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Ivanpah Solar Electric Generating System (Ivanpah)
Avian & Bat Technical Advisory Committee (TAC) Meeting
April 19, 2016; May 4, 2016 continuation; & June 13, 2016 continuation – Meeting Notes

TAC Meeting on April 19, 2016 via WEBEX

Attendees:	Roger Johnson – TAC Co-chair – CEC
	Amedee Brickey – TAC Member – USFWS
	Magdalena Rodriguez - TAC Member – CDFW
	George Piantka – TAC Member - Solar Partners
	Mitch Samuelian – TAC Member – NRG Operations
	Doug Davis – NRG Operations
	Daniel Riser-Espinoza – WEST, Inc.
	Karl Kosciuch – WEST, Inc.
	Marc Sydnor – Sydnor and Associates, Inc.

Introductions

- Attendee introductions (TAC members and invited guests)

Review of Agenda

- Agenda items reviewed. No additions.

Review of March 11, 2016 meeting notes and follow up actions

- Review of the annual and fall reports.

TAC Discussion:

- Discussed that the annual report should clarify the methodology for inclusion of the incidentals in the estimate.
- Discussed areas searched under Revision 13 of the Plan. WEST clarified that standardized searches are performed in the heliostat fields of Unit 2 and for all three inner HD/Tower areas – fences are no longer surveyed.
- Discussed the carcass aging criteria used in 2014 and 2015. WEST clarified that approved biologists use multiple qualitative indications to assess the age of carcasses. WEST stated that in 2015, decomposition trials were performed to gain additional information to assess how site-specific conditions affect carcass decomposition. NRG stated that in 2014, the approved biologist onsite estimated the age of the carcasses.
- Discussed revisions to footnotes and titles for tables to improve clarity of the annual report and fall reports.
- Discussed the deterrence for bats. NRG explained that the cause of the four devices being unplugged is not known. The devices may have malfunctioned as a result of an electrical fault and then been unplugged. An ultrasonic testing protocol has been initiated to verify and respond to interruption of operations of the ultrasonic deterrents.

Follow-up Items:

- WEST to make revisions as per above comments to the fall and annual reports.

Annual Estimate Comparison 2014-2015

- WEST presented a comparison of the 2014-2015 estimates.
    - To compare estimates between seasons, seasons should match avian migratory periods.
    - Evaluation of the data patterns for detections of non-resident migratory species show that avian migratory seasons and designated seasons as specified in the Plan do not match for these fall migration periods.
    - Based on the data analysis, fall migratory period adjusted to end on December 15th of each year (from October 20th). The winter season would then commence on December 15th.
    - Data show that the migration patterns for spring and summer seasons match the Plan dates and should therefore remain the same.
    - When comparing the seasonally adjusted estimates from year 2014 and 2015, analysis suggests no overall statistical difference between years.

TAC Discussion:

- Seasonal Adjustments
    - Discussed additional data sources supporting the seasonal variation observed in the data. WEST stated that birdcast data show that fall migration is typically the longer migration relative to spring.
    - Discussed the potential to use the avian use counts as a proxy to determine migration. WEST stated that correlation between the species detected in mortality surveys and the species in the avian use surveys is low, so comparison of these two surveys does not provide meaningful information.
- Estimate Comparisons
    - Discussed whether the seasonally adjusted estimates used revised carcass persistence values. WEST indicated that the underlying carcass persistence model is unchanged and cumulative bias trial and detection data is included. Thus, the estimates are not revised in the context of the carcass persistence model, but instead the seasonally adjusted estimates result from detections being binned into biologically informed seasons.
    - Discussed why the end of migration date of December 15 was chosen. WEST stated that this date captures the entire fall season - searches are a look back over the previous 21 days, so the 15th of December survey picks up mortality from November 24th to December 15th.
    - Discussed the sampling interval and whether a seven-day interval is necessary until December 15th. WEST stated that regardless of the sampling interval, the model used to determine the fatality estimates determines the actual interval from the time of the carcass discovery and the time of the last survey. Therefore, the model accounts for varying sampling intervals in the estimates and no change is necessary.
    - Discussed the effect of deterrence. The comparison of seasonally adjusted estimates does not provide inference on the effectiveness of deterrence at this time. WEST stated that confounding variables may exist that mask the effects of

deterrence, and fatality surveys were not designed to determine the effects of the deterrence.
- Discussed the graphics for presentation of the data for reporting purposes.
- Discussed the revisions to the estimates and the incorporation into the second annual report. The annual report will need to be revised to provide the comparison between years, including explanation for the seasonal adjustments.

