Study Plan
Pilot Study to Investigate Burrowing owl Mortality Mechanisms in the Altamont Pass Wind Resource Area
July 19, 2011

Introduction

Recent monitoring results in the APWRA have suggested an unusually high incidence of burrowing owl mortality; however, the accuracy of the reported estimates and the causes of burrowing owl mortality are uncertain. While collision-related burrowing owl mortality has been previously documented, quantified, and analyzed in the APWRA with respect to turbine type, operations, and other ecological factors (Smallwood et al. 2007), the unique behavior of this species, the difficulty correlating abundance with mortality, and the relative rarity of documented fatalities combined with uncertainty regarding the extent of scavenging of carcasses, has created a significant amount of uncertainty regarding the actual levels of burrowing owl mortality in the APWRA and to what extent mortality is influenced by the presence or operation of wind turbines.

Accurately estimating turbine-related burrowing mortality and better understanding the causes and circumstances of that mortality will require additional information on 1) distribution and abundance of the species in the APWRA (data that is currently being collected; Smallwood 2011), 2) behavior of the species (e.g., the extent to which owls fly into the rotor plane of turbines and are at risk of collision), and 3) other potential causes of mortality (primarily predation by other raptor species). The latter two investigations are the focus of this study plan.

Potential to Inform Repowering

The uncertainty regarding the causes and circumstances of high burrowing owl mortality in the APWRA makes understanding the mechanisms of that mortality a primary concern. Understanding burrowing owl mortality mechanisms is important not only for existing turbine operations, as much as 20% of which might be in operation for at least the next four years (Settlement Agreement 2010, S30; AWI permit renewal request 2011), but could also provide guidance for future repowering.

Siting repowered turbines to minimize mortality could benefit from information on the following potential risk factors: 1) proximity of burrowing owl colonies and flights around turbine rows could be associated with mortality, 2) specific topographic features around turbines may contribute to risky foraging and flight patterns, 3) certain turbine features or transmission lines used for perching by burrowing owls or their potential predators could increase risk of mortality, 4) some turbine types, layouts, or operations (operating or non-operating) may make burrowing owls more susceptible to predation, and 5) turbine configurations could be critical in relation to topography.

Because burrowing owls are not commonly recorded during daytime observation surveys within the APWRA, little information is available on their flight patterns and how they use the terrain. Information on burrowing owl nighttime use and behavior is also lacking. Although Smallwood et al. (2007) examined burrowing owl behavior patterns around turbines in the APWRA, these surveys were not conducted at night. A focused nighttime and dusk observational study should provide data on burrowing owl foraging behavior and flight patterns around turbines (i.e., flight height, proximity to turbines, and use of landscape and topographic features), use of turbines and associated features (i.e., perch sites for predators near burrowing owl colonies), and the possible influence of predators.

Model development to inform turbine siting for the Tres Vaqueros repowering project in the APWRA was based on habitat use and flight behavior of American kestrel, red-tailed hawk, and golden eagle, but did not incorporate burrowing owl use or behavioral information. Only burrow locations were used in the model (Smallwood and Neher 2010). In the absence of burrowing owl behavioral data, a similar approach (that does not incorporate burrowing owl habitat use and flight behavior) will be used for developing models to assist with future repowering projects.

Although the data that will be collected for the proposed burrowing owl behavior study may not be sufficient to incorporate into turbine siting model formulations to assist with NextEra's current repowering efforts, quantifiable metrics such as frequency of night flights at different distances from the ridge crest, flight height, and use of turbines (or associated structures) for perching (by burrowing owls or their predators) could still be very useful in siting repowered turbines. For example, if burrowing owl burrows are located on the lower slopes, well away from the turbine row, but they mostly use certain topographic or other features higher on the slopes that could make them more susceptible to collision mortality, these features could be avoided during turbine siting.

Objectives

The primary purpose of this study is to determine the effectiveness of the proposed methodology for observing burrowing owl behavior in the vicinity of turbines during dusk and nighttime hours as it relates to potential turbine collision mortality. Secondarily, and to the extent possible, the study will investigate the mechanisms of burrowing owl predation. The study has been designed to assess if an observational survey using thermal imaging equipment will be effective at collecting this type of behavioral data. A night vision scope will also be used to augment visibility at night. A more detailed discussion of the purposes of the behavior/predation study can be found in P90. Results of the study will be used to determine if a larger, more extensive field study is feasible.

Study Plan

The following tasks would be required:

- Select four survey areas.
  Three areas with turbines that have the following characteristics:
    - Vicinity of active burrowing owl colonies (i.e., areas of high burrowing density). Use Shawn Smallwood's new data on burrowing owl distribution (Smallwood 2011).

  - High historical burrowing owl mortality (if possible; using data compiled by the Monitoring Team – M68 and M71).
  - At least one lattice and one tubular turbine type.
  - At least one site of repowered turbines.
  - Variety of topographical characteristics (e.g., steep or rolling).
  - At least one with transmission lines in close proximity.

