie Yee: The QAQC study to tease apart carcass removal rates and observer detection.

Jesse Schwartz of the Monitoring Team: I would rehash that proposal. The current study has a lot of turbines, and not a lot of power. I would restructure it to increase your power to prioritize over a large sample set.

Jim Estep: I would echo what was said yesterday, topography and geography mapping, and integrate that. That is something we should be doing.

Joanna Burger: Also, we need to determine what factors, besides pure geography, end turbines, slopes and valleys, affect mortality. Synergies may be important, not single factors.

**Mike Lynes: If we restructure monitoring, what about if it is seamless or stops and starts?**

Joanna Burger: I would not interrupt the current monitoring until there is a new program. You could reduce or change it, but you want the thread of continuity and to be able to compare the current program to the future program. We might use nine years of data to pick strings and parts of the Altamont Pass to select representative areas and data.

Jim Estep: Monitoring needs to be reformulated. It needs to kick in right away. Monitoring needs to continue, but not necessarily using the same methods and protocols as are currently used.

**Nan Leuschel of Ralph Prop II (Altamont property owner): The SRC has not yet addressed winter shutdown.**

Sue Orloff: I'm uncomfortable increasing or institutionalizing the winter shutdown until we know what it's doing to burrowing owls. This is a species that is more likely to be listed in the future.

Jim Estep: It should be considered. It hasn't proven to be effective yet, but it should be on the list.

Joanna Burger: It should be on the list, maybe as an intermediate solution before repowering. If burrowing owls are not evenly distributed, maybe you would not shut down where the burrowing owls are.

Shawn Smallwood: The SRC has a standing recommendation for a four-month shutdown. There is no strong evidence that burrowing owl mortality has increased during the winter shutdown.

**Public Comment**

Emre Ergas of NextEra: I am extremely disappointed in what I have heard from Shawn. If he is saying at this time that we have not met the 50% reduction, there is biasing going on. There's a ton of data we are analyzing and you're making a decision already, your comments are in the paper. I'm not positive of getting unbiased results. You can't make that assumption.

Shawn Smallwood: I'm just being honest.

Mike Boyd of CARE: One thing we know is effective is wintertime shutdown. Shutdown works. We could address the 50% within three years. Consider a no project alternative.

**9.4. If the 50% reduction is met, what kind of monitoring level of effort is needed until the NCCP takes precedent to show the trend in mortality?**

Julie Yee: It's difficult to answer unless we know what's going to happen with respect to management actions or what kind of trend to anticipate.

**Emre Ergas: Assume the status quo. What inputs do we need to provide to get to the questions?**

Julie Yee: If we assume the status quo, there is no reason to assume a decrease in mortality. If you tell us what actions are changing, when they're changing, and the percentage change in fatality you are aiming for, then we could focus the monitoring to look for that effect. We could perform power analyses to determine a sampling frequency. If, by "status quo," you are aiming to show no increase in mortality, it is difficult to show something is zero. You need to define "increase" in terms of a range away from zero. And is it for the four species?

Joanna Burger: If it is 1-2 years until the NCCP, continue the monitoring program as is, we should "do no harm" to the monitoring.

**Emre Ergas: What is the continued benefit of monitoring the older turbines? If it is to measure if mortality has increased or decreased, would we need the same level of effort?**

Jim Estep: I would reframe the question if there is repowering. There is no utility at looking at the effects if repowering is actually moving ahead. It could be scaled down if you are looking at a trend analysis.

Joanna Burger: Unfortunately, we are dealing with geographical diversity. We will have better questions or hypotheses to test after the analysis is done.

**Public Comment**

Mike Boyd of CARE: The NCCP is a take permit. Why do you need monitoring? To show DFG, USFWS you are addressing the take. To show a reduction in the numbers you are killing. Monitoring is never going away. On November 10, they will need a permit when they come back from winter shutdown.

Mike Lynes of Golden Gate Audubon: Is there an inherent value to estimate the annual mortality in the Altamont Pass? We believe it is a necessity of operations -- what the biological cost is of operations. There should be a baseline amount of monitoring.

**9.5. Other Questions Directed to SRC**

### **What is the level of confidence in regards to the 50%?**

Shawn Smallwood: The fundamental problem is in extrapolating from monitored turbines to APWRA-wide.

Joanna Burger: The last few days have been very useful. We might have a lot of confidence for part of the Altamont with respect to the 50% reduction, but not for the turbines that were not monitored. We may have increased our confidence in the data from over a year ago.

