

SAMPLING PROTOCOL

Bird Use at Wind Power Development Sites

Location: _____

(Observation point number)

should add types of towers (e.g., lattice or tubular)

Date: _____

in a form appropriate for sorting in the data base software (i.e., 021496)

Start time: _____

24-hour clock

Weather

Temperature: _____ °C

Visibility: _____

Distance bird can be seen, in m

Wind: _____

Speed and direction; max. gusts can be recorded if desired

Precipitation: _____

Record as N (none), L (light), M (moderate), H (heavy), F (fog)

Observer: _____

initials

Primary Data

Species: _____

4-letter code (e.g., red-tailed hawk = RTHA; golden eagle = GOEA)

No. species in same zone: _____

Record number of same species at same time in same zone

Direction: _____

Direction of flight (0°-360°)

Zone: _____

A,B,C, and D

Record number: _____

Record as '1' for each new bird; record as '2' if same bird re-passes rotor plane during same sampling period; and so forth.

Secondary Data

If time allows, can record:

Sex: M (male), F (female), U (unknown).

Age: A (adult), SA (subadult), I (immature), U (unknown)

Bird Mortality

Location: _____
Turbine number
should add types of towers (e.g., lattice or tubular)

Date: _____
in a form appropriate for sorting in the database software (i.e., 021496)

Start time: _____
24-hour clock

Weather
Temperature: _____ °C

Precipitation: _____
Record as N (none), L (light), M (moderate), H (heavy), F (fog)

Snow cover: _____ % ground covered

Observer: _____
initials

Primary data

Species: _____
4-letter code

Sex: M or F; unknown

Age: _____
Adult, immature (be as specific as possible)

Dead: Y or N

Estimated time since death: _____
in days

Description of bird (e.g., broken or missing body parts): _____

Disposition of bird: _____

Distance of carcass from turbine: _____ m

Notes on bird: _____
(e.g., condition and location)

heights of bird movements with reference to the "zone of risk" notwithstanding the number of turbines creating the zone of risk.

Corrections for Bias in Dead Bird Searches.—Several attendees noted that different studies have used or are using different procedures, including different intervals between searches and native vs. non-native "planted" birds. Different investigators have given varying degrees of emphasis to the development of bias corrections. It was recognized that procedures for assessing search, removal and other biases need further discussion, and that a comprehensive assessment would be complex and require much effort.

Appendix: Codes and Explanations for Data Sheets

APPENDIX TABLE 1. Codes and explanations for visual observations data sheet.

Column Number Description

- | | |
|---------|-----------------------------------------------------------------------------------------------------------|
| (1) | Location—Use the same digit code (e.g., "1") to indicate the same observation segment. |
| (2) | Type of Watch—Corridor = 1; Circular Scan = 2; Radar Surveillance = 3. |
| (3) | Wind Direction: 1-N, 2-NE, 3-E, 4-SE, 5-S, 6-SW, 7-W, 8-NW |
| (4-5) | Wind Speed: mph (can get data from meteorological towers) |
| (6) | Precipitation Type: 1—none, 2—mist, 3—light drizzle, 4—light snow |
| (7) | Visibility: 1—<100 ft, 2—<500 ft, 3—<1000 ft, 4—<1/2 mile, 5—<1 mile, 6—<2 miles, 7—<5 miles, 8—<10 miles |
| (8) | Cloud Cover: (tenths) 0—clear to 1—overcast |
| (9-11) | Temperature: Celsius |
| (12) | Start Watch: check this column and add information to columns 14-23 |
| (13) | Stop Watch: check this column and add information to columns 14-23 |
| (14-15) | Year—last two digits only (e.g., 94) |
| (16-17) | Month—01 through 12 |
| (18-19) | Day—01 through 30 or 31 |
| (20-21) | Hour—00 through 24 |
| (22-23) | Minute—00 through 59 |
| (24) | Time Zone: (e.g., Eastern, Central, Pacific) |
| (25) | Time Basis: (e.g., Standard, Daylight Saving) |
| (26-29) | Species Code—use letter abbreviation codes derived from common name |
| (30-33) | AOU Number—use four digit AOU numbers |
| (34-36) | Number—the number of individuals in a flock |

- (37) Sex: 1= male, 2=female, 3=unknown
- (38) Age: 1=adult, 2=immature, 3=young
- (39) Flight Behavior:
 1—straight 6—flew up from corridor
 2—curved 7—circling
 3—zigzag 8—
 4—hovering 9—
 5—landed in corridor
- (40) Height of Flight:
 1—0 ft and <30 ft (9 m) 4—200 ft and <400 ft (122 m)
 2—30 ft and <137 ft (42 m) 5—400 ft and above
 3—137 ft and <200 ft (61 m)
- (41-42) Distance from Observer:
 01—0 to 500 ft (152 m) 06—2.5k ft to 3k ft (914 m)
 02—500 ft to 1k ft (305 m) 07—3k ft to 3.5k ft (1067 m)
 03—1k ft to 1.5k ft (457 m) 08—3.5k ft to 4k ft (1219 m)
 04—1.5k ft to 2k ft (610 m) 09—4k ft to 4.5k ft (1372 m)
 05—2k ft to 2.5 ft (762 m) 10—4.5k ft to 5k ft (1524 m)
- (43) Direction of Flight (towards) : 1-N, 2-NE, 3-E, 4-SE, 5-S, 6-SW, 7-W, 8-NW
- (44) Direction of Bird(s) from observer:
 1-N (337.5-22.5°) 5-S (157.5-202.5°)
 2-NE (22.5-67.5°) 6-SW (202.5-247.5°)
 3-E (67.5-112.5°) 7-W (247.5-292.5°)
 4-SE (112.5-157.5°) 8-NW (292.5-337.5°).
- (45) Number of Observers
- (46) Observer Code: apply individual codes (e.g., a, b) consistently throughout study
- (47) Recorder Code: same code letter as used above for observer code

APPENDIX TABLE 2. Additional codes and explanations for radar observations.

