Altamont Pass Scientific Review Committee
Agreements & Recommendations

SRC agreements represent consensus recommendations of the SRC developed during its meeting deliberations. Consensus agreements stand unless new information arises. At that time, the SRC member with new information will request that the SRC facilitator place it on the appropriate SRC agenda for discussion and reconsideration.

The SRC submits its recommendations to the County Planning Director.

Agreements & Recommendations are listed below in alphabetical order by topic, and reverse chronological order, with the most recent recommendation first, within each topic. In some cases, recommendations are contained in separate documents that are linked from the topic heading or from a topic underneath the heading.

List of Topics

Additional Studies

(July 2011 Meeting Summary P217)

Other Monitoring Team Studies

The SRC prioritized and recommended burrowing owl studies as follows:

- Continuation of the current burrowing owl distribution and abundance surveys through December 2011 and ideally through February 2012 (Task 1 of P216 Shawn Smallwood proposal presented at the meeting).
- Pending available resources, proceed with the burrowing owl behavioral pilot study.

(Dec 2010 Meeting Summary P196)

Other Studies for 2011

The SRC agreed to recommend that available monitoring funds be allocated to a burrowing owl study incorporating the following elements:

- An analysis of existing historic fatality data to identify burrowing owl fatality hot spots, clusters and potential related environmental attributes from available GIS layers; including a temporal and seasonal analysis.
- Development by the SRC and Monitoring Team prior to March 2011 of the design of a pilot study on burrowing owl behavior; and
- Prior to the end of March 2011, a limited distribution and abundance study in lower terrain, with report back to the SRC.

(Dec 2010 Meeting Summary P196)

CalWEA Study

The SRC agreed to:

- Recommend that CalWEA be asked to provide map and location information about its study sites
- Favored seeking a way to work with CalWEA or reduce any potential impacts
- Recommended that Alameda County attempt to develop a memorandum of agreement with the CalWEA study principals

(Feb 2007 SRC Meeting Summary P12)
The SRC discussed the approach to the monitoring program and agreed that some of the provisions of the settlement agreement, such as the blade painting study, may require additional studies outside scope and costs of the current monitoring program to avoid confounding monitoring results. If the monitoring program includes too many mortality reduction schemes, it may fail to provide conclusive data on each scheme's effectiveness. However, the SRC remains undecided on this issue, and decided to defer further deliberations on it until the Parties and Companies return with more answers to outstanding questions.

Baseline for Avian Mortality Analysis

(July 2010 Meeting Summary P182)
Assumptions for Measuring SRC-Recommended Baseline
The SRC reviewed the Monitoring Team's memo on approaches to measuring the SRC-recommended new baseline (M55 New Baseline Memo). The SRC supported the memo's approach with the following changes:

- Develop an approach to representing baseline installed capacity that gives credit for significant changes on the ground through hazardous turbine removal, attrition and repowering, to most accurately represent the pre-management action baseline environment. Turbine removals to be accounted for would be the Flowind turbines, Buena Vista, Howden and Kenetech turbines.
- Revisit Assumption 1 and incorporate supporting evidence for its conclusion
- Explicitly incorporate the language of the SRC recommendation and clarify that it is in regard to the proposed Adaptive Management Plan
- Incorporate straightforward performance metrics
- Tighten the introduction and clarify language in the first paragraph in regards to CUP conditions and Settlement Agreement conditions
- Correct and/or rectify information in Table 1 and Table 9
- To address refinement of the 3-year-average baseline, the SRC recommended a process, modeled on Shawn Smallwood’s methodology used for the Tres Vaqueros turbines, and suggested that the settling parties identify which operating groups would be the focus of credit actions. SRC recommends patching best available rates for the larger groups only: Flowind, Buena Vista, Kenetech, and Howden.

(Oct 2009 Meeting Summary P139)

Suitability of Baseline

The SRC does not think the "1300" settlement baseline is suitable to measure a 50% reduction. Among the reasons are:

- The 1300 number was defined in the Settlement Agreement as being for **all** raptors, while the current study focuses on 4 focal raptor species.
- The baseline study used a different methodology for calculating mortality.
- 1300 was the upper end of a range of estimates in the study at that time, not a point estimate.

More Suitable Baseline Approaches

- Using the existing analytical approach to compare the current study to the baseline study, analyzing by operator group, in geographically specific and narrow comparisons. The analysis would be aggregated by company, project, turbine type and turbine size. This information could then be summed to a near-Altamont-wide estimate. Questions asked would vary by group; certain questions would be asked in the baseline to current study comparison, while other questions might be asked for other analyses.
- Use a simulation or other method to compare the CEC baseline data to current study data, possibly by randomly picking current study searches that are closest to compare with the two baseline searches [One SRC member has since expressed concern about moving forward with this approach without further SRC discussion]. The CEC data include the northern APWRA area.
- Explore a comparison between years 1 & 2 of the current study and the last two years of the current study. This approach might lack sufficient years of data to reach conclusive results. It also would involve periods of time when various management and mitigation measures were in effect. It would be important to incorporate bird use data to provide a context for the numbers and trends.
- All analyses would benefit from bird use data to help understand inter-annual variation in fatality rates.