  One area without turbines that is comparable to the other three sites as much as possible.

- Conduct pre-survey visits to identify observation sites.
  - Within each of the four survey areas, select a slope (preferably side of prevailing wind) with an associated ridgeline (with or without turbines).
  - Divide each of the four slopes into two elevations (high and mid to low) for a total of two observation stations on each slope. This equates to a total of 8 observation stations. A recent analysis of burrowing owl carcass distribution around turbines should be reviewed to evaluate the appropriate distances from turbine rows for the mid to low slope positions (Smallwood 2008).
  - On the high slopes, select observation sites that are in line with the turbine rows so that the observer would be looking down the row.
  - If possible, select observation sites that face west for the best visibility after the sun sets.
  - Select observation sites at some distance away from the turbine rows or colonies as to minimize disruption of burrowing owl (or their predators) behavioral patterns. If necessary setup a blind.
  - Mark burrowing owl colonies on the ground in each area (e.g., with rocks – which have a high heat signature) to be able to easily identify burrow locations.
  - If necessary, install thermally contrasting markers on the ground (e.g., pin flags) to better estimate distances.

- Conduct trail and full surveys.
  - Conduct a nighttime field trial at each of the sites (≈1hr/site) to become familiar with the areas at night and to determine the parameters of observable distances.
  - Following the field trial, only one of the four survey sites is surveyed per night.
  - At the beginning of the full surveys, randomly choose a slope position to start (high or mid to low) and then systematically alternate the survey start between the two positions.
  - Each slope position is surveyed for a 2-hour period using the thermal imaging camera and night scope for a total of 4 nighttime survey hours per night.
  - Immediately prior to the 4 hours of nighttime observation, conduct one hour of daytime/dusk observation using binoculars from the first selected slope location for a total of 5 hours of observation per night.
  - Conduct survey for 16 nights (14 at sites with turbines and 2 at the site without turbines).

- Surveys will be scheduled to include a variety of moon phases to examine behavior and possible predation under variable light conditions.
- One thermal imaging camera, one night vision scope, and two-person field crew will be used per site.
- Using two crew members at each site, one operates the thermal camera and the other operates the night vision scope and records owl behavior and related data on field forms.
- Record the nightly activities on digital video for reviewing the data.
- Test the use of lights with red filters placed on the slopes to enhance visibility.
- Surveys should not be conducted when the average wind speed reaches more than 40 km/hr or if there is any rain or fog.

- Using the attached protocol, field staff will record data on flight behavior, foraging behavior, prey species and prey captures, other local movements, perching behavior, inter- and intra-specific interactions, proximity to wind turbines and blades, flight height and flight type near wind turbines, presence and proximity of avian and mammal predators, predator behavior (e.g., den excavation, stooping from perch, coursing flight through colony, etc.), prey captures, and dispensation of prey (e.g., carried off whole, dismembered and eaten onsite, partially eaten onsite, etc.), and interactions between potential predators and burrowing owls. Additional data recorded includes turbine type, wind speed and direction, percent cloud cover, precipitation, temperature, moon phase, time of observations.

- Survey period: July/August.

- Conduct fatality searches only if a potential predation event on any avian species is detected. Conduct searches using standardized methods currently in use by the Monitoring Team. The associated turbine string should be searched in its entirety from the ridgeline to the toe of each slope (both sides). Fatality searches at the turbine sites would allow actual fatalities during the survey period to be correlated with observational data.

- After 4 surveys have been completed (one at each site), the initial results of the effectiveness of the technique will be reported to the SRC (or subcommittee) in a conference call format. This will give the SRC the option of providing input or altering the surveys. If after 8 surveys, the techniques or equipment are thought to be infeasible or ineffective at gathering useful information, the remaining of the surveys should be cancelled. Otherwise, complete the full 16 day protocol.

- If the results of the pilot study prove effective at gathering behavioral data on burrowing owls, develop a study plan for a more comprehensive survey using the same technique, including adding winter season surveys.

Estimated Costs

Cost Assumptions:

- Two observers are required for a total of 7 hours each per night (5 hours for surveys plus two additional hours for travel time and set-up). The surveys are conducted for 16 nights for a total of 224 hours.
- Four complete fatality searches (for each search a two-person crew conducts a four-hour fatality search) for a total of 32 hours.
- Thermal camera training (24 hours).
- Presurvey investigation and mobilization will require 60 hours.
- Data compilation, analysis, and report preparation will require 100 hours.
- Total labor hours = 440 hours
- Field staff rate = $50 per hour; management rate = $140.
- Per Diem = $23/day for 64 person-days = $736.
- Reimbursable expenses (vehicle use, gasoline) = $2,000.
- Thermal camera rental (two months at $5,000/month = $10,000).
- Night vision scope rental (two months) = $2500 (this is approximate).

Total estimated cost based on the above assumptions = $43,536 for the summer season.

References Cited

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