- Col. (41-42) Distance to Echo:
 1—0 to 0.1 nm (185 m) 6—0.5 to 0.6 nm (1111 m)
 2—0.1 to 0.2 nm (370 m) 7—0.6 to 0.7 nm (1296 m)
 3—0.2 to 0.3 nm (556 m) 8—0.7 to 0.8 nm (1482 m)
 4—0.3 to 0.4 nm (741 m) 9—0.8 to 0.9 nm (1667 m)
 5—0.4 to 0.5 nm (926 m) 10—0.9 to 1.0 nm (1852 m)
- Col. (43) Direction of Flight (towards):
 1-N 5-S
 2-NE 6-SW
 3-E 7-W

	4-SE	8-NW
Col. (44)	Direction to Echo (from radar location):	
	1-N	5-S
	2-NE	6-SW
	3-E	7-W
	4-SE	8-NW

APPENDIX TABLE 3. Codes and explanations for dead bird searches.

Col. (2)	Type of Search: 1=wind turbine, 2=met tower, 3=power line
Col. (43)	Approximate Time of Death: 1=6-12 hrs, 2=12-24 hrs, 3=1-2 days, 4=1 week, 5=2 weeks, 6=several weeks
Col. (44)	Physical Condition: 1=broken bones, 2=lacerations, 3=abrasions, 4=bloody, 5=discolorations, 6=gun shot wounds, 7=decomposition, 8=scavenger damage
Col. (45)	Probable Cause of Death: 1=collision, 2=electrocution, 3=hunting, 4=predation, 5=unknown
Col. (46)	Necropsy: Y=yes, N=no
Col. (47)	Specimen Number: Whenever specimens are saved for future analysis.

Note: When a dead bird search is along a power line corridor, columns 36-39 are not used and columns 40-42 will indicate distance to power line in meters.

BIRD MOVEMENT OBSERVATION FORM

DEAD BIRD SEARCH FORM



Formatted for the Web by:

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Explanations of Fields on Mortality Form (Mortbase File)

- | | | |
|------------------------------------------------------------------|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Record Number | = | Sequential number starting with No. 1 (right justified) |
| 2. Species | = | Common name of bird, unknown raptor, or unknown |
| 3. Number | = | The number of dead or injured birds |
| 4. Age | = | Adult (A)
Immature (I)
Unknown (U) |
| 5. Sex | = | Male (M), Female (F), Unknown (U) |
| 6. Date Found | = | Date bird was discovered (--/--) |
| 7. Estimated time since death | = | Fresh kill - less than 2 days old (FK)
Few days - maggots starting to appear (FD)
1 week - maggots over entire body (1W)
2 weeks - flesh at least half gone (2W)
1 month - no flesh left, just bones and feathers (1M)
Over 6 months bones and feathers disassembled (6M)
Undetermined (UD) |
| 8. Cause of death | = | Collision with turbine (COLT)
Collision with wire (COLW)
Electrocution (ELEC)
Unknown (UNKN) |
| 9. Index of probability (degree of certainty for cause of death) | = | 1 thru 10 (1 = low probability, 10 high probability) |
| 10. Condition (Also describe in detail on back of sheet) | = | Dead (D)
Injured (I) |
| 11. Injuries (For both dead and alive birds) | = | Wing sheared off (WSO)
Head sheared off (HSO)
Feet sheared off (FSO)
Body sheared in half (BSH)
Multiple dismemberment (MUD)
Broken wing bone (BWB)
Broken neck bone (BNB)
Broken leg bone (BLB)
Injury to wing (ITW)
Injury to legs (ITL)
Injury to eyes (ITE)
Injury to body (ITB)
Injury to head (ITH)
Feather damage (FED)
Decomposed - body and feathers intact (DBI)
Decomposed - feathers and bones disassembled (DBD)
Decomposed - just feathers (DJF)
Decomposed - just bones (DJB)
Wing only (WGO)
Electric burns on feet (EBF)
Electric burns on wings (EBW)
Internal injuries (IIN)
Impact, then continued on (ITC) |

- Stunned (STU)
Entangled in wires (IIW)
No obvious signs (NOS)
12. Maximum distance at which bird could be observed = In feet
13. Scavenged (at time of discovery) = Yes (Y), No (N), Unknown (U)
14. Closest Structure to mortality = Wind Turbine Machine (WTM)
Power line associated with WTM (WPL)
General utility power line (GPL)
Telephone line (TPL)
Large distribution line (LDL)
Meteorological tower (MET)
15. If another type of structure is in close proximity and could have caused the mortality - list second structure = Wind Turbine Machine (WTM)
Power line associated with WTM (WPL)
General utility power line (GPL)
Telephone line (TPL)
Large distribution line (LDL)
Meteorological tower (MET)
16. Location = Land ownership (Souza)
For Biologist: Turbine site and letter (e.g., USW1 Ab)
17. WindFarm Company = Fayette, US Windpower, WindMaster, AEC, Flowind, Seawest, Altamont Energy Corp., Zond, Am. Divers.
18. WindFarm Structure Number (closest structure) = Tu (turbine) #, Tx (power pole) #
19. Is closest structure an EndRow = Yes (Y), No (N)
20. Within CEC study mortality site = Yes (Y), No (N)
21. UTM = 8 digit number
22. Distance to closest Structure = Distance (in feet) the bird was from the structure
23. Distance to second type of structure = Distance (in feet) the bird was from the structure
24. Aspect from closest structure to site of mortality = 8 point compass heading (NW, SE)
Biologists use degrees also
25. Elevation = In feet (from map)
26. Slope Angle of Hill = 0-10 degrees (1)
11-20 degrees (2)
21-30 degrees (3)
31-45 degrees (4)
over 45 degrees (5)