Behavior Use and Relative Abundance

(Feb 2008 SRC Meeting Summary P78)

SRC members agreed that bird use data should be integrated into the mortality analysis to the extent possible so the estimates account for raptor population fluctuations that might influence fatality statistics. To work toward this goal, they agreed that all possible bird abundance and use data for the four focal species should be gathered for evaluation and possible integration. The information will be carefully reviewed and any use of these data will first be discussed. The SRC also reiterated its recommendation for acquiring power generation or turbine operating hours data to similarly account for fluctuations in turbine operation.

(March 19, 2007 Conference Call P19)

SRC Agreed: Monitoring Team to do a total of 30 minutes at each observation point. The first 20 minutes to record data on bird behavior followed by a 10-minute point count. Location selection: The MT should select the location of the observation point based on key topographical features in order to maximize observability of raptors while retaining a good view of the turbines. The MT should select the location that is the most appropriate for that survey with clear documentation to keep the same point for future observations. The observer should have a good view of the turbines and the landscape around those turbines (which may not necessarily be at the top of the hill).

(Dec 2006 Meeting Highlights P3)
This agreement has been superseded. Please see March 19, 2007 Item
For now, the SRC recommends that the monitoring team complete a relative abundance study to measure the number of birds in Altamont. Behavior use studies will be designed and tied to specific management actions as they are implemented.

Blade Painting--AWI Hodos Study

(Feb 2007 SRC Meeting Notes P12)
The SRC agreed that AWI should move forward with the study and present study plans to the SRC.

Buena Vista Repowering Project

(Dec 2006 Meeting Highlights P3)
SRC open to serving as Contra Costa Technical Advisory Committee.

Burrowing Owl Study

(Feb 2011 Meeting Summary P202)
Burrowing Owl Study Design
The SRC revised and accepted the burrowing owl study hypothesis framework (original version, M67; revised version, P203).
The SRC agreed that key objectives of burrowing owl studies are the following:

- To inform repowering;
- To test several hypotheses, including:
    - Burrowing owl mortality is related to proximity of burrows to turbines
        - Burrowing owl mortality is associated with specific positions of active turbines relative to occupied burrows (i.e. distance, directions, and/or slope
        - Mortality increases with increasing density of burrowing owls
        - Mortality is influenced by topography
    - Burrowing owl deaths are indirectly turbine related
    - Burrowing owl mortality is partly dependent on behavior
        - Predators use turbines to hunt for burrowing owls

- Perch hunting predators hunt from turbines and kill burrowing owls at their burrows
- Predators flush burrowing owls into the rotor swept area

To meet these objectives, the SRC recommended the following burrowing owl studies in order of priority, pending development of a detailed work plan and budget:

1) A distribution and abundance study based on P198 Smallwood Proposal to Sample Burrowing Owls across APWRA;
2) An analysis of existing historical fatality data to develop information on presence of burrowing owl populations in the Altamont, including an analysis of seasonal and yearly variation of fatalities that might shed light on the degree to which populations at various sites vary or remain constant. The information would be mapped visually and analyzed both by #/strings/year and #/megawatt/year; and
3) The summer set of behavioral observations detailed in P194 SRC Burrowing Owl Behavior Pilot Study Proposal as a pilot study to assess the utility of techniques for later research.

In making this recommendation, the SRC emphasized the importance of ensuring that the distribution and abundance and behavior studies be undertaken by qualified researchers, with burrowing owl experience, and whose time is fully dedicated to the burrowing owl study.

(July 2008 SRC Meeting Summary P104)
The SRC agreed that the thermal imaging study would focus on burrowing owl behavior relative to turbines, and what predators are doing. It would incorporate an adaptive sampling search method and corresponding statistics. Specifics of the study:

- Study time to occur in winter, between Thanksgiving and January
- Simultaneously observe one site with towers and a comparable site without a towers
- Divide ridgelines into 3 elevation areas: high, mid and low
- Observe each of the 3 areas for 2 hours, for a total of 6 hours
- Before the 6 hours of nighttime viewing, 1 hour of binocular viewing before dark, for a total of 7 hours of viewing
- Select areas of high burrowing owl density, with a variety of turbine types (lattice and tubular)
- Conduct viewing for 20 nights (a total of 40 sites)
- Study would encompass 4 pairs or replicates, each viewed 5 times
- Randomly select the 3 elevation areas, for viewing in random order, each night
- View on side of the slope with prevailing wind
- Measure wind speed
- Use a thermally contrasting marker – pin flag or plastic bag – to mark distance
- When fatality searches occur on these plots, they should include all segments

(April 2008 SRC Meeting Summary P93)
The SRC agreed to two phases of research, beginning with a pilot study. The SRC agreed to:

Distribution & Abundance

- Expand the proposed study to include migrating winter populations
- For sampling, divide the APWRA into at least 4 geographic subsets, and then identify two areas in each subset, one representing areas with known burrowing owl populations and the second those areas lacking information on burrowing owl populations. Random sampling would occur in each of the two areas within each geographic subset.
- Consider a margin of error of ± 10% or ± 20%.
- Stable isotope analysis will be part of the study.