Follow-up Items:
- WEST to provide data and analysis on annual comparisons to USFWS and CDFW for comment.
- USFWS and CDFW will examine the data and adjustments to the estimates and provide comments on the methods in a subsequent teleconference.
- Subsequent to the comments from USFWS and CDFW, WEST will provide a report on the comparison.
- WEST to provide a revised draft executive summary for second annual report in advance of the next TAC call.

Additional Topics
None

Next Meeting
May 4 – 3:00 pm via conference call.

TAC Meeting on May 4, 2016 via WEBEX (Continuation)

Attendees:
Roger Johnson – TAC Co-chair – CEC
Amedee Brickey – TAC Member – USFWS
Magdalena Rodriguez - TAC Member – CDFW
George Piantka – TAC Member - Solar Partners
Mitch Samuelian – TAC Member – NRG Operations
Doug Davis – NRG Operations
Daniel Riser-Espinoza – WEST, Inc.
Karl Kosciuch – WEST, Inc.
Marc Sydnor – Sydnor and Associates, Inc.

Introductions
- Attendee introductions (TAC members and invited guests)

Review of Agenda
- Agenda items reviewed. No additions.

Review of April 19, 2015 follow up actions
- WEST to provide a revised draft executive summary for second annual report in advance of the next TAC call.

- WEST to provide data and analysis on annual comparisons to USFWS and CDFW for comment.
- USFWS and CDFW will examine the data and adjustments to the estimates and provide comments on the methods in a subsequent teleconference.
- Subsequent to the comments from USFWS and CDFW, WEST will provide a report on the comparison.

TAC Discussion:

- Revised Executive Summary
    - No comments on suggested revisions to the Executive Summary to date; however, summary may be revisited following discussion of the results.
- Two-year review of biologically informed seasons.
    - TAC discussed the shift in the seasons regarding how much variation is just specific to this location or year, the number of migratory versus non-migratory birds in the data, and how the years and seasons relate to carcass persistence. WEST explained specific location and year variation are subject to a number of confounding variables, including weather, number of birds, food sources in the area and other factors. Regarding migratory versus non-migratory birds, the species that were examined to determine the biologically relevant seasons were migratory (non-resident) birds. The carcass persistence values estimated were applied according to the ABMMP.
    - The shift in seasons dates results in detections moving from one year to another based on the biologically relevant seasons. The estimated values changed because some fatalities move from one year to the other, but all detections during the two-year period were included.
    - TAC discussed that some species may stop and not continue to migrate further south than the facility. WEST explained that these non-resident birds are also shown on the graphs that were used to determine biologically relevant seasons. The pattern of detections of these species is elevated in the fall, lower until spring, decreases again in summer and is elevated again in fall.
    - TAC discussed how search intervals and carcass persistence rates were applied to the estimates from the biologically informed seasons. WEST explained that with respect to the search interval, the Huso estimator accommodates for variations in the search interval within and between seasons. For the carcass persistence rate, the estimator also accommodates the variations in rates within and between season in which the carcass was detected.
    - TAC discussed the potential for development of estimates on a daily basis to examine seasonality, since there are different adjustments according to where the carcasses are found. WEST explained that daily estimates are problematic, since there are generally five or fewer each day. On days where five or more detections are discovered, there would be wide variance in the estimates of daily fatalities.
    - TAC discussed whether differing ending dates could be applied to the fall seasons for each year. WEST explained that the longer period is more appropriate and captures the potential variation in migration activity. In addition, comparing an unequal number of sampling efforts would be specious.