27. Aspect of dominant slope = 8 point compass heading (NW, SE)
28. Configuration of WTM = Vertical axis (VRA)
Three blade lattice - Downwind (3LD)
Three blade lattice - Upwind (3LU)
Two blade lattice (2BL)
Three blade - Guyed wires (3GW)
Steel Tubular - Medium (STM)
Steel Tubular - Large e.g., Howden (STL)
WindWalls (WWS)
29. Configuration of Power Pole = From enclosed diagram, choose the pole number which most closely matches. Place an X on the spots where the bird made contact with structure - there should be darkened burned areas (arcs) where contact was made. If burn marks are not obvious, circle any uninsulated wires or conductors that might have caused an electrocution.
30. Riser Pole = Yes (Y), No (N)
31. Number of lines (conductors) = One digit number
32. Number of Cross Beams (arms) = One digit number
- Beam A (top)
33. •Length = In feet
34. •Material = Wooden (WO), Metal (ME), Ceramic (CE), Metal with Wooden Braces (MW)
35. •Oriented perpendicular to prevailing wind (at estimated time of incident) = Yes (Y), No (N), Unknown (U)
36. •Number of wires that extend upward = One digit
37. •Are these wires insulated = Yes (Y), No (N), Partially (P)
38. •Are wildlife insulation caps used = Yes (Y), No (N), Partially (P)
39. •Perchability = Adequate (A), Little (L), None (N), Unknown (U)
- Beam B (middle)
40. •Length = In feet
41. •Material = Wooden (WO), Metal (ME), Ceramic (CE), Metal with Wooden Braces (MW)
42. •Oriented perpendicular to prevailing wind (at estimated time of incident) = Yes (Y), No (N), Unknown (U)
43. •Number of wires that extend upward = One digit
44. •Are these wires insulated = Yes (Y), No (N), Partially (P)
45. •Are wildlife insulation caps used = Yes (Y), No (N), Partially (P)
46. •Perchability = Adequate (A), Little (L), None (N), Unknown (U)

Beam C (bottom)

47. •Length = In feet
48. •Material = Wooden (WO), Metal (ME), Ceramic (CE), Metal with Wooden Braces (MW)
49. •Oriented perpendicular to prevailing wind (at estimated time of incident) = Yes (Y), No (N), Unknown (U)
50. •Number of wires that extend upward = One digit
51. •Are these wires insulated = Yes (Y), No (N), Partially (P)
52. •Are wildlife insulation caps used = Yes (Y), No (N), Partially (P)
53. •Perchability = Adequate (A), Little (L), None (N), Unknown (U)
54. Are all Cross Beams Parallel = Yes (Y), No (N)
55. Shortest distance between lines (conductors) = Lines more than 60 inch apart (M60)
Lines less 60 inch apart (L60)
Lines less 50 inch apart (L50)
Lines less 40 inch apart (L40)
Lines less 30 inch apart (L30)
56. Are there other manmade or natural perches available in general area (< ¼ mi) = Yes (Y), No (N)
57. Frequency of human activity = Low - roads seldom used, no building in area (L)
Medium - road use occasion, no building in area (M)
High - road use common or buildings in area (H)
58. Topography of pole site = Top of hill (T)
In valley (V)
On slope (S)
59. Configuration of Met. Towers = Wide Lattice (WL)
Narrow Lattice (NL)
Guy Wires (GW)
60. Height of Met. Tower = In feet
61. Incident Observed = Yes (Y), No (N)
- If incident observed:
62. •Time of incident = 24 hours clock
63. •Turbine operating during incidence = Yes (Y), No (N)

64. •Adjacent turbines operating = Yes (Y), No (N)
65. •Wind speed at time of incident = In MPH
66. •Describe incident in detail = On back of sheet and in memo in DBASE

If incident observed or less than 1 week old record the following information (from the time of discovery to estimated time of death):

67. •Fog = Yes (Y), No (N), Unknown (U)
68. •Rain = No (N), Light (L), Medium (M), Heavy (H), Unknown (U)
69. •Storm = Yes (Y), No (N), Unknown (U)
70. •Gusty Winds = Yes (Y), No (N)
71. •Maximum Wind Speed = In MPH (if incident was observed - record max. MPH for day of incident)
72. •Average Wind Speed = In MPH (if incident was observed - record average MPH for day of incident)
73. •Wind Direction = 8 point compass bearings - (e.g. NW). If too variable record (VAR).
74. •Percent time WTM operating - (from time of discovery to estimated time of death) = Percent

75. Other Contributing Factors (can have more than one entry) =
- Closest structure within 500 feet of large valley (SNV)
 - Closest structure within 500 feet of trees (SNT)
 - Closest structure within 500 feet of wetland or water (SNW)
 - Closest structure within 500 feet of large drainage or canyon (SNC)
 - Closest structure within 500 feet of large transmission line (SLT)
 - First row in area (FRA)
 - Line parallels road (LPR)
 - Starvation, weakened condition (STA)
 - Pesticide poisoning (PPP)

76. Index of Structure Density (within 500 feet of closest structure - includes closest structure row) =
- Isolated structure (1)
 - Short row of structures <4 - [turbines or transmission lines] (2)
 - One row of structures [turbine or transmission lines] (3)
 - One row of structures and one single structure [i.e. met tower] (4)
 - Two rows of structures (5)
 - Two rows of structures and one single structure (6)
 - Three rows of structures (7)
 - Three rows of structures and one single structure (8)
 - Four rows of structures (9)
 - Four rows of structures and one single structure (10)