Behavior & Predation

- Have the Monitoring Team test a rented thermal imaging camera for use in night observation as part of the pilot study
- Configure the study to include two-observer teams viewing burrowing owl behavior and predators for two hours, starting two hours before sunset – it could be from one location, or the two observers could triangulate
- Focus on the peak mortality periods of July and January
- Use thermal imaging, if proven feasible during the pilot, to study owl behavior on both ridges with turbines and ridges without turbines.
- Explore the possibility of telemetry to watch movement.
- SRC members prefer recording versus fieldnotes so they can look at it later

The SRC will finalize the proposal at its May meeting after the thermal imaging test is conducted and analyses have been completed to determine sample sizes.

Burrowing Owl & American Kestrel Study Design

(Feb 2007 SRC Meeting Notes P12)

- The SRC agreed for the first year to focus the four-month study in two 2-month periods, September-October 2007 (when mortality is most likely to occur) and in the spring, probably March-April (when predators are searching for food for young) to observe if there is a seasonal difference in scavenging rate.
- The study will sample 200 turbines every other day for two months, or 6000 total turbine searches per season and 12,000 searches for the year.
- Using a 4 turbine/hour search rate, the study will take 3000 hours total for the four-month period. The trade-off is that the number of hours for this focused study is still less than what would have been spent on a much larger Altamont wide monitoring study (i.e., sampling every two weeks).
- The MT will provide the SRC with more information about study plot locations.
- The study should as much as possible overlap with existing monthly search plots.
- The MT should check with Alameda County if this item should go before the Board of Supervisors on Feb.27 (Feb.13 deadline).

(Dec 2006 Meeting Highlights P3)
200 turbines recommended for study on Burrowing Owl and Kestrel

Data Transparency

(Feb 2008 SRC Meeting Summary P78)
The SRC and MT thought creating a central shared database system would be beneficial. The data could be placed on the SRC website for interested parties to use. While database management and processing data will be time-consuming, MT members said it should save time in the long run.

The SRC agreed that the MT should create a shared public database to provide access to the following data:

- 1998-2003 CEC NREL Fatality Data (Used to Develop the 2004 CEC Report)
- 2005-2007 MT Fatality Data (Used to Develop the 2008 Monitoring Report)
- Bird Use Data
- Turbine Operation Data

Data-Related Confidentiality

(Feb 2007 SRC Meeting Notes P12)
The SRC agreed to a protocol for handling confidential data:

- It will not be shared outside SRC/MT
- It will not be e-mailed
- Companies should label materials “Confidential”

Diablo Winds Monitoring

(Apr 2007 SRC Meeting Summary P28)
SRC members were in consensus that continuing to gather data at Diablo Winds is critical as repowering seems likely to reduce avian mortality significantly and more directly comparable data is needed, and because the settlement parties expected the SRC to incorporate data from the repowering projects into the overall analysis stemming from the monitoring program. To ensure this occurs, the SRC agreed to shift a portion of the monitoring program's proposed 2.5-year budget from "Addressing Additional SRC Requests" to a new line item to continue monitoring at Diablo Winds. These mortality data will allow the monitoring team and the SRC to evaluate repowered versus non-repowered sites. These data will be critical to adaptive management strategies.

Feathering versus Lockdown

(Dec 2007 SRC Meeting Notes P71)
SRC members decided feathering versus lockdown of turbine blades when turbines are not operating is not a potential management strategy. There appears to be no clear pattern in the data and multiple confounding factors. Statistics demonstrate there is a great deal to learn about burrowing owl mortality in the APWRA and underscore the value of conducting a

nocturnal behavioral study to understand the factors, including predation, that affect burrowing owl fatalities near turbines.

FPLE Credit for Removing High Risk Turbines

Hazardous Turbines

(Jan. 4, 2008 SRC Meeting Notes P72)
All towers and turbines that were rated 8-10 are recommended for removal (P69).
If the winter shutdown is not extended to at least three full search cycles (anticipated to be about 3 months), towers and turbines rated 7 and 7.5 are recommended for removal.
The SRC recommends that it will consider evaluating turbines and towers not previously evaluated for hazard and removal.

(Feb 2008 SRC Meeting Summary P78)
The SRC reiterated its previously made recommendation that turbines it ranked 8-10 on a hazard scale of 1-10 be removed as one measure toward achieving the 50% reduction in raptor mortality required by the Settlement Agreement. Since the winter shutdown was shorter than three months, the SRC additional recommendation to remove turbines assigned ratings 7 and 7.5 is in effect. (See P68_Turbine List for SRC Selection of Dangerous Wind Turbines 12/21/07 and P69_SRC Hazardous Rating Scale 2/1/08).

Management Strategies

(June 2010 Meeting Summary P170)
Adaptive Management Proposal
(SRC Reviewed P163_Alameda County Adaptive Management Plan Proposal II, 06-07-2010)

Developed 15 June 2010 by the Scientific Review Committee[1]

The Scientific Review Committee (SRC) reviewed the County of Alameda's proposed plan at the SRC public meeting on June 14-15, 2010. The County of Alameda requested that the SRC review and provide recommendations on the County's proposal (P163_Alameda County Adaptive Management Plan Proposal II, 06-07-2010)**.** The SRC received and considered elements of the two other proposals submitted by the settling parties. Because the settling parties were unable to reach agreement on adaptive management, the SRC considered the various proposals striving to balance the interests of wildlife and wind power. Some of the settling parties participated in the public meeting and discussion on these recommendations.

