Burrowing Owl Behavior Survey Protocols – Night Observations

When a burrowing owl (or potential predator) is detected, its location, flight characteristics, and other relevant behavioral information is recorded on a datasheet as well as a map (Table 1). For each detection during the behavior survey the following information is recorded: ID# for each individual, species identification (include adult or immature if possible), number of individuals, time, height above ground, closest distance to turbine row, if closest turbine is actively turning, and behavior (see Tables 2 and 3). If the bird being observed is perched, the type of perching structure and height (m) is also recorded (see Table 2 for list of perching structures and heights). After the initial observation, any major change in position or behavior during the observation period is also recorded as a detection (using the same individual number as the bird moves or changes behavior). To ensure that all perched birds within the observation area are identified, a scan of the entire plot is conducted with binoculars immediately before the survey period.

Observers also record the location of each sighting on a topographical map that includes the layout of the turbine row. Using the individual's ID#, the observer records the initial location of each bird and draws an arrow indicating initial and subsequent directions of movement. If a predation event (predators preying on or attempting to prey on burrowing owls) is observed, a detailed description should be written on the back of the data sheet, including predator/prey interactions and dispensation of prey (e.g., carried off whole, dismembered and eaten onsite, partially eaten onsite, etc.)

The observer using the thermal imaging scope should mainly focus on the turbine strings, while the observer using the night scope primarily focuses on the burrowing owl sightings/colonies and also records all the data. A small tripod should be used with the night scope and a blanket placed over the thermal imaging scope if necessary. Surveys should not be conducted when the average wind speed reaches more than 40 km/hr or if there is any rain or fog. Percent time the turbines are in operation during the survey period is recorded on the data sheet. Data recorded at control sites follow the same protocols, except instead of closest distance to turbine row they record the closest distance to the ridge line.

Thermal Imaging Equipment

The thermal imaging scope tested previously was a FLIR model P640 High Definition Infrared Camera/Thermal Imager (http://www.goinfrared.com/cameras/P-Series/thermacam-p640) with a 12 degree (telephoto) lens on loan from FLIR Systems. A Sony Handycam DCR-HC32 Mini DV digital camcorder was attached to the P640 to record video of the thermal images using a standard A/V patch cable. The P640 was mounted on a Bogen tripod with a mini-fluid head suitable for spotting scopes and video. Although the P640 is no longer available, the P660 is available at the same cost. Cost of Thermal Camera rental is approximately $5000 per month or $1500 per week.

Comment [S1]: Doug – I used a two month rental in the cost estimates but I don't know if you will need all that time.

Night Scope (TBA)

Table 1. Burrowing Owl Behavioral Study Data Sheet

Date _______ Site # ___ Slope Posit. _____ Turbine Type _____ % Turbine Operation _____ Obsvs. ________ Start Time ________
End Time _______ Sunset time ______ Wind Speed/Direction ________ % Cloud Cover _________ Temp _____ Moon Phase________

Map of Site

ID #	Species	#	Time	Ht (m)	Dist (m)	Turb/ Op.	Behavior	Perch

Comments:

Table 2. Behavior and feature codes used during burrowing owl observations.

Behaviors (can have more than one)

1. Flying upslope
2. Flying downslope
3. Flying parallel
4. Coursing flight over BUOW colony
5. Contouring
6. Circling
7. Surfing
8. Hovering
9. Soaring
10. Diving
11. Stooping from perch
12. Foraging
13. Ground hopping
14. Running on ground
15. Interacting
16. Fleeing
17. Flushed
18. Landing
19. Taking off
20. Perching (see perching codes)
21. Predation
22. Carrying prey
23. Copulating
24. Other

Heights

Wooden electrical pole = 12 m
Metal electrical/communications tower = 40 m
Enertech lattice turbine = 18 m
Bonus, WEG, Nordtank tubular turbine = 25 m
Horizontal lattice turbine (short windwall) = 20 m
Horizontal lattice turbine (tall windwall) = 45 m
Diablo Winds tubular turbine = 50 m

Perches
1. Turbine devices
1a. Wind meter
1b. Catwalk
1c. Ladder
1d. Housing
1e. Blade
1f. Lattice
1g. Transformer box
2. Electrical Dist. Pole
2a. Wire
2b. Pole top
2c. Crossbar
3. Metal/Electrical Tower
3a. Tower crossbar
3b. Met. tower
3c. Commun. tower
3d. Tower lattice
3e. Guy wire

4. Landscape Features
4a. At burrow
4a. Rockpile
4b. Rock outcrop
4c. Fence
4d. Ground
4e. Low vegetation
4f. Sign
4g. Tree
4h. Other

Table 3. Burrowing Owl Behavior Code Definition

Code	Action	Definition
1	**Flying upslope**	Directional flight powered by wing flaps
2	**Flying downslope**	Directional flight with no wing beats
3	**Flying parallel**	Few wing beats, and gradual turning, often powered by thermals
4	**Coursing Flight**	Low flying over burrowing owl colony
5	**Contouring**	Flights close to the terrain, and changing directions and height with the terrain
6	**Circling**	Tight circles with some wing beats
7	**Surfing**	Wind power flights usually perpendicular to wind direction
8	**Hovering**	Stationary position maintained using frequent wing beats.
9	**Soaring**	Few wing beats, and gradual turning, often powered by thermals
10	**Diving**	Wings recessed or folded for rapid downward flight, usually to attack prey or competitor
11	**Stooping from perch**	Diving after leaving perch
12	**Foraging**	
13	**Ground Hopping**	Hops along the ground while foraging
14	**Running**	Running on the ground
15	**Interacting**	Interactions with other species
16	**Fleeing**	Strong flight away from pursuer of similar or larger body size
17	**Flushing**	Chased off perch
18	**Landing**	
19	**Taking off**	Taking off without being flushed
20	**Perching**	
21	**Predation event or attempt**	Predator (avian or mammal) preys on BUOW
22	**Carrying Prey**	
23	**Copulating**	
24	**Other**	