Five rows of structures (11)
 Five rows of structures and one single structure (12)
 Six rows of structures (13)
 Six rows of structures and one single structure (14)

77. Number of isolated structures -
 i.e., met towers (within 500
 feet of closest structure) = Number
78. Number of turbines rows
 (within 500 feet of
 closest structure) = Number (includes the row in which the mortality was found)
79. Number of transmission
 rows (within 500 feet
 of closest structure) = Number (includes the row in which the mortality was found)
80. Total number of isolated
 structures or rows (from
 above three fields) = Number
81. Are structure rows all
 parallel = Yes (Y), No (N)
82. Distance from closest
 structure to next closest
 row or isolated structure = In feet
83. Index of ground squirrel
 density (within 500 feet
 of closest structure) =
 None (1)
 Few (2)
 Scattered (3)
 Common (4)
 Abundant (5)
84. Percent of ground surface
 area with squirrel burrows
 (within 500 feet
 of closest structure) = Percent
85. Nearest ground squirrel
 colony = In feet
86. Direction of nearest
 ground squirrel colony = 8 point compass heading (NW,SE)
87. Nearest open valley
 (flat area) =
 1-250 feet (1)
 250-500 feet (2)
 500 ft - ¼ mi (3)
 ¼ mi - ½ mi (4)
 Over ½ mi (5)
88. Direction of nearest valley
 (only if < ¼ mi away) = 8 point compass heading (NW,SE)
89. Index of ground squirrel
 density within nearest valley
 (only if < ¼ mi away) = None (1)

- Few (2)
 Scattered (3)
 Common (4)
 Abundant (5)
90. Nearest Trees = 1-250 feet (1)
 250-500 feet (2)
 500 ft - ¼ mi (3)
 ½ mi - ¾ mi (4)
 Over ¾ mi (5)
91. Direction of trees (only if < ¼ mi away) = 8 point compass heading (NW, SE)
92. Nearest Water (pond, wetland) = 1-250 feet (1)
 250-500 feet (2)
 500 ft - ¼ mi (3)
 ½ mi - ¾ mi (4)
 Over ¾ mi (5)
93. Direction of water (only if < ¼ mi) = 8 point compass heading (NW, SE)
94. Nearest Canyon = 1-250 feet (1)
 250-500 feet (2)
 500 ft - ¼ mi (3)
 ½ mi - ¾ mi (4)
 Over ¾ mi (5)
95. Direction of nearest canyon (only if < ¼ mi away) = 8 point compass heading (NW,SE)
96. Report Completed By = Initials of person completing this form
97. Source of Information = Person that discovered the bird (full name)
98. Did this incident cause a site event (feeder trip, blown fuse, etc.) = Yes (Y), No (N), Unknown (U)
99. Name of Rehabilitation Center (if used) = Type name of center
100. Ultimate disposition of bird sent to rehab. = Dead (D)
 Euthanized (E)
 Released (R)
101. Name of wildlife agency or person contacted = Type name of person or agency
102. Comments = Place on back of sheet (In memo in dBASE)

Route Observer	A (Southern Route) or B (Northern Route) Personal Initials	Distance to Observer at First Observation	At 200-foot intervals See scale below: 200 ft. = 1/8 in. 1000 ft. = 1/2 in. 2000 ft. = 1 in.
Foggy	Yes/No and describe in Notes		
Cloud Cover	Estimated %		
Temperature	°F		
Wind Direction	Alpha 8-Point Compass Heading (e.g., NW)	Height Above Ground at First Observation	0 - On Ground
Site #	1-40		1 - 1-50 ft
Observation #	Each bird sighted is numbered sequentially. (Map)		2 - 50-100 ft
			3 - 100-200 ft
			4 - 200-300 ft
			5 - >300 ft
Military Time	At start of 10-minute interval	Distance to Closest Structure at First Observation	0 - On Structure
Species Abbrev.	AK - American kestrel		1 - 1-50 ft
	BAO - Barn owl	Type of Structure (Add "+" to symbol if turbine in running)	2 - 50-100 ft
	BE - Bald eagle		3 - 100-200 ft
	BO - Burrowing owl	Direction of Movement (For Obvious Flybys Only)	4 - 200-300 ft
	CH - Cooper's hawk		5 - >300 ft
	FH - Ferruginous hawk	Notes	TU - Turbine
	GE - Golden eagle		TX - Transmission Line
	GH - Goshawk		MT - Meteorological Tower
	GBH - Great blue heron		
	GHO - Great horned owl		Alpha 8-Point Compass Heading
	NH - Northern harrier		
	MER - Merlin		
	OSP - Osprey		
	PR - Prairie falcon		
	PGF - Peregrine falcon		
	RAV - Raven		
	RLH - Rough-legged hawk		
	RSH - Red-shouldered hawk		
	RTH - Red-tailed hawk		
	SEO - Short-eared owl		
	SSH - Sharp-shinned hawk		
	SWH - Swainson's hawk		
	TV - Turkey vulture		
	WTK - White-tailed kite		
General codes:			
	ACC - Accipiters		
	BUT - Buteos		
	DU - Duck		
	EAG - Eagles		
	FAL - Falcons		
	GE - Geese		
	UID - Unidentified		
Ageclass			
	A - Adult		
	I - Immature		
	U - Undetermined		

Remember to include description of fog

BIRD UTILIZATION COUNT VARIABLES (CEC 4/12/96)

spp. list: Species List: Mark this space when the birds on this sheet have been checked off on the cumulative species list.

check1: First Quality Check: Mark this space when the original data on this sheet has been checked by someone other than the original observer.

comp: Entered Into Computer: Mark this space when the original data on this sheet has been entered into D-Base on the computer. Write "A", "B", or "C" for corresponding computer file.

check2: Second Quality Check: Mark this space when the original data from this sheet has been entered into the computer, printed out, and checked by someone.

map: Mapped: Mark this space when this transect has been mapped out.