The SRC provides these recommendations on repowering, hazardous turbine removal, additional studies, and methodology for measuring 50%. The SRC cannot provide assurances that the management actions proposed in the Adaptive Management Proposal will achieve a

[1] SRC Member Susan Orloff did not participate in developing these recommendations due to illness.

50% reduction. The plan can provide a framework to evaluate the 50% reduction and potential subsequent actions if the 50% reduction has not been reached.

Repowering Primary Strategy

The Scientific Review Committee reiterates its recommendation that **repowering with careful turbine siting is the primary strategy to reduce avian mortality** toward a 50% reduction and should move forward as quickly as possible. Without repowering, then the SRC recommends seasonal shutdown and hazardous turbine removal.

Hazardous Turbine Removal

Strategies based on high risk turbine removals should take into consideration the configuration of turbines after the removals. For example, the removal of a HRT ranked moderately high (<9) could create a gap which increases the collision risk of neighboring turbines and discounts the benefit of removal. The plan should aim to remove high risk *situations*, and removals of HRTs ranked <9 should be examined case-by-case. For HRTs ranked 9 through 10, the collision risk is considered sufficiently high that they are always recommended for removal.

Following the relocation guidelines and filling gaps when possible is part of the relocation evaluation. Consistent with the existing proposal, the SRC and staff should periodically re-evaluate turbine rankings to consider how the configuration at the time of the evaluation might change the hazard ranking of turbines. The configuration shifts frequently as part of regular wind company operation, but would also be affected by filling gaps, removals and relocation established through the proposal.

Relocations should also be evaluated on a case-by-case basis, and should avoid areas with burrowing owls as well as HRT addresses.

Credits can be applied to HRT removals when lesser HRTs are removed for repowering and for creating safe flight paths (corridors) and more open space for foraging. Similar credits can be considered for other contexts besides repowering if they create safe flight paths and open space for foraging.

Burrowing Owl and Adjustment Factor Studies

The SRC recommends that the plan heighten the importance of the burrowing owl study and adjustment factor study since these studies are essential to improve understanding and ultimately reduce fatalities. Burrowing owl fatalities have been very significant in the mortality rates. The burrowing owl study is just as important as the monitoring plan for analyzing and

interpreting trends and for informing repowering. The management plan should make the burrowing owl study high priority.

Omit the item under 5.e.ii. The search interval should remain set at 30 days.

Methodology for Measuring 50%

The SRC would recommend shifting the methodology to measure 50% reduction for the purposes of this monitoring program.

The 50% reduction should be evaluated annually by comparing mortality estimates between:

1) a recommended new baseline defined using the first 3 years of the current monitoring program (bird years 2005-06, 2006-07, 2007-08), and

2) A running average based on the last 3 years. For example, at the end of 2010, the average of bird years 2007-08, 2008-09, and 2009-10 would be compared with the recommended new baseline.

The 50% reduction should be evaluated separately for the four focal species.

The recommended new baseline (2005-2008) is considered to have had similar fatality conditions as the original baseline period (1998-2003), and the recommended new baseline does not rely on assumptions about the uneven sampling in the original baseline study. To the extent possible, the recommended new baseline will be adjusted upward to offset reductions from mitigations occurring between 2003 and 2008, for the purpose of better representing the baseline period.

Each year that the 50% reduction is not met, then the SRC will recommend management actions determined to most effectively reduce fatalities, at a level commensurate with the remaining difference. In order to inform the SRC's recommendations, the County should provide complete information on the management actions conducted to date (i.e. when, where, and which turbines removed or relocated).

The SRC recommends that the metric for measuring a 50% reduction be scaled by bird abundance, as soon as bird abundance data are available.

(Jan 2010 Meeting Summary P149)

Priority Adaptive Management Actions to Reduce Mortality

The SRC recommended the following priorities:

1. **Repowering**
    a. Must be done with very careful siting, considering pattern, location, slope, etc., so repowered turbines do not cause golden eagle fatalities.
    b. SRC supports implementing it as soon as possible.