- TAC discussed placing the analysis of the biologically relevant seasons into the annual report following the reporting of the analysis according to the ABMMP season dates. WEST agreed to add a new section to the annual report.
- TAC discussed the seasonality of reports going forward and whether these reports should maintain the current ABMMP seasonality. WEST indicated that the current survey schedule should continue, since the estimates can be adjusted to inform biologically relevant season.

Follow-up Items:

- WEST to revise the report with the additional section on biologically relevant seasons.
- WEST to determine a date for when the revision will be available and dates/times for a meeting to approve the report.

Additional Topics

None

Next Meeting:

June 13, 2016 in Sacramento

TAC Meeting on June 13, 2016 at California Energy Commission (Continuation)

Attendees:	Roger Johnson – TAC Co-chair – CEC Amedee Brickey – TAC Member – USFWS Mitch Samuelian – TAC Member – NRG Operations Doug Davis – NRG Operations Daniel Riser-Espinoza – WEST, Inc. Marc Sydnor – Sydnor and Associates, Inc.
Via Teleconference:	Karl Kosciuch – WEST, Inc.

Introductions

- Attendee introductions (TAC members and invited guests)

Review of Agenda

- Agenda items reviewed. No additions.

Review of May 4, 2016 follow up actions and notes:

- WEST to revise the report with the additional section on biologically informed seasons - completed.
- TAC has no comments on meeting notes from the April 19th and May 4th meeting notes.

Follow-up Items:

- Meeting notes to be amended with June 13th content.

TAC Discussion of Annual Report:

- Discussed the revised Executive Summary and suggested minor edits for clarity.
- Discussed bat deterrence inspection protocols and suggested edits to update the current status for the implementation of the bat deterrence testing procedure.
- Discussed why comparisons between the first year report results and second year report results are inappropriate. WEST explained that the expanded bias trial results must be applied to the first year fatality data to obtain estimates that are adjusted properly for bias for the first and second years.
- Discussed clarifying the difference in the analysis process between the ABMMP defined seasons and the biologically informed seasons. WEST presented how the estimates were affected by shifting fatalities from year 2 winter to year 1 fall season and adjusted for the bias trials relevant to those seasons.
- Discussed why the estimates increase when fatalities are moved from one season to another season versus when these are not moved. WEST explained that the bias trial adjustments are made on a seasonal basis; therefore, when detections are moved from one season to another, and additional bias trial data are included, detections are adjusted according to different bias trial results. In the case of moving fatalities from year 2 winter to year 1 fall, the bias trial results increase the estimates.

Follow-up Items:

- WEST to revise the report according to previous comments.
- WEST to provide additional analysis to describe the magnitude of the numerical differences of the estimates resulting from the processes in the ABMMP to biologically informed seasons.

Discussion of the Winter Report:

- TAC discussed the seasonal dates for the Winter Report. WEST indicated that the season presented is in accordance with the requirements of the ABMMP (Revision 13).
- TAC discussed whether less than 5 detections have ever been discovered in the heliostat area previously. WEST indicated that in summer 2014 (when Units 1-3 were all searched) that did occur.
- TAC discussed the camera data information regarding multiple feather spot creation. WEST stated that the camera data show evidence that multiple feather spots are created by scavengers; however, a numerical estimate of the number of carcasses creating multiple feather spots, and how many additional feather spots, would be difficult to calculate.

- TAC discussed whether the data from this Winter season was included in the two-year comparison of biologically informed seasons. WEST indicate that the data were included up to December 15th in the annual report.
- TAC discussed when the fall season monitoring should end under the current version of the plan. WEST indicated that the fall season should end at a date consistent with capturing the widest range in variation across the previous fall seasons (December 15th); it is anticipated that year 3 monitoring will include this time period and capture the full fall season to enable year-year comparison.

Follow-up Items:

- WEST to submit Winter Report by June 23rd to the TAC.

Additional Topics

- Roadrunner BMPs approval by TAC was provided formally to the facility.
- NRG reported that roadrunner BMPs measures are anticipated to be installed the week of June 20th.

Next Meeting:

July 5, 10 am via WEBEX – Winter Report Review.