Date: month/day

Transect #: Transect Number: #001-?

Start Pt.: Starting Point of the transect.

Angle: Random angle taken from the starting point (magnetic bearing) through wind resource area.

Obs: Observer
 1 = Dick Anderson 2 = Natasha Neumann
 3 = Jennifer Noone 4 = Judy Tom
 5 = Michele Disney 6 = John Cleckler

Company/Area:
 100 = Zond
 110 = near Zond - Zond side of Cameron Rd.
 120 = West of Zond - between TWS Rd. and Zond.
 200 = Cannon
 210 = near Cannon - Cannon side of Cameron Rd.
 220 = area between Cannon and Sea West
 300 = Sea West
 310 = near Sea West
 400 = FloWind

Precip: Precipitation. ie. 331 = hard rain all day.

100 = no information
 200 = no precipitation
 300 = rain - no other info.
 310 = sprinkle/mist
 320 = moderate
 330 = hard
 400 = snow - no other info.
 410 = < 4"
 420 = > 4" but ≤ 12"
 430 = > 12"

rain/snow duration:
 001 = all day
 002 = part of day
 003 = most of day
 004 = off and on all day
 007 = rains and quits - include comments on hours.

Fog: 10 = no information
 20 = no fog
 30 = light fog
 40 = dense (visibility < 100m)

fog duration:
 01 = all day
 04 = part of day
 07 = most of day

Cloud: Cloud Cover.
 10 = no information
 20 = clear
 30 = partly cloudy (>15% cloud cover) - no other info
 40 = overcast - no other info. (>80%)

partly cloudy/overcast duration:
 01 = all day
 02 = part of day
 03 = most of day

Sloc: Sublocation: Each count along transect.
 (m) = Distance from start point in meters.

TDst: Turbine Distance: The distance(m) between the sublocation and the nearest turbine. Follow the general contour of the landscape. See protocol for exceptions and examples. Note: Do not include guy wires of vert. axis turbines in TDst.

10 = 0-20m	80 = >1km (if not more specific)
20 = 21-40m	81 = >1k-1.5km
30 = 41-60m	82 = >1.5-2km
40 = 61-100m	83 = >2km
50 = 101-200m	99 = no information
60 = 201-400m	
70 = 401m-1km (if not more specific)	
71 = 401-600m	
72 = 601-800m	
73 = 801m-1km	

Op.: Operating. Are turbines within 200m operating?
 1 = yes 2 = no 3 = not applicable

Str.11D: First Structure Identification: Description of the closest structure within a 200m radius of the sublocation. Note: Use distance to electrical line itself and number of electrical poles for density. Use in reference to codes 4, 5, 6, & 7.

1 = lattice wind turbine
 2 = tubular wind turbine
 3 = vertical axis wind turbine
 4 = distribution line assoc. w/ wind turbine. (usu. 1 wood pole, alum. lines)
 5 = general distribution line
 6 = telephone line (mult. lines in 1 cable)
 7 = large transmission line (usu. metal/mult. wood (H-config.) poles)
 8 = meteorological tower
 9 = road - include well traveled roads with vehicles generally traveling ≥ 35mph. Do not include less-traveled dirt roads even if there are no other structures within 200m.
 10 = other human made structure - i.d. in space. Include fences if no other main structures (ie. turbines, powerlines, met. towers, main roads, and substations) are within 200m
 11 = none in sight (use dst. & dens. code #99)
 12 = substation
 13 = none (use code "0" for dist.& dens)
 14 = no information (use dst. & dens. code #99)

Str.1Dst: First Structure Distance: Distance between the closest structure and sublocation. Use same codes for T.Dst.

Dens1: Density of first structure: Total number of structure 1 within 100m(1) and 200m(2) of sublocation. For fences and roads, just count each continuous string as one.
 c = # structures 99 = no information

Str.21D & Str.31D: Secondary & Tertiary Structure Identification: Description of any secondary or tertiary structure in the area. Use same codes used for Str.11D.

Str.2Dst & Str.3Dst: Distance between the secondary and tertiary structures and sublocation. Use same codes for TDst.

Density: Total number of secondary or tertiary structure within 100m(1) and 200m(2) of the sublocation. Use same codes used for Dens1.

NCom: Natural Community within a 50m radius of the sublocation. Abbreviations in parenthesis.

- 2 = high desert sub-shrub scrub (HDSSS)
- 3 = annual grassland with component of sub-shrub scrub (AGSSS)
- 4 = oak woodland (OW)
- 6 = hard wood/conifer area (HWCA)
- 7 = other - include description
- 8 = Joshua tree woodland (JTW)
- 9 = high desert sub-shrub scrub with a few (<8) Joshua trees (HDSSSJT)
- 10 = annual grassland (AG)
- 11 = annual grassland with a few (<30% canopy cover) trees (AGT)
- 12 = scruboak chaparral (SC)
- 13 = chaparral/juniper (CJ)
- 14 = high desert sub-shrub scrub with juniper component (HDSSSJ)
- 15 = riparian (R)
- 16 = perennial grassland (PG)
- 17 = perennial grass w/sub-shrub scrub (PGSSS)
- 18 = grassland
- 20 = no information/unknown

Topog: Topography of the sublocation. Use same codes for topography of area which each bird is flying over.