2. **Interim management actions until repowering is implemented:**
    a. **High Risk Turbine Removal**
        i. The SRC would evaluate and rate currently unrated turbines 9 or 10 to be removed. These would be removed rather than those turbines already rated 7.0-7.5 that have not been removed.
        ii. Turbines should be reassessed annually because conditions change.
        iii. There needs to me more data and analysis on the effect of this management action.
        iv. This management action includes removing unproductive (derelict) turbines and towers without turbines.
    b. **Seasonal Shutdown.** Four SRC members reiterated the SRC's recommendation for a 4-month shutdown; 1 member recommended a 12-month shutdown.
        v. There needs to be more analysis of seasonal shutdown effect.
        vi. There needs to be analysis of whether there is a possible spike in fatalities from turbine restarting or not
3. **Recommended Research:**
    a. **Burrowing Owl Behavior Study:** The Burrowing Owl study has two parts: the behavior study is highest priority and the distribution element is second priority. Both are designed to address the high number of burrowing owl fatalities. The behavior study should be decoupled from the distribution/abundance study and the proposal resubmitted to the CEC. The study is important to understand why burrowing owls are being killed, and whether the fatalities result directly from turbines or indirectly from predators.
    b. **Research on Adjustment Factors** (also referred to as detection probability)

(Aug 2007 SRC Meeting Notes P53)
The SRC agreed to recommend the following short-term management strategies to meet the Settlement Agreement's requirement for a 50% mortality reduction by November 2009:

- Classify unclassified turbines
- Remove/relocate Tiers 1&2 of the newly classified turbines
- Reiterate previous recommendation that all Tier 1 turbines be removed/relocated
- The SRC also recommends repowering as a strategy to reduce mortality in the long-term.

Management Strategies -- Winter Shutdown

(Sept. 2007 SRC Meeting Notes P49)
The SRC agreed to recommend a one-year four-month winter shutdown for the 2007-08 year, to strive to achieve the goal of a 50% reduction in mortality for the four focal raptor species as a whole, with the following conditions:

- The SRC consider recommending a separate behavior study of burrowing owls

- The shutdowns be sequenced with the timing of searches, so turbines are searched shortly after being shut down, to improve the validity of the data.
- The shutdown period would start in mid-October and end in early March, with each turbine shut down for four months, to allow enough time to synchronize the shutdown with the searches while closely achieving a Nov. 1, 2007 to Feb. 28, 2008 shutdown.

The recommendation was made with the following caveats:

- It may not have an effect on burrowing owl mortality
- It may not reach the 50% goal
- The SRC may make additional recommendations based on the results of the shutdown, including possibly recommending a full shutdown in subsequent years.

The SRC will attempt to estimate the potential effect of the shutdown for the entire year. The decision was based on data and analyses of the previous two years of winter shutdown, including the Monitoring Team's 9/12/07 Winter Shutdown Data Tables (M15), Julie Yee's 9/11/07 Winter Shutdown Data Analysis (M16 and M16b) and Wally Erickson 's Updated Seasonal Shutdown Analyses 9/12/07 (M13).

Monitoring Analysis

(Dec 2010 Meeting Summary P196)

December 2010 Monitoring Report

After the discussion, SRC members agreed that the report would achieve its main goal as is, with minor modifications, and the Monitoring Team could then move on to its next piece of analysis, and use SRC suggestions in future reports.

The SRC as a body accepted the draft final APWRA 2005-09 Monitoring Report (M21), while asking that the Monitoring Team:

- Provide sufficient explanatory and clarifying text to the report's figures and tables so that they can stand alone;
- Explain multiple biases in the analysis with examples (installed to installed, address to address); and
- Duplicate the fatality tables with upper and lower bounds and explanations.
- Define terms clearly

(April 2010 Meeting Summary P157)

Monitoring Report

There was SRC consensus that the Monitoring Report be completed without the bird use data. If necessary, a separate report on the bird use data could be produced afterwards.

(Oct 2009 Meeting Summary P139)

Criteria for Including Strings in the 50% Fatality Reduction Analysis

2. Length of monitoring is greater than or equal to one year's worth of contiguous data
3. That period spans at least each of all four seasons

4. At least six searches per bird year
5. Average search interval is 0-60 days

Feather Spots

- Separate feather spots out from whole carcasses in the analysis
- Present feather spot raw numbers
- Present adjusted feather spot numbers.
- For small raptor feather spots, use rate set out in 48-Hour Search Interval study (M32 APWRA Draft 48-Hour Search Interval (KB) Study, June 2009).
- For large raptor feather spots, use existing records to develop a rate. This approach will be reviewed by the SRC Subcommittee.

(May 29 2008 SRC Meeting Notes P96)
The SRC agreed that there will be two analyses in the baseline comparison, each using the 2008 assumptions.

- One analysis would use all data from 2004 and 2008 extrapolated to the entire APWRA.
- A second analysis would consider only turbines searched in both the 2004 and 2008 studies, which represent about 20% of Altamont turbines.

(Feb 2008 SRC Meeting Summary P78)
For the monitoring report, the SRC agreed the minimum unit of analysis for comparison will be string per season (adjusted for number of turbines). The SRC and MT will arrive on an agreement for the definition of a season. Both the seasonal and annual rates will be presented.

(Feb 2008 SRC Meeting Summary P78)
Another issue in making data from the multiple studies comparable is the definition of bird sizes. Sue Orloff used a different definition than the other two studies in her research (Orloff and Flannery 1992, 1996). The SRC agreed on using the following bird size definitions for the analyses:
Small: Hummingbird to mourning dove
(This size includes kestrel & burrowing owl)
Medium: Pigeon to raven
Large: Red-tailed hawk to golden eagle

(Feb 2008 SRC Meeting Summary P78)
The SRC agreed:

- The adjustment factor for Golden Eagle will be ≈1, which corresponds to nearly zero scavenger removal.
- To gather information for potentially refining scavenger removal rates, the Monitoring Team will continue tracking feather spots found in the second month of the American Kestrel Burrowing Owl Study this spring, visiting sites once per week until those feather spots have been followed over one search interval (approximately 37 days). These searches can continue through the end of May.