Shawn Smallwood: We can have the highest confidence in fatality rates estimated from the NREL core turbines. Emre is correct -- if the mitigations were applied to those turbines in the northern part of the APWRA -- we won't see it in our comparison of the NREL core turbines. We have a problem there.

### **9.6. Timeline for Monitoring Report**

Doug Leslie of the Monitoring Team said, if the report is to show data up to September 30, it would take 1.5 months to produce a draft report. In order to provide enough time for SRC members and the public to digest the report, it would need to be produced two weeks before an SRC meeting, which would be in December.

### **9.7. SRC & Monitoring Team Work after October**

Sandi Rivera of Alameda County has asked SRC members to extend their contracts. She said the County envisions SRC work to occur with the same level of effort, on the following topic areas:

- Monitoring -- SRC's assessment
- The 50% reduction question
- Mitigation/adaptive management

Monitoring Team members said members of the Team's field crew are making plans to leave after October. If it is a priority to keep the staff, a strong signal needs to be sent. SRC members agreed that, until the monitoring program has been redesigned, it will be important to keep the expertise of existing field monitors.

### **9.8. SRC Recommendation on Monitoring**

The SRC recommends that the Monitoring Team continues at its current state until there is a monitoring redesign.

## **10. AWI Permit Update**

The East County Board of Zoning Adjustments is seeking SRC input on the permit issues. AWI asked the board members (or a subset) to come to an SRC meeting. The motion was amended to have one board member come to an SRC meeting and

report to the rest of the Board. The Board meets the fourth Thursday of the month, or occasionally the second Thursday. CARE prefers a joint meeting of the two groups, believing its case could be prejudiced otherwise. The issue will be taken to the Board for further discussion.

## 11. Documents Circulated at Meeting

P100

[M37 Fatalities Table Data Dictionary \(9-10-09\)](#)

[M38 Altamont Database Technical Reference](#)

[P119 Request from Audubon, County and Settling Party Companies to SRC \(8-18-09\)](#)

[P120 Warren-Hicks Altamont Mortality Model \(9-2-09\)](#)

[P121 Yee Simulations \(9-10-09\)](#)

[P122\\_CBI APWRA Science Process Update Memo \(9-17-09\)](#)

[P123 Yee PPT Presentation \(9-22-09\)](#)

[P124 Warren-Hicks PPT Presentation \(9-22-09\)](#)

[P125 Stark PPT Presentation \(9-22-09\)](#)

[P126 Alameda County APWRA Compliance Report 9-22-09](#)

[P127 NextEra Outline of Seasonal Shutdown Process SRC 9-23-09 Meeting](#)

## 12. SRC Meeting Participants

### **SRC Members Days 1, 2 & 3**

Joanna Burger  
Jim Estep  
Sue Orloff  
Shawn Smallwood  
Julie Yee

### **Staff**

Gina Bartlett, Facilitator, Days 1-3  
Sandi Rivera, Alameda County, Days 1-3  
Ariel Ambruster, Facilitator Assistant, Days 1-3

### **Monitoring Team**

Doug Leslie, ICF John & Stokes, Days 1-3  
Jesse Schwartz, ICF Jones & Stokes, Days 1-3  
Brian Karas, BRC, Days 1-3

### **Others**

#### **(Meeting Sign-in is optional)**

Michael Boyd, CARE, Day 3  
Chris Dreiman, enXco, Days 1-3  
Emre Ergas, NextEra, Days 1-3  
Jim Hopper, AES, Days 1-3  
Mike Lynes, Golden Gate Audubon Society, Days 1-2  
Nanette Leuschel, Ralph Prop II, Day 3  
Ryan McGraw, AWI, Days 1-3  
Tara Mueller, California Atty. Gen.'s office, Day 2  
Steve Mullin, AWI, Days 1-3  
John Opris, enXco esc., Day 3  
Bob Power, Santa Clara Valley Audubon Society, Day 3  
Joan Stewart, NextEra and AIC, Days 1-3  
Loan Tran, NextEra and AIC, Day 2  
Bill Warren-Hicks, EcoStat, Days 1-2  
Zack Walton, NextEra, Day 3  
Mark Welther, Golden Gate Audubon Society, Day 3  
Ed West, BRC, Days 1-3

### **13. List of SRC Agreements Developed September 22, 23 & 24**

(Compiled from this document)

#### **Continuation of Altamont Monitoring**

The Scientific Review Committee recommended that the Monitoring Team continue at its current state until there is a redesign of Altamont monitoring.