- 10 = ridgetop (top of main ridge - Zond, Cannon, Flowind)
- 20 = midslope (areas between main ridge, not including bottom of valleys)
- 30 = valley (bottom of canyon/ravine) - no more information
- 31 = valley - <0.1 km wide
- 32 = valley - >0.1, <0.5 km wide
- 33 = valley - >0.5km
- 40 = unknown
- 50 = flat - open land (Mohave, Tehachapi Valley)

Incline: Incline of the sublocation within 50m. Use same codes for incline of area which each bird is flying over.

- 1 = steep (>30°)
- 2 = moderate (5°-30°)
- 3 = flat (<5°)
- 4 = unknown

Ip: Temperature at each sublocation in °F.
999 = no information

WdSp: Wind Speed. Use (Beaufort scale + 1) x 10:

- (c) = code for wind.
- 10 = calm = 0-1mph
- 20 = light air = 1-3mph
- 30 = light breeze = 4-7mph
- 40 = gentle breeze = 8-12mph
- 50 = mod. breeze = 12-18mph
- 60 = fresh breeze = 19-24mph
- 70 = strong breeze = 25-31mph
- 80 = mod. gale = 32-38 mph
- 90 = fresh gale = 39-46mph
- 100 = strong gale = 47-54mph
- 110 = whole gale = 55-63mph
- 120 = storm = 64-72mph
- 130 = 72+mph
- 140 = no information

Is the wind constant or gusty?

ie. 102 = a gusty strong gale; 10 = calm wind and no other info.

- 01 = constant
- 02 = gusty
- 03 = variable

WDir: Wind Direction: Circle the direction from which the wind is coming. (c) = the number code.

- | | |
|--------------------|----------------|
| 0 = no information | 5 = South |
| 1 = North | 6 = South-West |
| 2 = North-East | 7 = West |
| 3 = East | 8 = North-West |
| 4 = South-East | 9 = no wind |

Start: Time that count was started, recorded in military (24-hour) time. Start as soon as possible when you hit your sublocation. If you flush a bird out at ≤ 10m from your next sublocation as you are walking towards your next point, include this bird in your count and start your count time at that moment.

Species: The 4-letter acronym for the bird species detected at the sublocation. See bird code list.

#: Number of a certain species at the sublocation which are doing a similar activity.

Dt: Closest distance (as it follows the general contour of the topography) of the area the bird is flying over from the center of the sublocation during the 5 min. count: Use same codes used for structure distance. See protocol for exceptions and examples.

Ht: Height bird is seen from ground. Actual estimated height. Write comments that may help you to code as detailed as possible. Put general height information (100 series) in the first column. Put more specific codes (200 & 300 series) regarding wind turbines/conductors in the second column.

100 general height - no info. (use in 1st column)

- 110 = <1m above ground
- 120 = 1-10m above ground
- 130 = 11-50m " "
- 140 = 51-100m " "
- 150 = 100+m " "

If bird flies near significant human-made obstructions excluding turbines and conductors, use:

001 = near other obstructions - describe in comments

200 = in reference to turbines within 50m of bird. Use if no info in 2nd column.

210 = flying through blades/perched on blades/horiz. blade wires (vert. axis turb.) - *also note in comments

220 = within 25% of blade length

230 = within 100% of blade length

240 = within blade height

Angle at which bird(s) are flying when near turbine(s): ie. 241 = bird(s) flying within blade height perpendicular to blades.

001 = parallel (0 - 45°)

002 = perpendicular (46 - 90°)

003 = perpendicular-upwind

004 = perpendicular-downwind

300 = in reference to conductors within 50m of bird.

310 = flying through conductors/perched - *also note in comments

320 = within 3m above/below conductors

330 = within conductor height

MORE ON BACK

the bird(s) identified. If the behavior changes significantly as it is closest to turbines, then record that behavior. If other interesting behavior occurs further from turbines then record that behavior in comments.

10 = other - specify in comments (ie. avoidance of blades, etc.)

20 = soaring

30 = flapping

40 = eating /foraging

50 = perching on ground

51 = " " on vegetation

52 = " " on lattice wind turbine

53 = " " on tubular wind turbine

54 = " " on power pole

55 = " " on conductor

56 = " " on other human-made structure - identify in comments

57 = " " on vertical axis wind turbine

58 = " " on guy wire of vertical axis turbine

60 = gliding

70 = diving

For flying behavior include the following if possible.

01 = into wind (upward)

02 = downwind

03 = crosswind

NCom: Natural Community within a 50m radius of the point the bird is flying over.

WRA: 1st Column: Is bird flying within a cylinder with an ~200m radius that includes or borders a wind resource area (any wind turbine)?

1 = yes

2 = no

3 = unknown

2nd Column: The closest distance (as it follows the general contour of the topography) a bird gets to a turbine within that 5 min. count. See protocol for exceptions & examples. Use codes for TDst. Note: Do not include guy wires of vert. axis turbines in TDst.

Dur.: Duration: How long each bird or group of birds remain in the area.

| = 0-1 min.; || = 1-2 min.; ||| = 2-3 min.

|||| = 3-4 min.; ||||| = 4-5 min.

(c) = code # (1-5) that corresponds with the number of tick marks.

Comments/Map: Any comments not covered by codes. Also note if significant changes in weather occur. Note any bats flying in area whether or not during point count. Include a map to help map transect if needed.

Dd.#: Number of mortality records (dead/injured birds and/or solitary feather(s)) found within a 50m radius of the sublocation.

c = # mortality records

Mort.Rec.#: Mortality Record Numbers within that sublocation. Use #9999 if no mortality records.