- After the study, the MT will analyze whether the study substantiates a need for a change in the scavenger removal rate and return to the SRC with a recommendation.

(Feb 2008 SRC Meeting Summary P78)
The SRC agreed that there will be four analyses in the baseline comparison:

- One analysis would use all data from 2004 and 2008 extrapolated to the entire APWRA.
- A second analysis would consider only turbines searched both in the 2004 and 2008 studies, which represent about 20% of Altamont turbines.
- Each of these analyses would be developed twice, once using 2004 assumptions and once using 2008 assumptions, to ensure matched comparisons since the baseline established by the settling parties is based on the 2004 study. The comparison to 2004 turbines using 2004 assumptions and extrapolated to the entire Altamont is as directed by the County.

Monitoring Analysis: Quality Assurance

(July 2011 Meeting Summary P217)

QAQC Study

The SRC made the following recommendations:

- That the Monitoring Team continue with the current methodology for the remainder of the 2010-11 bird year.
- SRC Member Julie Yee and the Monitoring Team will evaluate the statistical power of the current level of the QAQC design and conduct a power analysis to determine the level of effort needed to produce cumulative detection probability estimates.

(Dec 2010 Meeting Summary P196)

Detection Probability (QAQC) Study

The SRC made the following recommendations for the detection probability study that began in October 2010:

- The Monitoring Team should pursue the goal of developing methods to increase the accuracy of fatality estimates going forward, while ensuring that the data are as comparable as possible to the 2005-2009 period;
- Tighten the pre-to-primary and secondary-to-follow-up intervals to 0-1 days;
- Limit the interval between primary and secondary searches to 0-15 days, while varying it within that timeframe;
- Leave carcasses on the ground for 90 days;
- Conduct a simulation analysis to determine if data collection will produce a viable analysis (Julie Yee will work with the Monitoring Team on this effort);
- Do pre- searches and follow-up searches as often as possible; and
- Use carcasses of known age, as fresh as possible.

(July 2008 SRC Meeting Summary P104)

The Scientific Review Committee recommends that Alameda County conduct a Data Quality Assurance/Quality Control Study to improve the estimates for scavenging and searching efficiency in calculating avian mortality in the APWRA Monitoring Program. The current analytical practice of using these correction factors in the science of avian mortality could be biasing mortality either high or low. The study would add searches by a second team of avian carcasses on a portion of Monitoring Program turbines.

The QAQC study will move forward with the following parameters:

- One analysis would use all data from 2004 and 2008 extrapolated to the entire APWRA.
- To start in October 2008 and run for one year.
- Designed with a 90% confidence level
- ±15% margin of error
- There would be no proxies
- To include all bird species
- The study would be revisited after 6 months to determine feasibility of reducing the sample size
- Searches would occur at an average rate of once a month.

(April 2008 SRC Meeting Summary P93)
This agreement has been superseded. Please see July 2008 Item
The Monitoring Team will develop a study design and scope to conduct independent searches for carcasses at monitoring sites to improve the accuracy of adjustment factors for searcher detection error and scavenger removal of carcasses. Along with achieving a more refined estimate of Altamont avian mortality, the study has the potential to make a significant contribution to wind turbine/avian analysis outside the Altamont.

Monitoring Period

(Feb 2008 SRC Meeting Summary P78)
SRC members agreed that they have an interest in looking at multiple analyses. They agreed to look at three spans:

- 1-year span for each year
- 2-year span for Year 2 & 3
- 3-year span

They agreed to consider inter-annual variation and the trend over the three years.

(August 17, 2007 SRC Meeting Notes P48)
The monitoring period is three years occurring from November 2006 to November 2009.

Monitoring Program: Pylons and End-Row Turbines

(Apr 2007 SRC Meeting Summary P28)
The SRC recognized the importance of studying the specific effects of adding pylons and removing risky end-row turbines on raptor behavior and mortality.

Monitoring Program Recommendations

(July 2010 Meeting Summary P182)

Draft Study Plan for Future Monitoring

The SRC reviewed M53V2 Second Draft APWRA Study Plan for Future Monitoring and reached the following consensus recommendations for future monitoring:

- By August 7, the SRC would like to see a cost estimate breakdown of the reduced sampling approach, and the accompanying opportunities this would provide for conducting SRC recommended priority studies.
- The SRC prioritized the following studies: the burrowing owl distribution, abundance and mortality mechanisms study (P90, which the SRC plans to soon update); the detection probability (QAQC or double observer) study; and a search radius study on a subset of turbines to develop information to inform potential search radii for repowered turbines. The SRC agreed that the QAQC study should be part of the monitoring program, rather than a separate study.
- Monitoring should track searcher detection rates with scavenger removal, with supervisor confirming presence/absence and carcass condition
- The detection probability study placed carcasses should include a variety of species, and best efforts should be made to include raptors.
- Monitoring would not include the surveying of vacant addresses, unless they are internal to the string
- Diablo Winds would be removed from regular monitoring, with an appropriate subsample potentially selected for the search radius study

In addition, a majority of SRC members recommended that the Monitoring Team's proposed rolling panel design be applied to 40% of monitored turbines, with the remaining 60% at fixed turbine locations selected from the currently monitored turbines, rather than the original 50/50 proposal, as this may allow for greater comparability with current study data. A buffer should be considered to account for turbine attrition.