Scavenging Study#: 01-?Company/Area:

- 100 = Zond
 110 = near Zond - Zond side of Cameron Rd
 120 = West of Zond - between TWS Rd. & Zond
 200 = Cannon
 210 = near Cannon - Cannon side of Cameron Rd.
 220 = area between Cannon & Sea West
 300 = Sea West
 310 = near Sea West
 400 = FloWind

OBS: Observer

- 1 = Dick Anderson
 2 = Natasha Neumann
 3 = Jennifer Noone
 4 = Judy Tom
 5 = Michele Disney
 6 = John Cleckler

Date: month/day

Note: Take weather information at the beginning of each scavenging check

Time: Time at which weather information is taken.

Temp.: Temperature from the thermometer (F).

Wind: Use (Beaufort scale + 1) X 10. Obtain information from wind energy companies.

- 10 = calm = 0-1mph
 20 = light air = 1-3mph
 30 = light breeze = 4-7 mph
 40 = gentle breeze = 8-12 mph
 50 = mod. breeze = 13-18 mph
 60 = fresh breeze = 19-24 mph
 70 = strong breeze = 25-31 mph
 80 = mod.gale = 25-31 mph
 90 = fresh gale = 32-38 mph
 100 = strong gale = 47-54 mph
 110 = whole gale = 55-65 mph
 120 = storm = 66-72 mph
 130 = 72+ mph

Is the wind constant or gusty?
 ie. 31 = a constant light breeze; 102 = a gusty strong gale

- 01 = constant
 02 = gusty
 03 = variable

Cloud: Cloud Cover. Best estimation

- 10 = no information
 20 = clear
 30 = partly cloudy (>15% cloud cover)-
 no other info.
 40 = overcast (> 80%)- no other info.

Precip.: Precipitation.

- 100 = no information
 200 = no precipitation
 300 = rain - no other info.
 310 = sprinkle/mist
 320 = moderate
 330 = hard
 400 = snow (amount presently on ground) - no other info.
 410 = < 4"
 420 = ≥ 4" but ≤ 12"
 430 = > 12"

Fog:

- 10 = no information
 20 = no fog
 30 = light
 40 = dense (visibility < 100m)

At the bottom of the page. Note any weather changes you feel are significantly different from those recorded (ie. storm comes in on an otherwise sunny day).

Moon:

- 10 = ● new
 20 = ◐ first quarter
 30 = ○ full
 40 = ◑ last quarter

Time & Cond.: See time and condition further down column.

Site#: The site number assigned to where the bird was placed.

Band#: Band placed on dead bird for scavenging study: 001-60.

Sp: Species: 4-letter acronym for the bird species. See list of acronyms for local Tehachapi bird species. Use CHIC for domestic chicken.

Size: Bird Size:

- 1 = small (ie. sparrow, chick)
 2 = medium (ie. dove, kestrel)
 3 = large (ie. raven, hawk, chicken)

Time: Use military (24-hour) time.

Condition:

State of bird:

- 10 = not scavenged
 20 = partially scavenged
 30 = removed + scavenged/found
 40 = removed/not found

Scavenged by: ie. 21 = partially scavenged by insects

- 00 = no other scavenging info.
 01 = insects
 02 = rodent
 03 = mammalian carnivores
 04 = non-raptor birds (crow/raven)
 05 = raptors

Comments: Include specific comments regarding the condition of the bird as needed.

_____ scavenging study #

SCAVENGING STUDY 1996

Company/Area _____ (c) _____ OBS _____ (c) _____

pg. of

Back 1
mp
Back 2

Date	am	pm														
Time																
Temp.																
Wind																
Cloud																
Precip.																
Fog																
Moon																

SITE#: _____
 Spp: _____
 Size: _____
 Bd#: _____

Time _____
 Cond. _____
 Comments: _____

SITE#: _____
 Spp: _____
 Size: _____
 Bd#: _____

Time _____
 Cond. _____
 Comments: _____

SITE#: _____
 Spp: _____
 Size: _____
 Bd#: _____

Time _____
 Cond. _____
 Comments: _____

SITE#: _____
 Spp: _____
 Size: _____
 Bd#: _____

Time _____
 Cond. _____
 Comments: _____

SITE#: _____
 Spp: _____
 Size: _____
 Bd#: _____

Time _____
 Cond. _____
 Comments: _____

Scavenging Study#: 001-?

Date: month/day bird is set out.

Obs: Observer.

- | | |
|---------------------|--------------------|
| 1 = Dick Anderson | 4 = Judy Tom |
| 2 = Natasha Neumann | 5 = Michele Disney |
| 3 = Jennifer Noone | 6 = John Cleckler |

Comp/Area: Company/Area

- 100 = Zond
- 110 = near Zond - Zond side of Cameron Rd.
- 120 = West of Zond - between TWS & Zond
- 200 = Cannon
- 210 = near Cannon - Cannon side of Cameron Rd.
- 220 = area between Cannon & Sea West
- 300 = Sea West
- 310 = near Sea West - East or South of S.W.
- 400 = Flowind

Site #: Assign this site a number that is preceded with the company's first letter(s). Begin with #1-? for each scavenging study and each area. ie. The first Sea West site in scavenging study #007 = SW1.

Band #: Band number placed on dead bird for scavenging study: 001-600.

Sp: Species: the 4-letter acronym for the bird species. See codes for Tehachapi bird species. Use CHIC if domestic chickens used. After "/" put the size code.

- 1 = small (ie. sparrow, chick)
- 2 = medium (ie. dove, kestrel)
- 3 = large (ie. raven, hawk, chicken)

Time: Time when bird is set out. Use military (24-hour) time.

NCCom: Natural Community. Include abbreviations with code - quick reference.