(Jan 2010 Meeting Summary P149)

Goals for Future Monitoring

To continue studying the existing trend in fatality rates, the SRC recommends improved surveys for bird utilization and behavior; attention to inter-annual variation; and double observer surveys (improves detection probability estimates) as part of the program.

To inform repowering, the SRC recommends the following studies be pursued:

- Intensive study with short search interval of an existing repowered site with turbines of comparable size to future repowered-turbine size, to gather information on background mortality, fatalities (species identified) and behavior (flight height and type)

- Siting studies
- Analysis of bird utilization and behavior data
- Post-construction monitoring
- Double observer surveys (previously referred to as QAQC study)
  - These surveys entail a second survey team conducting searches on different search dates
  - They are used by the Fish and Wildlife Service
  - The surveys provide information on detection probability, as an alternative to the currently used adjustment factors of searcher detection and scavenger removal
- Burrowing owl study
- Studies to establish a nexus between wind turbine-caused impacts and levels of compensatory mitigation

(Oct 2009 Meeting Summary P139)
Current Monitoring
Winter Shutdown: A simultaneous shutdown for 3.5 months with the Monitoring Team maximizing searches on or near the November 1 start date. The SRC strongly recommends that the Monitoring Team attempt to maximize the number of searches on and around November 1. Reactivation will also occur simultaneously to the degree possible, maximizing Monitoring Team searches on and around that date.

Current Program: Continue through the end of seasonal shutdown (09-10) to get a 3rd year of data, as two years of data is insufficient to reach conclusions.

(Sept 2009 Meeting Summary P128)
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.

Initial Monitoring Program Recommendations
(Submitted 1/4/07, and Cover Letter to Board of Supervisors added 2/7/2007)

Monitoring Protocols Altamont-Wide

(Dec 2006 Meeting Highlights P3)

- Will measure 45% reduction in pooled species
- Will examine individual species % reduction, but at lower level of precision than pooled species (Red-Tailed Hawks fatalities will be difficult to reduce.)
- Adaptive management in year 4 and beyond
- Initiate study with enough turbines beyond the 2000 to ensure the sample size will remain 2000 over the course of the study.

Monitoring Protocols

(Feb 2007 SRC Meeting Notes P12)

- The SRC agrees that the intensive sample design study for burrowing owls and American kestrels is an integral part of the Altamont-wide monitoring program and if not implemented, the search interval for the Altamont-wide program should be reduced to every two weeks instead of every 30 days.
- All turbines except Northwind, Diablo and Buena Vista will be included in the study. Also excluded are the turbines on East Bay Regional Park District property.
- The SRC assumes that the sample size of 2500 will accommodate turbine attrition, including any turbines that might be removed over the life of the study.
- The Monitoring Team should replicate the same criteria used to choose the first 2200 study turbines to choose the final 300.
- The MT, for its six-month analysis, should consider the association of fatalities with the number of rock piles as well as just rock piles and mortality. This will help to determine if rock pile removal should be evaluated further.
- The scope of services should include a line item for work and analyses requested by the SRC.

Monitoring Team

(12/19/06)

Monitoring Two Sets of Conditional Use Permits

(Apr 2007 SRC Meeting Summary P28)

The SRC agreed that a different approach to monitoring for Settling Party turbines and non-Settling Party turbines is not needed. However, it will be difficult to isolate effects on the non-settling party towers compared to the settling parties. Factors contributing to reduced mortality are not easily isolated in data analysis because the non-settlement turbines are small in number and dispersed throughout the APWRA.

Power Output Data

(Feb 2007 SRC Meeting Notes P12)

The SRC identified the specific data of interest:

- kWh per turbine per day
- Operating time per turbine per day (number of 10-minute intervals greater than 0)
- Average RPM per turbine per day with frequency distribution
- From Oct. 2005 forward
- If not available per day, at the smallest time interval available

(Dec 2006 Meeting Highlights P3)

Counties change permits to require companies to provide power output data for analysis. Data should be weekly from Oct 2005 to current, from now into the future.

Develop a confidentiality agreement between wind farm companies and analytical team to review and analyze wind power information.

Relocating Turbines

(Jan. 4, 2008 SRC Meeting Notes P72)
The SRC recommended that the companies consult with the SRC or a company point person trained by the SRC on removing and relocating turbines. The SRC could train the point person on relocation guidelines and situations to avoid when removing turbines that could increase the potential hazard for raptors in the Altamont. When getting ready to remove a turbine, the company could consult with the SRC or point person. The company could consult with the trained person about turbine removals that create gaps or relocations.

(Apr 2007 SRC Meeting Summary P28)
The SRC recommended that any relocated turbines be moved to lower risk sites designated Tiers 4, 5 or 6, otherwise companies should consult on new locations with the SRC. The SRC supports flexibility in the companies' approach and the use of professional judgment. When a company decides to move a turbine to a site other than Tier 4, 5 or 6, or one that is not classified, or if the company has special considerations, the company should consult with the SRC.
Citation: Smallwood and Spiegel (June 2005); SRC previous recommendation regarding tiers; and Repowering a Portion of the Altamont Pass Wind Resource Area 1998 Draft Environmental Impact Report.

Rock Piles

(Dec 2006 Meeting Highlights P3)
By Sept 1, 2007, rock piles should be 100 meters from turbines. Wind companies should note exceptions due to slop or other factors and schedule time at the SRC meeting to provide an explanation and photo.

Sample Size

(Feb 2007 SRC Meeting Notes P12)
The SRC agreed that, under the new settlement agreement goal of a 50% reduction in mortality, the sample size will remain at 2500 turbines (under the assumption that the reduction goal is based on pooled, not individual species mortality), as this will still allow for results with a scientifically credible margin of error of ±10%. The SRC agreed, however, that the sample size might have to increase to include monitoring of turbines used in the blade painting experiment and those subject to other mitigation measures.

Species Studied

(Feb 2007 SRC Meeting Notes P12)
The SRC agreed that assuming cost constraints will continue, the targeted reduction in mortality will be applied to the pooled mortality of four target species: golden eagle, red-tailed hawk, burrowing owl and American kestrel. However, at least one SRC member expressed reservations about the pooling of these species.

Because red-tailed hawks have not responded to any mitigation measures except winter-time shutdown, this could affect the parties' ability to achieve the 50% reduction target. Pooling the species could also result in a 50% reduction in which the mortality of one species contributes almost entirely to the 50% reduction of the pooled species, while the mortality of other species remains unchanged.

(Feb. 27, 2007 SRC Call Meeting Note P14)
The Evolution of SRC Thinking on Pooling Species

The SRC discussed that interested parties could benefit on understanding the SRC's thinking about a pooled-species approach and the implications of pooling for the Altamont-wide monitoring program. Members expressed concern that the pooled versus individual approach seems to have caused some confusion for the Board and others.

While the recommendation on sample size for achieving this margin of error is scientifically defensible, pooling the species is not the best approach from the SRC's perspective. The SRC thinks that the best approach is represented in the "optimal program" (Jan 2007) which would measure the mortality change in individual species with a plus or minus 10% margin of error. The SRC's decision to recommend a less optimal monitoring program as another option was prompted by cost considerations and in response to the County's request….The sample size necessary to look at the four species individually would be more than 3000 turbines (as compared to 2000 turbines for the pooled species).

The SRC and monitoring team share significant concerns about the implications for individual species. For example, while it may be possible to reach a 50% reduction for pooled species, reaching a 50% reduction for red-tailed hawk as an individual species is unlikely. Reaching a pooled 50% reduction may have similar implications for other species as well as it does not indicate a 50% reduction for each. Finally, the monitoring results can demonstrate that an individual species' mortality has been reduced, but results will likely not have the same degree of confidence in the change in mortality for another species (primarily because the certainty is affected by the number of incidents or fatalities).

SRC/MT Communication Process

(Feb 2008 SRC Meeting Summary P78)

The SRC and Monitoring Team members agreed to a communication plan to develop the next draft of the report, which emphasizes transparency as well as the separate roles of the two bodies. SRC members decided that Monitoring Team members can discuss data with SRC member Shawn Smallwood, who conducted the 2004 Altamont avian mortality study that formed the baseline. The Monitoring Team will log its calls and other discussion points, draft brief memos to the SRC describing their activities, and periodically brief the SRC in a public conference call on its progress, questions and statistical issues. The first SRC briefing will be scheduled for mid-March to consider statistical issues. In addition, citations will be given for assumptions. The documents can be linked from the SRC website.

(Feb 2007 SRC Meeting Notes P12)

1. A MT representative to be present at SRC meetings on relevant issues
2. MT to review draft SRC recommendation
3. MT summarizes and submits disagreements
4. SRC/MT meeting or conference call to resolve issues
5. SRC produces final decision to MT via county

SRC Protocols

(Feb 2007 SRC Meeting Notes P12)

- Meeting Highlights to end with a list of SRC consensus agreements to document actions taken
- SRC agrees to refer questioning parties to SRC agreements, documents & upcoming agenda items

SRC Protocols: Regular Conference Call Meetings

(Feb 2007 SRC Meeting Notes P12)

The SRC agreed to hold scheduled standing conference call meetings every 2-3 weeks to allow for timely response to issues. The conference calls will be regular meetings under the Brown Act, with agendized items for planned actions.

Tiered Classification

(Dec 2006 Meeting Highlights P3)

The wind companies should use the June 2005 classification and *professional judgment* based on field experience and on-the-ground knowledge. If a wind company has reasoning to believe different turbines might be considered or certain turbines could create other problems, such as additional end points and the like, the company should approach the SRC with an explanation.