- 2 = high desert sub-shrub scrub (HDSSS)
- 3 = annual grassland with component of sub-shrub-scrub (AGSSS)
- 4 = oak woodland (OW)
- 6 = hard wood/conifer area (HWCA)
- 7 = other - include description
- 8 = Joshua Tree Woodland (JTW) (>8 Joshua tree clumps)
- 9 = high desert sub-shrub-scrub with a few Joshua trees (<8 Joshua tree clumps) (HDSSSJT)
- 10 = annual grassland (AG)
- 11 = annual grassland with a few (<30% canopy cover) trees (AGT)
- 12 = scruboak chapparal (SC)
- 13 = chapparal/juniper (CJ)
- 14 = high desert sub-shrub scrub w/juniper component (HDSSSJ)
- 15 = riparian (R)
- 16 = perennial grassland (PG)
- 17 = perennial grassland w/sub-shrub-scrub (PGSSS)
- 18 = grassland (G) - no other info.
- 20 = no information/unknown

TDst: Turbine Distance: The distance(m) between the bird and the nearest turbine.

- | | |
|-------------------------------------|----------------------------------|
| 10 = 0-20m | 80 = >1km (if not more specific) |
| 20 = 21-40m | 81 = >1-1.5km |
| 30 = 41-60m | 82 = >1.5-2km |
| 40 = 61-100m | 83 = >2km |
| 50 = 101-200m | 99 = no information |
| 60 = 201-400m | |
| 70 = 401-1km (if not more specific) | |
| 71 = 401-600m | |
| 72 = 601-800m | |
| 73 = 801-1km | |

Str1ID: First Structure Identification: Description of the closest significant structure (# 1-9, #12) within a 200m radius of the bird. **NOTE 1:** Include lightly used roads and/or fences in structure i.d. spaces only if other structures (#1-9, #12) do not fill up all of the 3 structure identifications. **NOTE 2:** If other types of turbines w/in 200m are not accounted for in structure i.d. spaces, include descript., dens., and dist. for each type in comments

- 1 = lattice wind turbine
- 2 = tubular wind turbine
- 3 = vertical axis wind turbine
- 4 = distribution line assoc. w/wind turbine (usu. 1 wood pole, alum. lines)
- 5 = general distribution line
- 6 = telephone line (mult. lines in 1 cable)
- 7 = large transmission line (usu. metal/mult. wood configuration poles)
- 8 = meteorological tower
- 9 = heavily used road - paved or dirt with vehicles usu. traveling at > 35 mph (ie main entrance road to Zond.)
- 10 = other human-made structure (ie. fence - see note above) - i.d. in space
- 11 = none in site (use dst. & dns. code #99)
- 12 = substation
- 13 = none (use code "0" for dist. & dens.)
- 14 = no information/unknown (use dst. & dns. code #99)
- 15 = moderate-lightly used road - usually dirt roads (see note above)

Str1Dst: First Structure Distance: Distance between the closest structure and the bird. Use same codes for TDst.

Str1Dns: Density of first structure : total number of structure #1 within 100m(1) and 200m(2).
c = # structures 99 = no information

Str2ID & Str3ID: Secondary & Tertiary Structure Identification: Description of any secondary/tertiary structures in the area. Use same codes used for Str1ID.

Str2Dst & Str3Dst: Distance between the secondary/tertiary structures and bird. Use same codes for TDst.

Str2Dns & Str3Dns: Secondary & Tertiary Structure Density: Total number of secondary/tertiary structures within 100m(1) and 200m(2). Use same codes used for Dens1.

Bird Loc.: Bird Location. Place a bird within the area you are studying. Identify the closest and easiest identifiable landmark (ie. turbine, fork in road, Joshua tree, etc.) to find the bird. Include identification numbers for turbines, roads, etc. Record distance in meters and/or paces and the magnetic bearing of the direction that the bird is located from the landmark. Do not use codes in this space.

Flag Loc.: Flag Location. Place the pin flag 10 m at magnetic north of the bird. Record meters and/or paces used.

Flag Color: The color of the pin flag.

Comments: Include any comments that may help locate the bird and/or describe significant points regarding its original condition.

Map: Map out the location of the birds while labeling significant landmarks, degrees, meters, paces, the direction of magnetic north, etc.

Example:

Site#	Bd#:	Spp: /	Time:	NCom:	(c)	TDst:	(c)	Str1ID:	(c)
	Str1Dst:	(c)	Str1Dns: (1)	(2)	Str2ID:	(c)	Str2Dst:	(c)	
	Str2Dns: (1)	(2)	Str3ID:	(c)	Str3Dst:	(c)	Str3Dns: (1)	(2)	
Loc:					Flag Loc:	Flag Color:			

& Comments:

Site#	Bd#:	Spp: /	Time:	NCom:	(c)	TDst:	(c)	Str1ID:	(c)
	Str1Dst:	(c)	Str1Dns: (1)	(2)	Str2ID:	(c)	Str2Dst:	(c)	
	Str2Dns: (1)	(2)	Str3ID:	(c)	Str3Dst:	(c)	Str3Dns: (1)	(2)	
Loc:					Flag Loc:	Flag Color:			

& Comments:

check 1 comp check 2

OBSERVER BIAS STUDY
1996

DATE: ____ / ____

OBSERVER: _____ (c) ____

NCom. Type: ____ (c) ____

SITE #: ____

ORDER: 1st 2nd 3rd

COMPANY: _____ (c) ____

TIME: Start _____ End _____

Bird Mortality Sign Description (small = \leq 8 in.; large = $>$ 8 in.)
Distance at which sign was first observed

	sm	lg	dist.
1.			
2.			
3.			
4.			
5.			
6.			

	sm	lg	dist.
7.			
8.			
9.			

	sm	lg	dist.
10.			
11.			
12.			

